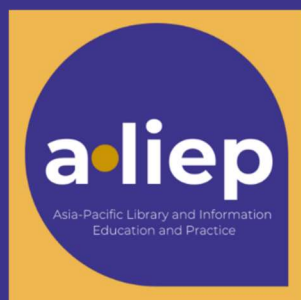


# 2023 ASIA PACIFIC LIBRARY AND INFORMATION EDUCATION AND PRACTICE

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## Conference Proceedings



## ABOUT THE CONFERENCE

# The 11th A-LIEP conference theme: LIS Education, Research, and Practice: Resiliency, Equity, and Solidarity

This conference focuses on the challenges, opportunities, drivers and innovations in LIS education, research, and practice that were experienced and encountered by individuals and institutions to adapt and survive the recent pandemic and moving forward to the post-pandemic. The implementation of remote teaching and learning, application of alternative research methods, and dependency on online information services has brought about issues in inequalities of information access and use, injustices and abuses in creation and dissemination of information, misinformation, censorship, and control of the narrative by the powerful. On the other hand new practices and processes have emerged and alternative research and teaching methods have been effected during these times that showed the resilience of the field, the educators, researchers and practitioners. The conference provides the venue for the discussion of such issues, realizations, and innovations the context of information use, information professions, libraries, LIS education, and LIS research. The conference is an on-site face to face event, however, options to join and present online for those who cannot attend onsite will be available.

# *Tracks and Integration Sessions*

The conference features full and short research paper presentations on the following main topics/themes: **LIS Education**, **LIS Practice**, and **LIS Research**. There are two integration sessions and these are: a) Education and Pedagogy Panel and b) Student Research Ideathon where students can discuss potential research projects, collaborate, and learn from one another.

The track on Education and Pedagogy, which was introduced in 2021, provides a venue for discussions relating to pedagogy, curriculum, tenure, promotion, and other matters relating to LIS educators and teaching. This year's conference features two Education and Pedagogy Panels, one is entitled *Archival Education and Training in Southeast Asia: A Panel Discussion*, and the other is entitled *Librarians as Partners in Consumer Health Information: A Panel Discussion on Strengthening Health Literacy Instruction in the LIS Curriculum*.

The Student Research Ideathon is a venue where students can participate and exchange ideas on how to draft research proposals and conduct research. This can be an opportunity for students to get research collaborators, or suggestions for improvement of their proposals, or ideas for their future research.

## *Conference Host*

National Taiwan Normal University (NTNU) is a prestigious institution of higher education located in Taipei, Taiwan. Established in 1946, NTNU has a long-standing reputation for excellence in education, particularly in the fields of teacher training and humanities. The university offers a wide range of undergraduate and graduate programs, attracting students from across Taiwan and around the world. NTNU's commitment to academic rigor, innovation, and cultural diversity has made it a leading institution in Taiwan's educational landscape. With its beautiful campus, vibrant student life, and dedicated faculty, NTNU provides a conducive environment for students to pursue their intellectual and personal growth.

This is the second time that A-LIEP Conference is held in the beautiful country of Taiwan. The first one was during the 2nd A-LIEP Conference held at the International Conference Hall, Management Building, Shih-Hsin University, Taipei on 23-24 November 2007. The theme was Advancing Library and Information Education in Asian Countries: Convergence and Cooperation in Information and Communication Sciences.

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# Conference Sessions

## Session 1: Organization of Data, Information, and Knowledge

Chair: Rhea Rowena U. Apolinario

- **ALIEP 1-1** *Modeling the Information Structure of Sociology Research Papers That Focus on Developing Theory, Model or Instrument: Analysis of the Abstract and Introduction Sections* (**ONSITE**)  
(Wei-Ning Cheng and Christopher S.G. Khoo)
- **ALIEP 1-2** *Comparing the Research Landscapes of Two Educational Research Institutions in Asia: A Preliminary Analysis of Journal Submissions, Author Keywords, and ERIC Categorization* (**ONSITE**)  
(Shun-Hong Sie and Guangyuan Sun)
- **ALIEP 1-3** *Long-term Progress of DOI Links on Wikipedia: Comparative Analysis of English and Japanese Wikipedia from 2015 to 2023* (**ONSITE**)  
(Jiro Kikkawa, Masao Takaku and Fuyuki Yoshikane)
- **ALIEP 1-4** *User Study of a Knowledge Graph Visualization Interface to a Digital Archive Collection: Initial Results* (**ONSITE**)  
(Christopher S.G. Khoo, Linyi Guo and Eleanor A.L. Tan)

## Session 2: Information Seeking and Information Behavior

Chair: John Hickok

- **ALIEP 2-1** *Psychological Mechanisms of Information Seeking Initiation in Online Learning: Focus on Resilience, Self-Regulated Learning Strategies, and Active Class Attitudes* (**ONSITE**)  
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- **ALIEP 2-2** *Relationships among Causation, Coping Strategies, and Information-Seeking Strategies Regarding Perceived Lack of Understanding in Learning* (**ONSITE**)  
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- **ALIEP 2-3** *Pet Parents on Spotlight: Information Behavior of Filipino Pet Owners* (**ONSITE**)  
(Dominique De Guzman)
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(Simon Philip Sacramento, Clark Anthony Trovela and Ian Dominic Sipin)

## Session 3: Information literacy, Digital literacy, Data literacy, Media literacy

Chair: April Manabat

- **ALIEP 3-1** *The Level of Awareness on Plagiarism and Impact of Anti-Plagiarism Tools of Senior High School Students Taking the Academic Track* (**ONSITE**)  
(Francis Kim Tanay and Rhea Rowena Apolinario)
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## Session 4: Pedagogy Panel 1

- **ALIEP 4-1** *Archival Education and Training in Southeast Asia: A Panel Discussion* (**ONSITE**)  
(Iyra Buenrostro-Cabbab, Naya Sucha-Xaya and Nordiana Mohd Nordin)

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## Chair: Iyra Buenrostro-Cabbab

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(Chen Su-may Sheih and Hsin-Tzu Hu)
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- **ALIEP 5-4** *Adaptation of Thai GLAMs Amidst the COVID-19 Pandemic* (**ONSITE**)  
(Saowapha Limwichitr)

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(Dan Anthony Dorado)
- **ALIEP 6-3** *An Exploratory Study on the Application of Transformer Models in Library and Information Science Based on Literature Review* (**ONLINE**)  
(Huei-Yu Wang and Hao-Ren Ke)

## Session 7: Service Design and Design Thinking in Libraries

### Chair: Ian Dominic Sipin

- **ALIEP 7-1** *The Development of Learning Spaces in University Libraries Based on Changing User Needs* (**ONSITE**)  
(Yue Hu)
- **ALIEP 7-2** *From Repository to Experience: Speculative Design for the Affective Intelligent Library* (**ONSITE**)  
(Han Chung and Ko-Chiu Wu)
- **ALIEP 7-3** *An Exploratory Study of Emotional-Healing Audiovisual Works: The Case of Taiwanese Librarian with Emotional Exhaustion* (**ONSITE**)  
(Chen Su-may Sheih and Mei-Fang Tsai)

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- **ALIEP 8-1** *Librarians as Partners in Consumer Health Information: A Panel Discussion on Strengthening Health Literacy Instruction in the LIS Curriculum* (**ONSITE**)  
(Mark Anthony Santos, Yhna Therese Santos and Kathleen Lourdes Obille)

## Session 9: Information Institutions, Their Collections and Services

### Chair: Naya Sucha-xaya

- **ALIEP 9-1** *Descriptive study of universities' attributes and their library collections: Focusing on the prices of books and social science collections* (**ONSITE**)  
(Shohei Yamada)

- **ALIEP 9-2** *Information Management of Woven Fabrics in Karen Community in the North of Thailand* (**ONSITE**)  
(Piyapat Jarusawat)
- **ALIEP 9-3** *The Great InfoHunt: A narrative analysis of the University Library, UP Diliman' s first library gamification program based on the experiences of the ISAIS librarians* (**ONSITE**)  
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- **ALIEP 9-4** *Understanding the Lived Experiences of Displaced Library Workers during the Pandemic using the CHIME Framework* (**ONSITE**)  
(Faye Labiano and Aiza May Palaya)

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Chair: Songphan Choemprayong

- **ALIEP 10-1** *The Status of Data and the Role of Descriptions in LIS: Diagnosing Pseudo-scientific Approaches related to the Use of Statistics* (**ONLINE**)  
(Kyo Kageura)
- **ALIEP 10-2** *Developing Teaching Material on Health Literacy: Formative Assessment* (**ONSITE**)  
(Makiko Miwa, Masae Sato, Yumi Yamashita, Yukie Isobe and Yumiko Abe)
- **ALIEP 10-3** *The Handbook as Hardware: An Analysis of the Pedagogical Utility of the #MIL4Democracy Handbook in Media and Information Literacy Instruction* (**ONSITE**)  
(Yhna Therese Santos, Irish Jane Talusan and Gerard Martin Suarez)

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# Modeling the Information Structure of Sociology Research Papers That Focus on Developing Theory, Model or Instrument

## Analysis of the Abstract and Introduction Sections

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### ABSTRACT

*Background.* Different types of research have different argument structures and information structures in the research paper. A research semantic frame is an information-structure template that indicates types of information that are expected in the research objective and research result statements in the paper.

*Objectives.* This study sought to identify the common information structures found in sociology research papers, focusing on research that sought to develop, improve or evaluate a theory, model, method or instrument. Such research studies can be called Development and Evaluation research.

*Methods.* Twenty sociology journal articles reporting Development and Evaluation research were selected for this study, and their Abstract and Introduction sections were analyzed to identify types of information roles and information structure patterns. These articles were sampled from ten sociology journals with the highest impact factor in InCites Journal Citation Reports.

*Results.* This study focused on the features of three research semantic frames or information-structure templates: the *Development and Evaluation frame*, the *Theory/model/framework frame*, and the *Measurement frame*. The results indicate that the focal frame (Development and Evaluation frame) is linked to other frames in different ways in order to represent a coherent information structure and argument structure.

*Contributions.* The information structures in Development and Evaluation research papers exhibit different link patterns (i.e., relations between semantic frames) that should be reflected in the knowledge representation of social science research papers in the form of scientific knowledge graphs.

### INTRODUCTION

This study is part of a series of research studies analyzing the argument and information structures of sociology research papers across different types of research. In our previous paper (Cheng & Khoo, 2021), we proposed a method for analyzing information structure using research semantic frames, and also presented the findings of analyzing causal relations and comparative relations in the main arguments steps

of sociology research papers (i.e., research objective, research question, research hypothesis, and research result). Our earlier study (Cheng, 2020) has identified five different types of research with different argument and information profiles: *Investigative research*, *Development and Evaluation research*, *Descriptive research*, *Historical analysis*, and *Identification research*. Our previous studies (Cheng & Khoo, 2021 & 2022) focused on *Investigative research*, defined as research that seeks to investigate a causal or associative relation between concepts/entities, often by using quantitative research methods. This study extends the earlier information structure analysis to *Development and Evaluation research*, defined as research that seeks to develop or evaluate a complex entity such as a theory, model, method or instrument.

Different types of research have different argument structures and information structures, being represented by different links between research semantic frames (Cheng, 2020). A *research semantic frame* is a template (or structure) that includes related types of research information that are expected in a particular context, and the role each information type plays in the context. Fillmore, Johnson, and Petruck (2003) defined semantic frames as “schematic representations of the conceptual structures and patterns of beliefs, practices, institutions, images, etc. that provide a foundation for meaningful interaction in a given speech community” (p. 235). In a pilot study, we developed six research semantic frames reflecting common information structure patterns and roles found in research papers. Each type of research is strongly associated with a focal frame: *Investigative research* is associated with a *Research-relation* (usually cause-effect relation) *frame*, *Development and Evaluation research* with a *Development and Evaluation frame*, and *Descriptive research* with a *Description frame*.

A focal frame is expected to model the core information content for that type of research. However, the associated semantic frame is likely to be complemented by other semantic frames. For example, a research study intended to develop a theory, model, method or instrument will be modeled by the *Development and Evaluation frame*, but the *Comparison frame* may be needed to model a comparison between two categories of a factor in terms of the resulting measure; a *Measurement frame* is needed to model the measurement of the dependent variable; a *Theory/model/framework frame* is also needed to model a theory/model/framework applied in the research. Note that a relation between component entities of the developed or evaluated method may need to be modeled by the *Research-relation frame*.

Thus, three other semantic frames were developed to model common information structures found in any type of research: *Comparison frame*, *Theory/model/framework frame*, and *Measurement frame*, and *Research-relation frame*. These will be used to model relationships between entities in Development and Evaluation research. We refer to these six research semantic frames collectively as the *Research Information Model*.

The objective of this study was to identify the common information structures found in sociology research papers, focusing on the main argument steps in the Abstract and Introduction sections of Development and Evaluation research papers: research objective, research result, research idea/approach, research question, and concept/theory/model-related statements. This study focused on the features of the Research Information Model, especially the Development and Evaluation frame (the focal frame), and two other semantic frames that often occur in this type of research (i.e., the Theory/model/framework frame, and the Measurement frame). The result shows how the focal frame is linked to other frames in order to represent the overall information structure in Development and Evaluation research Abstract and Introduction sections. The results carry implications for knowledge representation of social science research papers in the form of knowledge graphs, and for semantic relation extraction.

## THEORETICAL BACKGROUND

This study models the main information structure of a research paper using frame semantics theory (Fillmore, 1968; Fillmore et al., 2003) to model the roles (types) of research information related to a central concept. The frame semantics theory's assumption is that the meaning of a sentence should be understood in the context of background knowledge. Word meaning and the syntactic contexts embedded in the sentence are classified in terms of the author's world, which can be represented by *frames*. A semantic frame is activated by a lexical unit, which is "the pairing of a word with one of its meanings." (Fillmore & Baker, 2015, p. 795). Thus, the frame semantics theory can be considered a knowledge representation approach. For example, Zheng et al. (2022) constructed a frame knowledge graph based on frame semantics to model multiple semantic relations (e.g., relations between different frames, and frames and their roles). In research papers, we assume different verbs can be seen as *triggers* for different research relations relevant to the research. For example, *affect* and *improve* are relevant to a Cause-effect relation, whereas *develop*, *create* and *build* are relevant to a Development relation.

As for knowledge representation of scientific research, Ou, Khoo and Goh (2007) proposed a Variable-based Framework (for automatic multi-document summarization of sociology dissertation abstracts reporting quantitative research. The framework was developed to identify, integrate and organize the following types of research information in the research objective and research result statements (Ou, 2006; Ou, Khoo, & Goh, 2007): main research concepts (usually operationalized as variables), relations between concepts/entities (e.g., cause-effect, correlation, comparison, and prediction), contextual relations (e.g., in the context, theory/model/framework, or in the attitude or perception of a target population), research method, and modality (i.e., positive and negative indicators). The Variable-based Framework was applied in our series of research studies and extended to develop a set of research semantic frames. Thus, the basic Research-relation frame was taken from the framework and extended to model Cause-effect knowledge. It has two role concepts (i.e., *cause* concept and *effect* concept), and four other types of information including *context* (e.g., *location*), *evidence* (e.g., *research method*), *modality*, and *polarity* (i.e., *positive*, *negative* and *neutral*)."

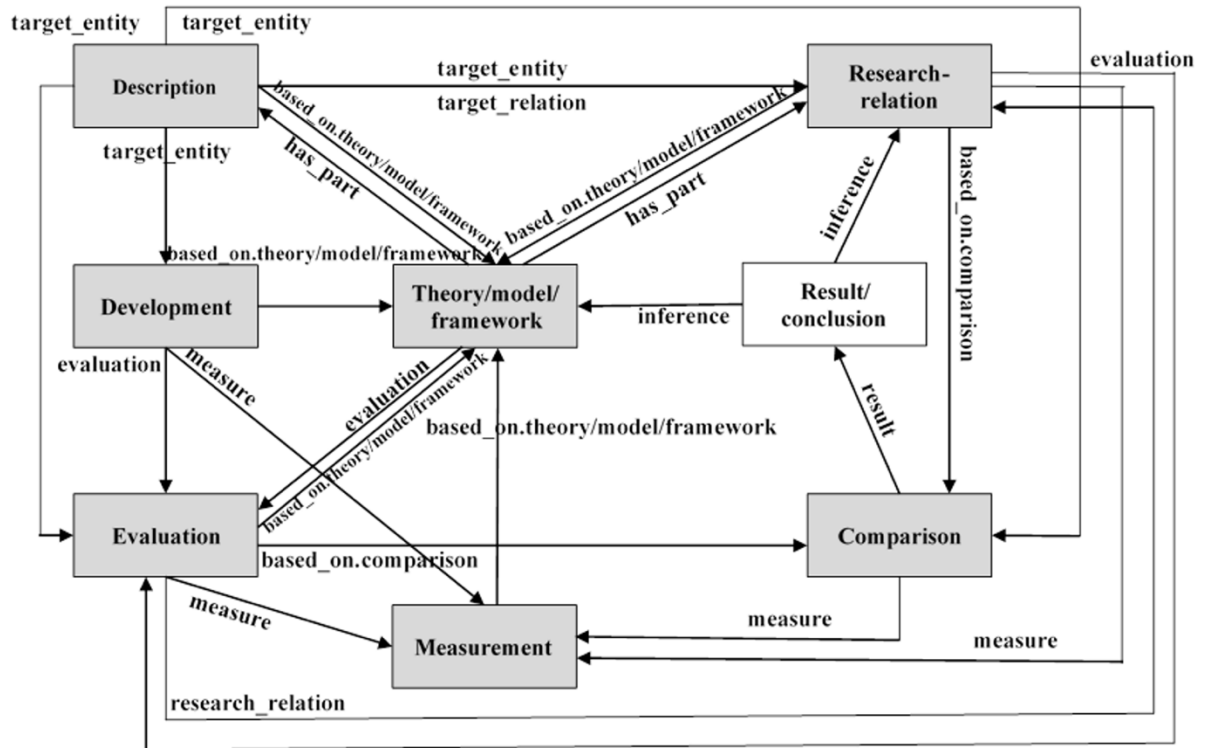
## METHODOLOGY

### Corpus

The data for this study were the Abstract and Introduction sections of research papers taken from twenty sociology journal articles reporting Development and Evaluation research. The articles were sampled from ten sociology journals with the highest impact factor in InCites Journal Citation Reports, published in late 2015 and early 2016 volumes of the journals: *American Journal of Sociology*, *Annals of Tourism Research*, *Cornell Hospitality Quarterly*, *European Sociological Review*, *Gender Society*, *Information Communication Society*, *Journal of Marriage and Family*, *Social Networks*, *Qualitative research*, and *American sociological review*. Only articles reporting research that involved data analysis were included.

### Analysis framework: Research Information Model

This sub-section explains the Research Information Model (i.e., six research semantic frames, see Figure 1) that were used in the information structure analysis in this study. The frames indicate expected types of information and their roles when particular types of relations are found in the text.



**Figure 1. The Research Information Model**

Figure 1 shows how the six research semantic frames can be linked together in a research paper. Each research semantic frame may link to another research semantic frame directly or indirectly. Consider the relation between the Research-relation frame and the Comparison frame:

1. The frames are linked together directly via the *based\_on.comparison* relation. This can represent a research objective that investigates a causal relation between concept1 and concept2, based on a comparative relation between two values/categories of an aspect/attribute of concept1.
2. The frames are linked together indirectly via the *result* and *inference* relations. This can represent a research result that involves a causal relation, which is based on a comparison result.

For frequently occurring relations between research semantic frames, we refer to them as *link patterns*.

A link between research semantic frames centers on a main semantic frame (the *focal frame*) and one or more other semantic frames. Each type of research has a main semantic frame that represents the research objective and research results. For example, a link pattern for *Development and Evaluation research* may consist of the *Development and Evaluation frame* (the *focal frame*), and other research semantic frames such as the *Theory/model/framework frame*. The six research semantic frames that we developed are described below.

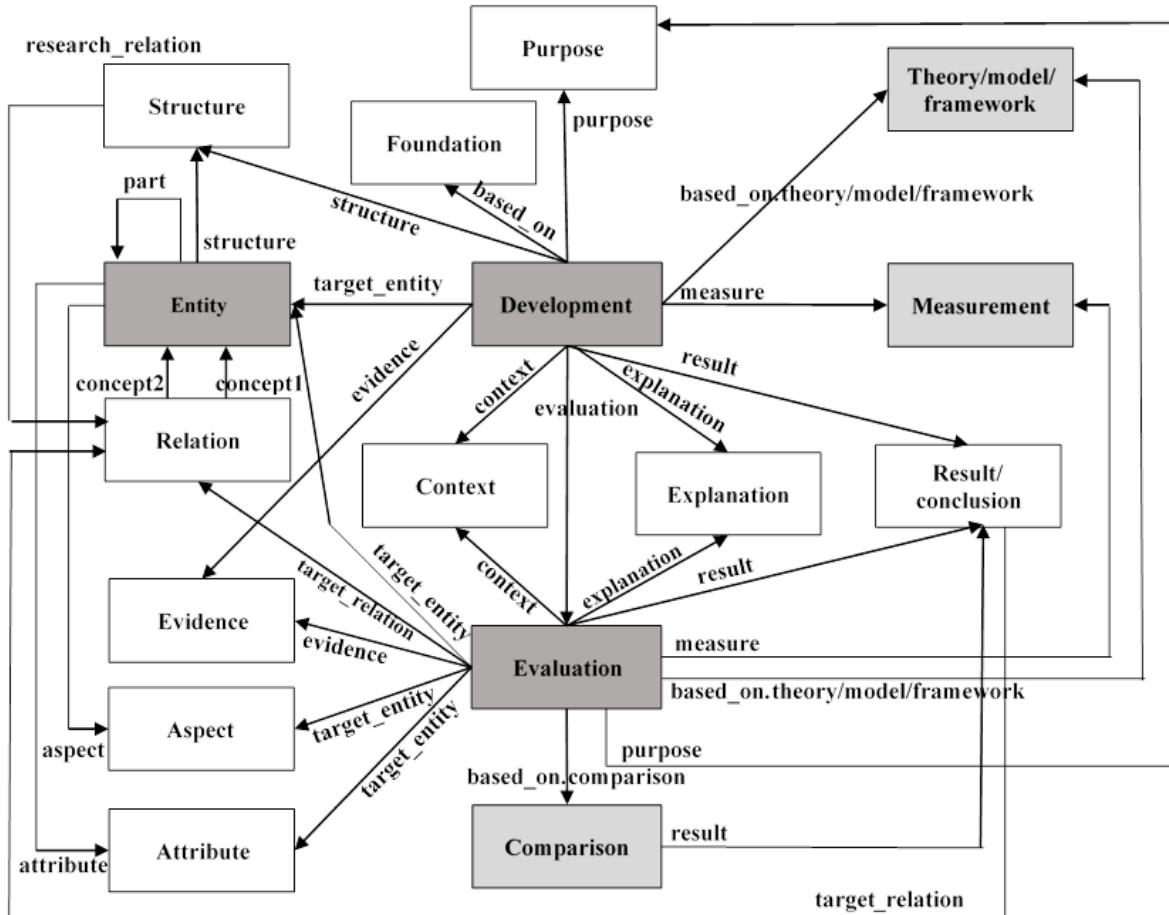
#### *Development and Evaluation frame*

Development and Evaluation research papers usually describe the entity that is developed or evaluated (e.g., a method or a system), and its relation with other relevant entity in the research study. We model these different types of information in the *Development and Evaluation frame* (see Figure 2). The information roles presented in the Figure are used as tags for annotating the research papers in the corpus. The developed



entity is often evaluated in different ways. These roles (i.e., Structure, Foundation, and Evaluation) are emphasized in the Development and Evaluation frame, especially for a study reporting the development process of a new entity.

Note that Development and Evaluation are two separate frames technically—a development process of the target entity usually involves an evaluation; however, the evaluation of the target entity is another different process. As they are often coupled together in the sample papers, we have combined them in Figure 2. This can be represented by the link with other research semantic frames: the Research-relation frame, the Comparison frame, the Theory/model/framework frame, and the Measurement frame.



**Figure 2. The Development and Evaluation frame**

#### *Research-relation frame and Comparison frame*

Most research intends to investigate a causal relation between two or more concepts, which is an important semantic relation often found in research objective statements. However, as this Cause-effect relation is not easy to establish, many researchers typically settle for an associative relation between concepts (e.g., Association, Correlation, Prediction, and Co-occurrence). We group all these as *Research-relations*. As a Research-relation is a complex concept with links to many types of concepts or entities, we represent it as a *Research-relation concept*, connected to two concepts/entities with the relations *concept1* (cause) and

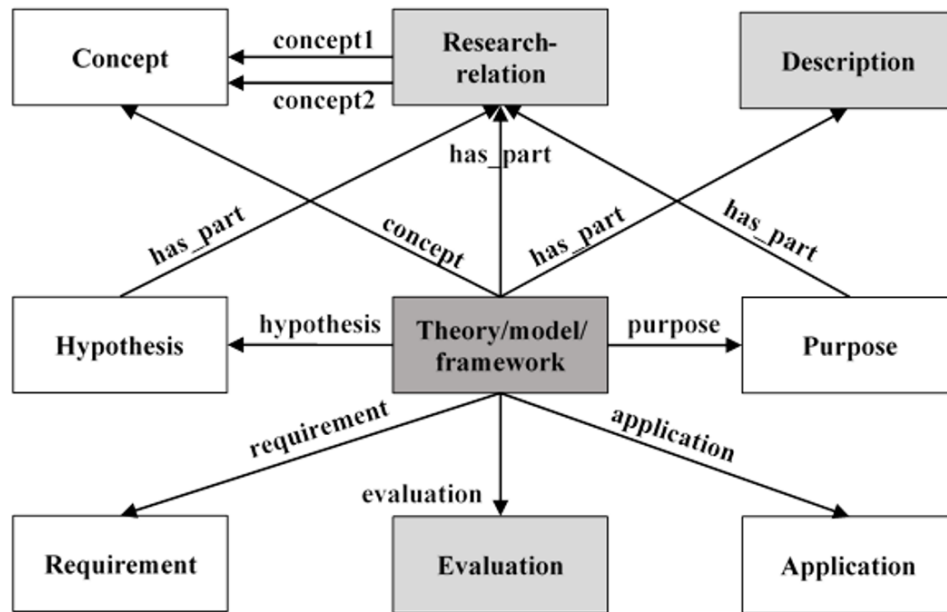
*concept2* (effect). The cause-and-effect concepts linked to the Research-relation may have additional *attributes* (external features) and *aspects* (internal features) specified. Moreover, the Research-relation concept is the central concept of the structure, and other related pieces of information (e.g., *modality* and *evidence*) may be linked to it.

A Comparison is also a relation that often occurs in research papers—being used to establish a cause-effect relation, and in evaluations and measurements. Other than the Research-relations, studies usually compare two aspects/attributes of the same concept, with a result role. We represent the Comparison relation with its relevant types of information in a *Comparison frame*. The details of the two semantic frames are described in Cheng and Khoo (2021).

In Development and Evaluation research papers, a relation between entities can also be represented by a Research-relation, especially a Cause-effect relation and an Association relation. This target relation can be represented by the Research-relation concept (i.e., the central concept in the Research-relation frame). Comparisons are often used to represent a research result (especially for the evaluation of an entity), and a measurement of an entity's value.

### *Theory/model/framework frame*

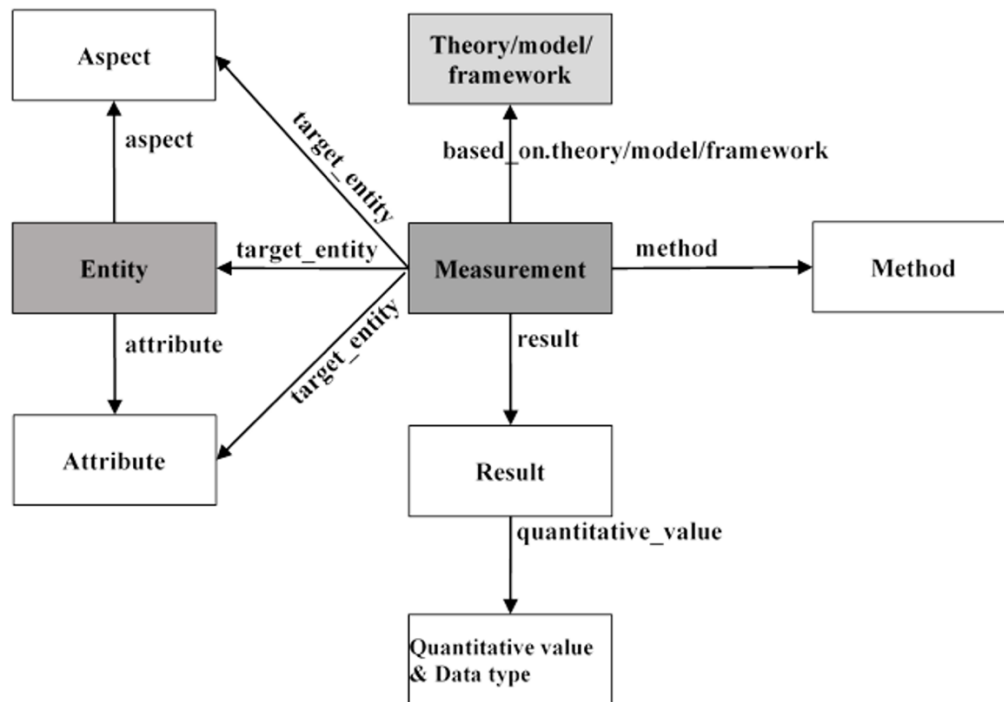
Research papers (especially the Introduction sections of Development and Evaluation research papers) often provide some kind of theoretical information such as an applied theory or a hypothesis. We represent the applied theoretical framework, especially the underlying assumption used to support research results, in the Theory/model/framework frame (see Figure 3). The frame also links to the Development and Evaluation frame, representing the evaluation process for the applied theory/model/framework.



**Figure 3. The Theory/model/framework frame**

### *Measurement frame*

A measurement method and results are often reported in research papers, especially in the Development and Evaluation research Introduction sections. Moreover, a qualitative value and data type may also be mentioned for the result. We represent these types of information in the Measurement frame (see Figure 4), which is centered on the measured entity and its aspect as well as attribute.



**Figure 4. The *Measurement* frame**

### *Example of how the information structure of an Abstract is represented using the semantic frames*

The Abstract from Jæger and Breen (2016) (given in Table 1) is used to illustrate how the semantic frames are used to represent the information structure of an Abstract.

**Table 1. Example Abstract from Jæger and Breen (2016)**

Statement	Texts
Concept/theory/model-apply	The authors draw on Pierre Bourdieu's theory of cultural reproduction
Research objective	to develop a formal model of the pathways through which cultural capital acts to enhance children's educational and socioeconomic success.
Research contribution/recommendation	The authors' approach brings conceptual and empirical clarity to an important area of study.
Research objective	Their model describes how parents transmit cultural capital to their children and how children convert cultural capital into educational success.
Research contribution/recommendation	It also provides a behavioral framework for interpreting parental investments in cultural capital.
Method	The authors review results from existing empirical research on the role of cultural capital in education to demonstrate the usefulness of their model for interpretative purposes, and they use National Longitudinal Survey of Youth 1979—Children and Young Adults survey data to test some of its implications.

### **Intercoder reliability for the Research Information Model**

The intercoder reliability for the Research Information Model was done by the two authors, focusing on the Research-relation frame and the Comparison frame, and the analysis was limited to research objective, research result, research hypothesis and research question sentences in the Abstracts and Introduction sections (Cheng, 2020; Cheng and Khoo, 2021). These two frames are the most important frames across the types of research. The two frames also play an important role in the Development and Evaluation research. Overall, high agreement was obtained for identifying the Research-relations together with cause concept and effect concept (Jaccard coefficient of 0.90 for the Cause-effect relation, and 0.86 for the Association relation). Types of information in the frame such as *size* (0.83) and *context* (0.81) were also identified. There is also high agreement in coding the Comparison relations (Jaccard coefficient of 0.96).

The analysis for the other four semantic frames (i.e., the Development and Evaluation frame, the Theory/model/framework frame, the Measurement frame, and the Descriptive frame) was coded by the first author, and reviewed by the second author. Intercoder reliability measures have not yet been measured for these frames.

## **FINDINGS**

### **Distribution of the research semantic frames and their information roles**

In Development and Evaluation research papers, the focal frame is assumed to be the Development and Evaluation frame. It represents the target entity's different parts (or components) as well as their relations: Development of an entity accounted for 85% of the 20 Abstracts as well as Introduction sections; Evaluation of an entity was more common in the Abstracts (85%) than in the Introduction sections (65%). This indicates that most Development and Evaluation research include an entity evaluated; however, an evaluation of the developed entity may not be reported in the Introduction section, but possibly left to the Results section.

A Theory/model/framework frame occurred commonly in Development and Evaluation research, especially in the Introduction sections (90%, 18 of 20 Development and Evaluation research Introduction sections). This shows that researchers typically specify details of theoretical background (e.g., a concept adopted from a particular theory, or the applied theory). A Comparison frame was common in the Abstracts (50%) of *Development and Evaluation research* papers, but did not occur frequently in the Introduction (35%).

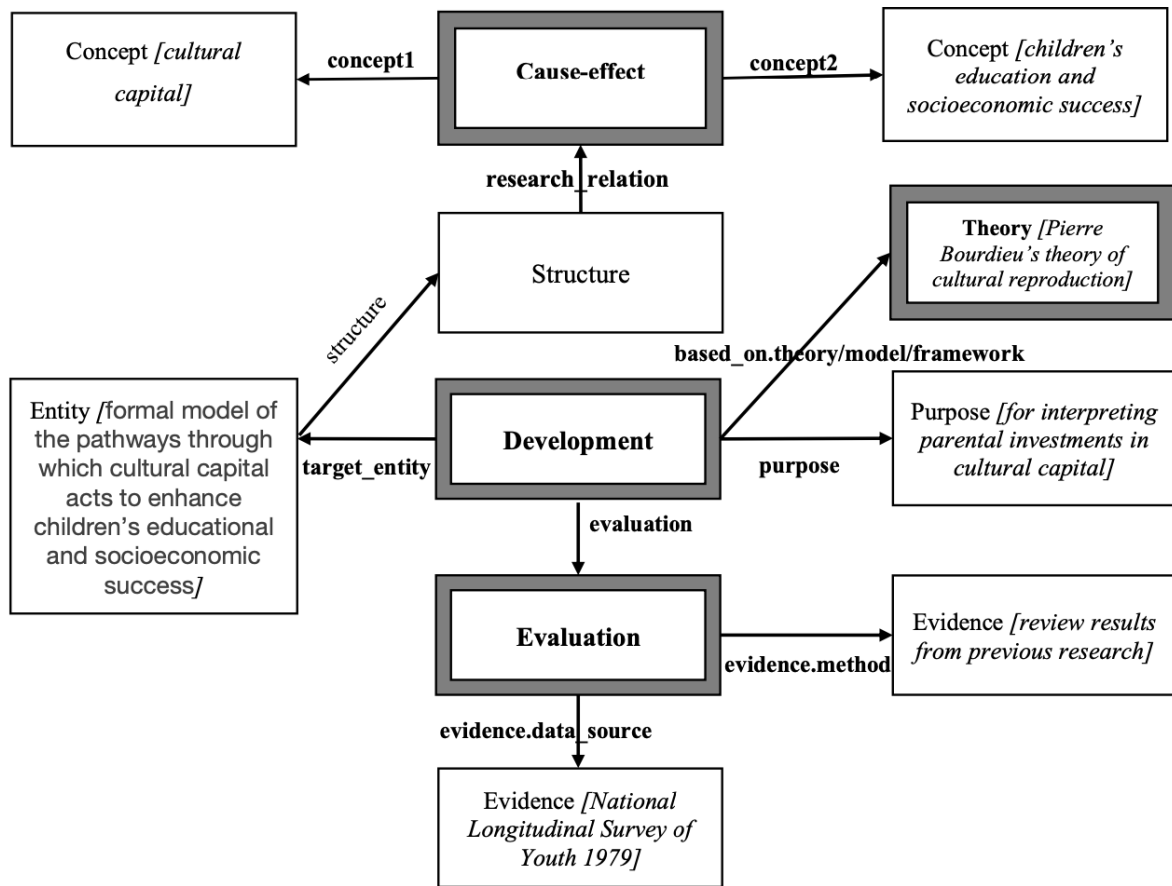
As for common information roles (i.e., types of information) in the Abstracts, we found that *evidence* was indicated in over half of the Abstracts, especially *research method* (75%) and *data source* (55%). In addition to the *target entity* (e.g., a model that a researcher intended to develop or evaluate), researchers specified a *part of the entity* (75%), and the entity part's *aspect* (20%) or *attribute* (40%). They also specified the analysis *results* (65%) in the Abstracts. Note that a *relation* (e.g., a relation between the target entity and its entity *part*, or between two entity parts) was also described (20%). Moreover, sociology researchers focused on describing a general *comparison result* (50%), which was often based on comparing an entity's different *attributes* (90%). A comparison result may infer a *Research relation* (30%) or a *theory/model/framework* (20%). In addition to a *concept* (46%) that was adopted from a particular theory, researchers also specified their *hypothesis* (18%), and proposed a Research-relation between an entity's parts (18%).

Similar to the results for Abstracts, a *part of an entity* (75%) was often specified in the Introduction sections. Some researchers specified a *part of the entity* or the *relation* between two entity parts (35%), rather than the *target entity* (90%) in the Introduction sections. Compared with the results for the Abstracts, *purpose* (50%) for the entity developed and/or evaluated was often specified, but the *result* (30%) was seldom mentioned in the Introduction sections. Other than that, a *concept that was adopted from a particular theory* (57%) was often specified in the Introduction sections. Researchers also generalized a *hypothesis* (44%), and proposed a Research-relation between an entity's parts (11%). However, they only specified a general *comparison result* (74%) rather than generalize a theory/model/framework or a Research-relation based on the comparison.

### Relations between the focal frame and other frames

In the Development and Evaluation research Abstracts, the focal frame was commonly linked to a Theory/model/framework frame (55%, 11 of 20 Abstracts). These two frames (i.e., Development and Evaluation frame, and Theory/model/framework frame) may be linked to just a Comparison frame (15%), or just a Research-relation frame (10%). Only five Abstracts (25%) were represented by the focal frame only.

Using Jæger and Breen's article (2016) as an example, we show how the Development and Evaluation frame is linked to the Theory/model/framework frame as well as the Research-relation frame in Figure 5. The figure presents an overall information structure of the research abstract.



**Figure 5. Example: The Development and Evaluation frame linked to the Theory/model/framework frame and the Research-relation frame in the Abstract**

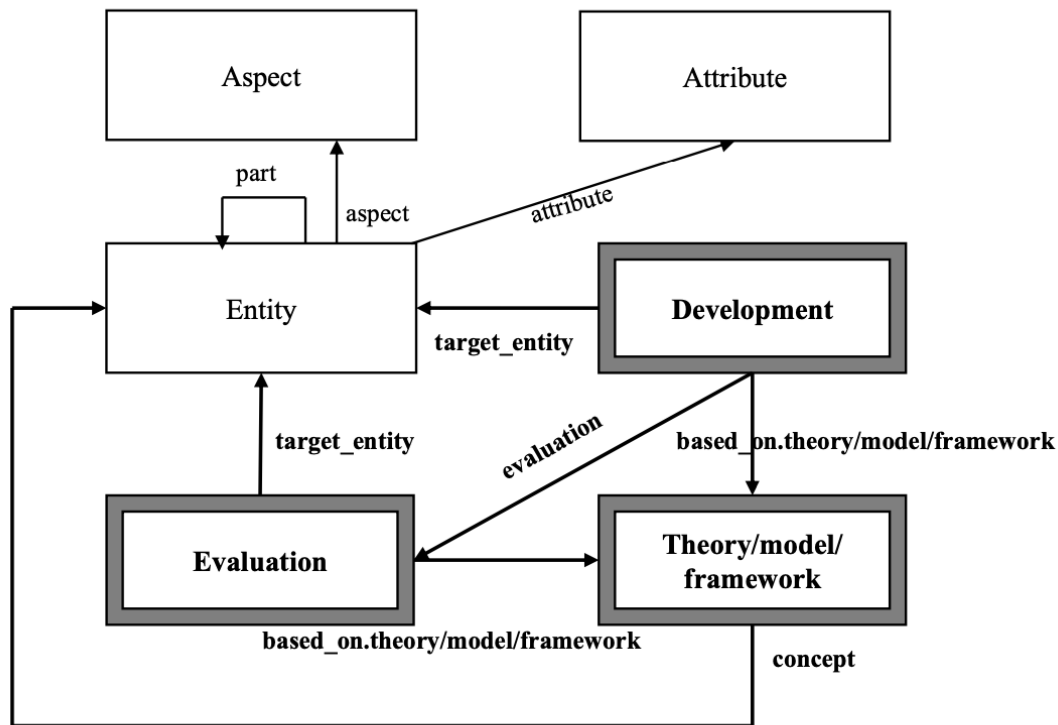
Similar to the Abstracts, in the Introduction sections, the focal frame was commonly linked to a Theory/model/framework frame (90%, 18 of 20 Introduction sections). Sometimes these two frames (the Development and Evaluation frame and the Theory/model/framework frame) were also linked to a Research-relation frame (45%).

Overall, we found six different *link patterns* (i.e., connections between the focal frame and other frames) to present the overall information structure in the Abstract and Introduction sections of Development and Evaluation research papers:

1. *Link pattern 1: A Theory/model/framework frame with the focal frame.* For example, a target entity mentioned in the Development and Evaluation research study is adopted from a particular theory/model/framework (see Figure 6), an underlying assumption of foundation as a support to a target relation and the entity developed or evaluated, an underlying assumption as a support to a target entity and/or its part entity described, and an applied theory/model/framework as an underlying assumption to support a research method.
2. *Link pattern 2: A Research-relation frame with the focal frame.* For example, a research relation (e.g., causal relation) to represent a relation between component entities of the target entity

developed or evaluated, and a research relation to represent a research result in Development and Evaluation research.

3. *Link pattern 3: A Measurement frame with the focal frame.* For example, a measurement method to the entity developed or its part entity in Development and Evaluation research.
4. *Link pattern 4: a Comparison frame with the focal frame.* For example, a comparison of an entity's subclasses/attributes/aspects, of underlying explanations, of evaluation results to the developed entity, and of results to expectation/hypothesis/theory.
5. *Link pattern 5: A Theory/model/framework frame with the focal frame and a Research-relation frame.* For example, an underlying assumption of an applied theory/model/framework is represented by a Cause-effect relation, a target entity or its aspect/attribute is affected by a cause concept (that adopted from a particular theory/model/framework), and a part entity (that adopted from a particular theory/model/framework) has a research relation with another entity.
6. *Link pattern 6: Standalone focal frame with no link to other frames.* This may occur in the Development and Evaluation research Abstracts only—to present a target relation and the entity developed or evaluated as well as other important information (e.g., evidence).



**Figure 6. Link pattern 1: A Theory/model/framework frame with the focal frame.**  
**A target entity in the research adopted from a particular theory/model/framework**

## CONCLUSION

This study analyzed the information structure of the Abstract and Introduction sections of sociology research papers that sought to develop or evaluate a theory, model, method or instrument (referred to as Development and Evaluation research papers). The purpose was to identify common research semantic frames and their information roles (i.e., types of information) in the main argument steps: research objective, research question, research hypothesis, and research result. The Development of an entity is common in both the Abstract and Introduction sections, whereas the Evaluation of an entity is more common in the Abstracts. A Theory/model/framework frame occurs more often in the Introduction sections, whereas a Comparison frame is more common in the Abstracts. Evidence, especially research method and data source, is most common in the Abstract; part of an entity is specified more often together with the target entity in the Introduction. Six link patterns (i.e., relations between the focal frame and other frames) are found in this study, being used to represent information structure patterns in the Development and Evaluation research Abstract and Introduction sections.

In follow-up work, we have extended the information structure analysis to other types of sociology research (i.e., Descriptive research), other sections of research papers (e.g., literature review), different languages (i.e., Mandarin Chinese) as well as other disciplines (i.e., mechanical engineering). We also plan to do further research work in graph visualization of link patterns in Development and Evaluation research, and extract semantic relations in research papers automatically—to contribute to the emerging research field of *scientific knowledge graphs*.

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# Comparing the Research Landscapes of Two Educational Research Institutions in Asia: A Preliminary Analysis of Journal Submissions, Author Keywords, and ERIC Categories

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## ABSTRACT

*Background.* Educational research landscapes are dynamic, influencing institutional strategies and collaboration opportunities. This study examined the research paper publishing patterns at the National Institute of Education (NIE), Singapore, and the National Taiwan Normal University (NTNU), aiming to discern shared and unique research interests.

*Method.* Using bibliometric techniques, we analyzed 3,403 bibliographic records downloaded from the Web of Science (WoS) Core Collection linked to the category 'Education/Educational Research'. Our multi-pronged approach involved: 1. Descriptive statistics of journal submissions (1987-2022); 2. Qualitative analysis of the top 10 shared keywords across all years; 3. Classification of 342 papers from 2020-2022 using Education Resources Information Center (ERIC) thesaurus.

*Results.* Both institutions have seen growth in research outputs, aligning with global trends. NIE displays greater publishing diversity, while NTNU has a concentrated approach to specific journals. Both institutions share an emphasis on the nexus of education and technology, yet possess distinct journal preferences suggesting collaboration opportunities and differing priorities. Although their keyword usage mirrors global educational themes, regional deviations such as the underemphasis on "Human Capital" and "Gender" are apparent. As per ERIC categories, both prioritize "Classroom Perspectives": NIE showcasing a more specialized approach and NTNU displaying varied interests.

*Implications.* Collectively, these findings underscore that while NIE and NTNU resonate with global research trends, they also carve unique research paths shaped by their specific socio-cultural and institutional contexts.

## 1. INTRODUCTION

In an increasingly globalized world, education transcends national boundaries. The value of understanding, learning, and comparing educational research practices between institutions is paramount, providing a means of strengthening each's unique areas of strength and fostering potential collaboration. Both Singapore and Taiwan have been pivotal in advancing the educational research domain, with notable contributions acknowledged by scholars such as Barrot (2023), Lopes (2017), and Tosun (2021). The National Taiwan

Normal University (NTNU) is a vibrant learning community that has long been recognized as one of Taiwan's elite institutions of higher education. NTNU was formerly an institute for teachers' education, as suggested in the title Normal, that later emerged as a comprehensive university; and The National Institute of Education (NIE), Singapore, is the national teacher education institute and an integral part of the nation's education system. Offering multidisciplinary undergraduate and graduate education programmers, the institute empowers students to analyses, tackle, and resolve challenges in various career pathways, both within and beyond the realm of education. NTNU and NIE are renowned educational research institutions in these two regions, and both have made substantial strides in knowledge creation and dissemination, yet, to our knowledge, no comparative study has hitherto been carried out to juxtapose their research landscapes.

This study aims to address this gap, and our objective is to provide a preliminary analysis of the research landscape at NTNU and NIE, focusing on the unique and shared characteristics of their educational research interests.

Bibliometric analysis has become an indispensable tool for examining academic research landscapes, offering insights into publishing trends, research foci, and collaborative patterns (Barrot, 2023; Sezgin et al., 2022; Tan et al., 2012). By transforming bibliographic information into discernable trends and patterns, this method provides invaluable insights into the nature and trajectory of research within and across institutions. Our study employs this tool to examine the research outputs of NIE and NTNU, particularly focusing on their educational research. The analysis is based on an examination of journal submissions, keyword usage, and paper theme classification using the Education Resources Information Center (ERIC) thesaurus.

The significance of this research is manifold. First, it offers a granular view of the publishing trends at NTNU and NIE, thus informing institutional policy and guiding individual researchers. Second, by highlighting areas of shared interest, the study may act as a springboard for future collaborative efforts between the two institutions. Third, the findings could be instrumental for funding bodies to direct resources effectively.

The rest of the paper is organized as follows: The next section presents a literature review, outlining relevant prior studies and delineating our research's novelty. This is followed by the methodology section, which explains the data collection and analysis procedures. Subsequently, the results section presents the findings, and the discussion section interprets these results in light of the research questions. The paper concludes with an overview of the key takeaways and potential avenues for future research.

While it is beyond the scope of this paper to conduct an exhaustive analysis of the educational research at NTNU and NIE, this preliminary study will provide a critical foundation for further investigations into the respective and shared strengths of these two premier institutions in the field of education.

## **2. LITERATURE REVIEW**

Bibliometric analysis offers a lens into the academic landscape, useful for tracking research trends, gauging publication significance (Lopes et al., 2017; Tan et al., 2012), and spotting discipline shifts and research focal points (Donmus Kaya, 2022). It illuminates prevailing directions, dominant areas, and collaboration potential.

The purpose of this literature review is to investigate the prevailing findings in bibliometric analysis within the context of educational research to provide a foundation for our comparative study of academic paper submitted by researchers in NTNU and NIE.

## 2.1 Bibliometric Studies in Educational Research: Global Results

Several shifts in educational research have been noted. In his theoretical paper, (Cheng, 2007) identified three significant shifts in the focus of educational research in the Asia-Pacific region, including Singapore and Taiwan. The first, "Internal Effectiveness" (1980s-90s), centered on optimizing teaching and learning processes. The second, "Interface Effectiveness" (1990s), prioritized meeting stakeholder expectations and educational accountability. The third, "Future Effectiveness" (2000s), emphasized the globalization, localization, and individualization of educational practices.

Studies have demonstrated how bibliometric analysis provide a granular understanding of research trends. Huang et al. (2020) conducted a bibliometric analysis on 19,750 papers from leading education journals between 2000 and May 2018, and using keyword co-occurrence networks, he segmented education research from 2000 to 2017 into three stages: from 2000-2007, emphasis was on teacher education, teaching strategies, human capital, and higher education; between 2008-2014, the spotlight shifted to professional development, distance education, and identity aspects within higher education; the 2015-2017 period broadened to include topics like governmentality in higher education, mathematics, and classroom teaching improvements. Furthermore, they pinpointed five core research topics that were present throughout all three stages of education research: "Interactive learning environment and teaching/learning strategies" consistently emerged as a primary focus. The rest four core topics "Human capital", "Teacher education", "Higher education", and "Equity and social justice" evolved in their prominence, highlighting the dynamic landscape of educational research over the examined period.

Tosun (2021) conducted a bibliometric analysis on 50 years of educational research within the Web of Science (WoS) database, analyzing 93,699 articles across 116 journals. He identified evolving research themes over time in educational studies. From 1974 to 2000, the emphasis was on problem-solving, teacher education, and constructivism. The period from 2001 to 2005 saw a transition towards interactive learning and collaboration. Between 2006 and 2010, the focus shifted to higher education, e-learning, and teaching strategies. The subsequent five years, from 2011 to 2015, concentrated on collaborative and interactive learning techniques. The research from 2016 to 2018 primarily emphasized assessment, professional development, and higher education. Lastly, in 2019 and 2020, the primary attention was on higher education, teacher education, and motivation.

Keyword analysis, while seemingly simplistic, serves as a reliable method to understand the core focus of research endeavors. Huang et al. (2020) identified the top ten keywords in educational research in the past two decades as: "higher education", "interactive learning environment", "teaching/learning strategies", "teacher education", "pedagogical issue", "improving classroom teaching", "professional development", "human capital", "computer-mediated communication", and "media in education". Tosun (2021) also concluded that the most frequent keywords in the education research field over the last half century included "higher education", "teacher education", "professional development", "assessment", "education", "gender", "motivation", "science education", "education policy", "learning", "curriculum", "teaching/learning strategies", "collaborative learning", "pedagogy", and "secondary education".

Both studies underscored the sustained significance of teacher education, interactive learning, teaching/learning strategies, professional development and higher education in educational discourse. And both studies show that, by the mid-2010s, professional development and higher education come to the forefront in analyses, albeit with Tosun (2021) additionally highlighting motivation as a key theme by 2019-2020.

Bibliometric analysis studies have also shown journal submission patterns in the field. Sönmez (2020) conducted a bibliometric analysis of the WoS database on scientific articles related to Social Studies

education, and found out 228 papers covering 1975 to January 2020. The research highlighted a rising interest in Social Studies education, with roughly 84 articles published in the past five years, and with "Theory and Research in Social Education" emerging as a significant journal in this area (Sönmez, 2020). Tosun (2021) found notable surges in publications were identified in 1980, 2008, and 2019. And "Computers & Education" and "International Journal of Science Education" were highlighted as the leading journals in the field. Concurrently, Huang et al. (2020) delineated three pivotal stages in education research: stability with under 10,000 publications annually from 2000–2007, a rise to 15,000–20,000 publications between 2008–2014, and a remarkable surge post-2015, exceeding 30,000 publications annually.

In their exploration of collaboration patterns and the evolving characteristics of educational research, Sezgin et al. (2022) conducted a bibliometric analysis of educational research publications from 2011 to 2020, sourcing data from WoS categories such as "Education and Educational Research" and "Psychology, Educational", among others. Their findings underscored a surge in multi-authorship and a consistent rise in reference counts, and highlighted an evolution in educational research, pointing to its increasingly organized, internationalized nature, its reduced fragmentation, and its inherent interdisciplinary character.

By comparing the above global trends with the research outputs of NTNU and NIE, our study hopes to identify their alignment or divergence with these larger movements, thereby unveiling their unique strengths and future trajectories.

## **2.2. BIBLIOMETRIC STUDIES IN EDUCATIONAL RESEARCH: REGIONAL RESULTS**

Despite the growing use of bibliometric analysis in understanding educational research trends, comparative studies between institutions, particularly NTNU and NIE, are limited. However, there are prior studies covering Singapore and Taiwan.

In a content analysis of learning sciences research in Asia Pacific countries, Tan et al. (2012) scrutinized 24 research papers from three selected journals, spanning 1997 to 2010. Their findings illuminated distinct contribution patterns based on authors' affiliated countries. Notably, Singapore emerged as one of the top three contributors, evidencing a surge in learning sciences activities post-2006. Conversely, by the study's end in 2010, Taiwan displayed an emergent interest in this field.

Nylander and Tan (2022) undertook a bibliometric analysis of 9,017 articles from 2000 to 2020 to compare educational research in Singapore and Sweden. Using topic modeling, they discerned that Singapore's research predominantly focuses on pedagogical practices such as sociocultural perspectives on teaching, pre-service training, and educational psychology tied to student achievement. Notably, compared to Sweden, Singapore's research approach is characterized as more centralized, practically-oriented, and quantitative, with a less critical stance.

Barrot (2023) evaluated the state of educational research in Southeast Asia (SEA) in relation to global trends. From a comprehensive analysis of 13,527 documents from Scopus, Singapore prominently emerged as the region's frontrunner, contributing to 26.31% of the total output. Despite its modest annual growth rate of 9.27%, Singapore's research was distinguished by its high citation count, robust performance metrics, and substantial international collaborations. Moreover, half of SEA's top 10 educational scholars are based in Singapore, underscoring its pivotal role in educational research.

In Tosun (2021)'s study, geographically, Taiwan emerged as a prolific contributor in recent years, emphasizing teaching/learning strategies, interactive learning environments, cooperative/collaborative learning, computer-mediated communication, improving classroom teaching, e-learning, mobile learning, pedagogical issues, media in education and applications in subject areas. Moreover, bibliometric studies

have also delved into the use of specific social network platforms, like Facebook, in the realm of educational research. Lopes (2017) applied this technique to identify key journals, authors, and seminal articles in the field. Notably, Lopes' findings highlighted authors from Taiwan and four other countries as pivotal contributors to the global conversation on leveraging Facebook in educational research.

### **2.3 Summary and Our Research Questions**

In summary, our review underscores the value of bibliographic studies in interpreting educational research landscapes. Our study contributes to the literature by providing a comparative bibliometric analysis of NTNU and NIE, illuminating unique strengths, shared research interests, and potential for collaboration. As we delve into the research landscapes of NTNU and NIE, we bring new insights into their roles within the broader educational research ecosystem. As such, our research questions are:

1. How do the journal submission patterns of NIE and NTNU researchers compare, and how do these patterns align with global publication trends in educational research?
2. How do the journal submission patterns of NTNU and NIE researchers highlight their unique and shared research interests in the field of education?
3. How do the keyword usage trends in educational research publications differ between NIE and NTNU, and what do these trends reveal about the evolving research focuses and priorities of the two institutions over time?
4. How do the keyword usage patterns in educational research publications from NIE and NTNU align with or diverge from global research trends in the field?
5. How do NIE and NTNU's research outputs, as classified by ERIC categories, compare in terms of their unique research focuses and shared interests?

## **3. METHOD**

### **3.1 Data Collection**

We utilized the WoS database to collect bibliographic data of research papers authored by scholars from NTNU and NIE. Our decision to employ WoS as the primary data source was influenced by its distinct category titled "Education & Education Research". In contrast, databases like Scopus group educational research under the broader umbrella of social sciences. As of our last update on August 12, 2022, our dataset comprises 3,403 records.

Our search protocol in WoS began with its basic search interface, where we set the "Affiliation" filter to "National Taiwan Normal University". The preliminary search produced tens of thousands of records from the WoS Core Collection. To enhance the specificity of our search, we opted for the "Education Educational Research" filter from the "Web of Science Categories" facet. Additionally, our search encompassed all citation indexes and all years (Timespan = All years) and was constrained to the "article" document type, which WoS defines as original research either published in academic journals or presented at symposia and conferences. This refined approach yielded 1,489 records affiliated with NTNU. Replicating the process for "National Institute of Education (NIE) Singapore" generated an additional 1,913 records.

### **3.2 Data Analysis**

Examining journal submission patterns is pivotal in bibliometric studies, providing a foundational step in understanding a domain's research landscape (Sezgin et al. 2022; Tosun, 2021). Keyword analysis, while

seemingly simplistic, serves as a reliable method and proxies to understand the core focus of research endeavors (Huang et al., 2020).

To analyze the educational research landscapes of NTNU and NIE, we employed a three-step approach. First, we reviewed journal submissions from both institutions spanning 1987 to 2022. Next, from this collection, we identified a substantial list of 6,903 unique keywords to capture the breadth of topics, and conducted a qualitative examination of the most common keywords. Lastly, to gain insight into recent research trajectories, we categorized 342 papers published between 2020 and 2022 using the 41 primary categories outlined by the ERIC thesaurus 41 main categories<sup>1</sup>.

For efficiency of the classification, we first employed an automated content classification system previously used in our research<sup>2</sup>. This system proposed initial categorizations for each paper based on the author keywords and ERIC Thesaurus indices. Subsequently, both authors of this study independently reviewed the bibliographic details, abstracts, and related information of each article. After comparing their evaluations with the system's initial suggestions, the most appropriate category was then assigned. The interface of this process is depicted in the Appendix. The system also had the capability to compute the degree of discrepancy between the classification by the two authors and computed the Kappa value for inter-rater reliability. Discrepancies in categorization led to online discussions among categorizers for resolution. With a Kappa value of 0.65, our findings indicate moderate agreement, affirming the moderate consistency in categorization outcomes by our team (Landis & Koch, 1977).

## 4. RESULT

### 4.1 Journal Submissions Analysis

NTNU and NIE have submitted papers across 361 journals over the years. The journal with the highest number of submissions is the "Journal of Research in Education Sciences" (n=193). This is followed by "Computers & Education" (n=172) and the "Asia Pacific Journal of Education" (n=127).

#### 4.1.1 Overall Submissions Descriptive Statistical Analysis

Figure 1's top plot displays the yearly count of unique journals for NIE (red squares) and NTNU (blue circles). The bottom plot charts each university's annual paper submissions, using the same color and shape cues. NIE researchers publish in approximately 37.6 unique journals per year (SD = 32.1, range = 1-90), showing greater diversity than NTNU researchers, who average 20.9 unique journals (SD = 19.8, range = 1-63). In terms of paper submissions, NIE's average is 59.8 papers per year (SD = 53.6, range = 1-155), while NTNU's average is 46.5 (SD = 47.1, range = 1-154). These data suggests a higher degree of publishing diversity and volume from NIE researchers compared to their NTNU counterparts.

It shows that both NIE and NTNU exhibit increasing trends in unique journal publications and paper submissions. NIE saw a surge from 2008 to 2014, then stabilized, while NTNU grew gradually, with acceleration from 2010 to 2021.

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<sup>1</sup> ERIC Thesaurus, <https://eric.ed.gov/?ti=all>

<sup>2</sup> Hao-ren Ke, Shun-hong Sie(2019). Exploring the Research Trends of Library and Information Science, 2006-2015. *Journal of Library and Information Science* 45(1):65-96 (April, 2019)

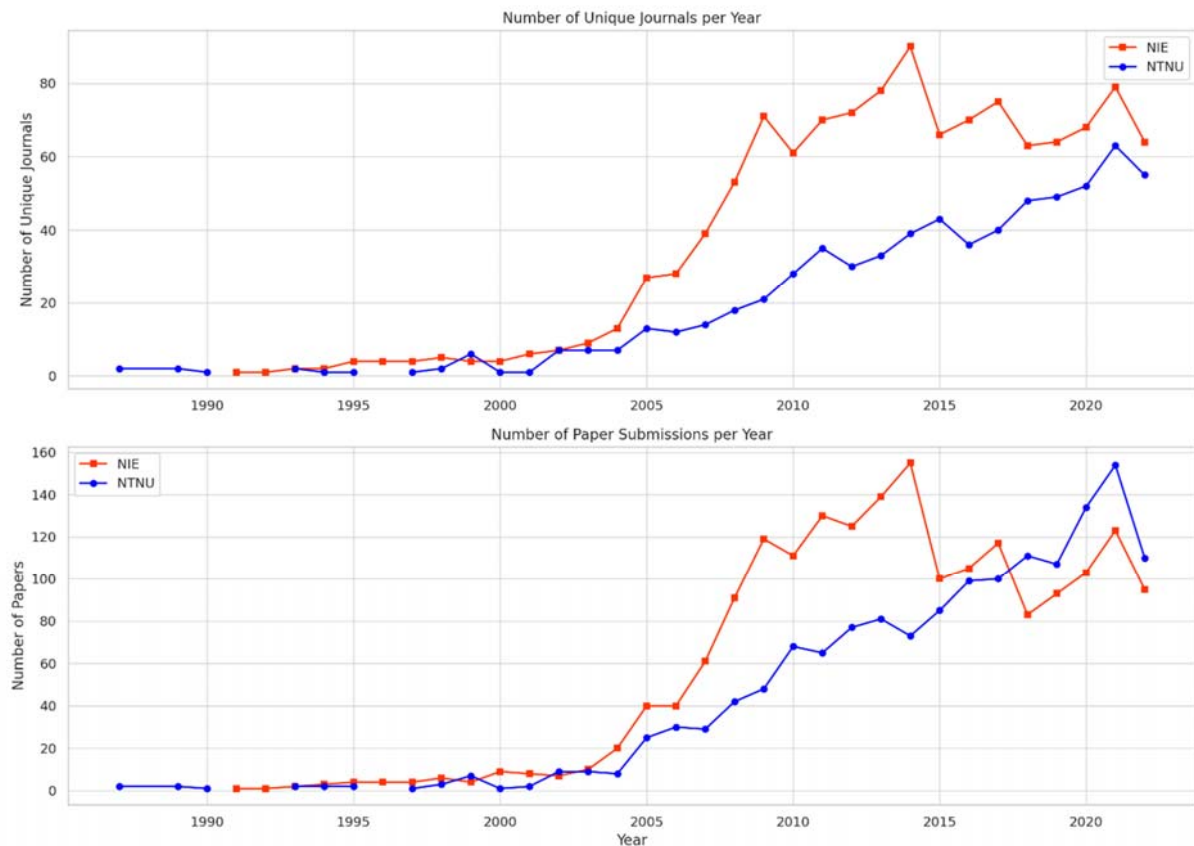


Figure 1. Number of unique journals and number of paper submissions over time by NIE and NTNU

Figure 2 plots the annual average papers per unique journal for NIE (red squares) and NTNU (blue circles). Both universities show fluctuations in average papers per unique journal, more pronounced for NTNU. NIE averages 1.43 papers (SD = 0.32, range = 1-2.25) and NTNU averages 1.86 (SD = 0.59, range = 1-2.75). These data show that NTNU researchers tend to submit more papers per unique journal compared to NIE researchers.

For NIE, the average number of papers per unique journal increased sharply around 2004 and then seemed to stabilize at a higher level compared to the earlier years. For NTNU, after around 2005, the average number of papers per unique journal for NTNU seems to be generally higher than for NIE, indicating that NTNU researchers might be focusing their efforts on a smaller set of journals compared to NIE.

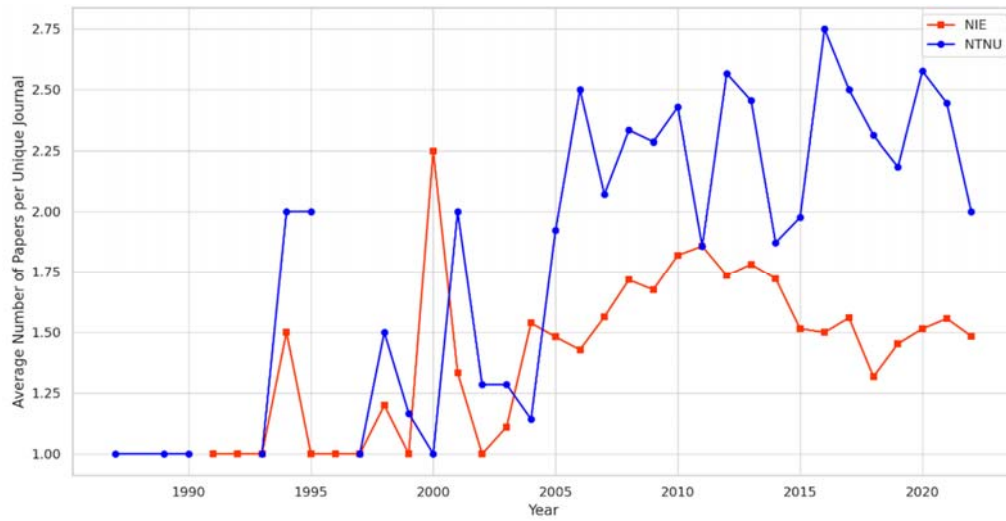


Figure 2. Average Number of Papers Submitted per Unique Journal.

Figure 3 shows increasing trends for NIE and NTNU in average number of authors, title and abstract word counts, and keyword usage per paper. From 2004, NTNU consistently surpassed NIE in these metrics, except for keyword usage where the difference is less pronounced.



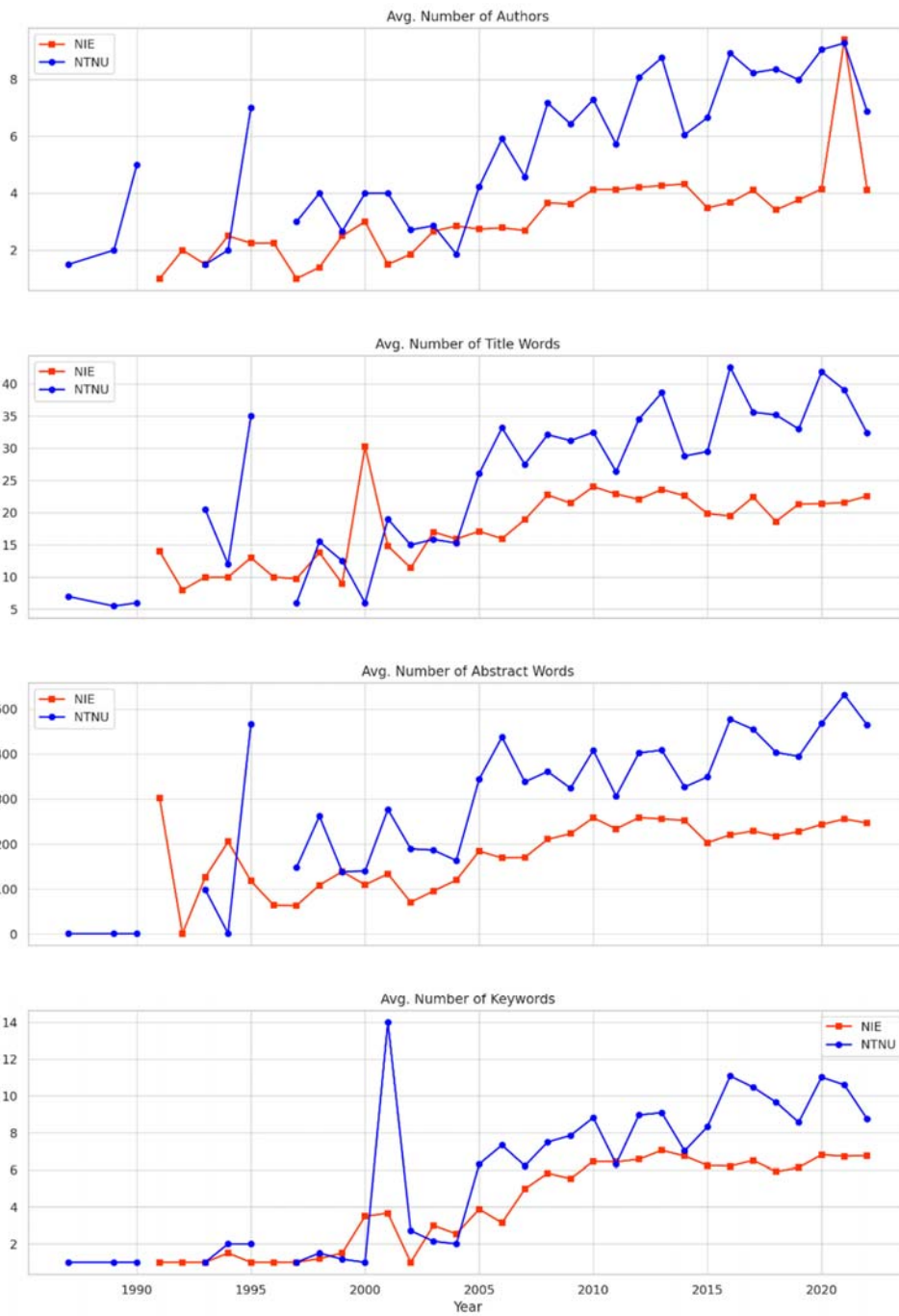


Figure 3. Average Number of Authors, Title Words, Abstract Words, and Keywords Over Time for Both NIE And NTNU

#### 4.1.2 Breakdown of Journal Submissions by University with Qualitative Interpretation

Figure 4 lists the top ten journals for submissions from NIE and NTNU, with "Asia Pacific Journal of Education" and "Journal of Research in Education Sciences" leading for NIE (n=120) and NTNU (n=193) respectively, indicating their prominent role in each institution's research output.

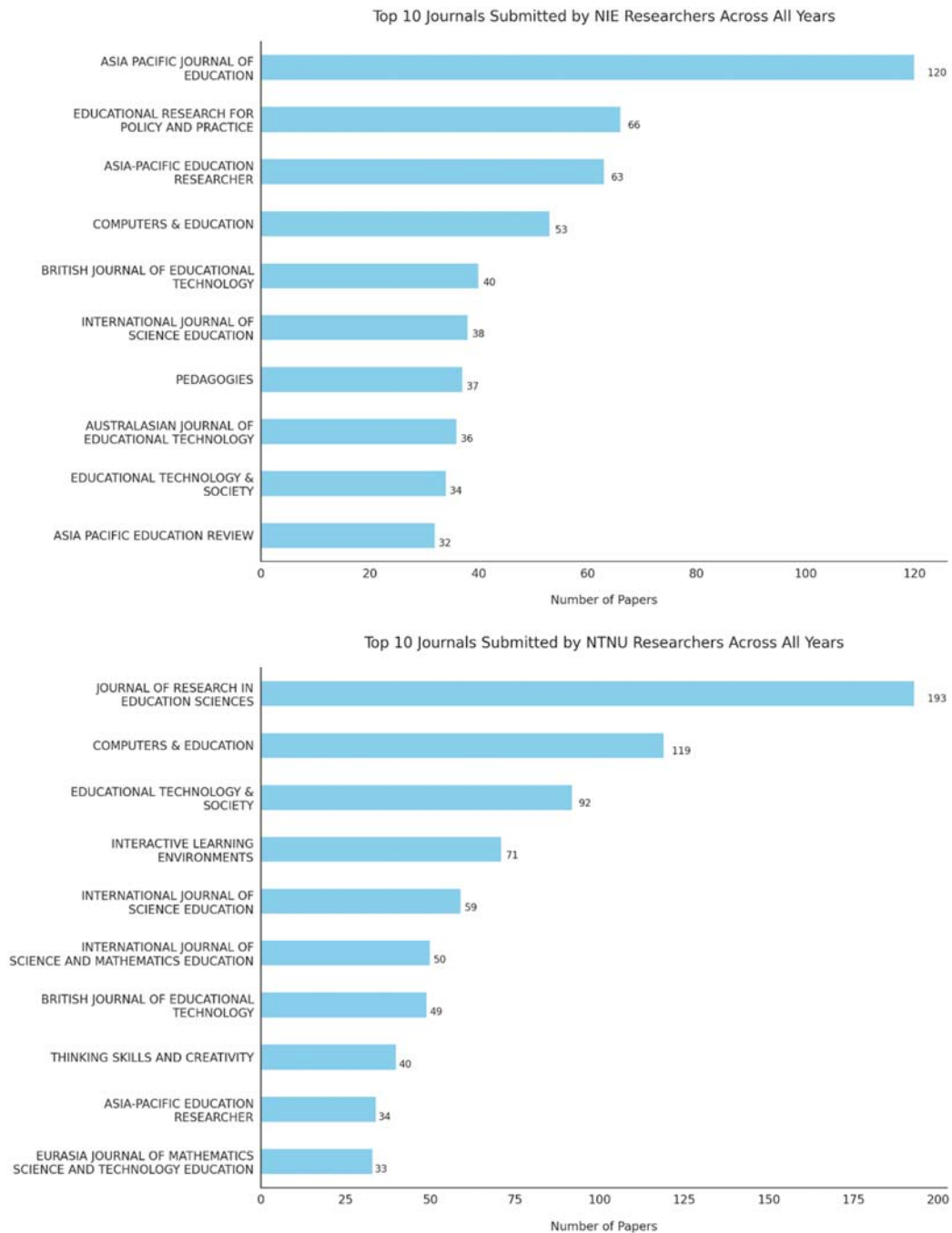


Figure 4. Top 10 Journals Submitted by NIE and NTNU Researchers Across All Years

Figure 5 compares the two universities' top 10 submissions using a heatmap. Each cell's color indicates the quantity, with darker shades representing more papers. The top section shows common journals, the middle, NIE-exclusive, and the bottom, NTNU-exclusive, all ranked by total submissions.

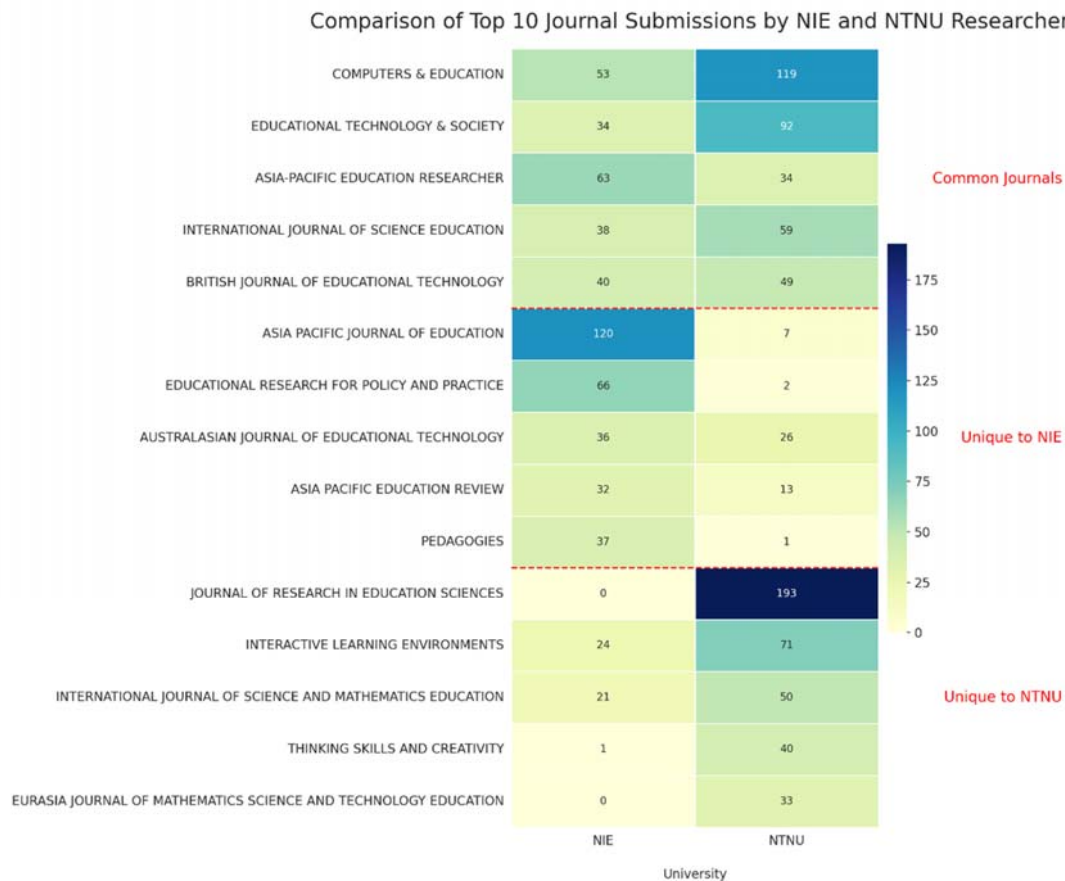


Figure 5.

It shows that both NIE and NTNU researchers frequently submit to five shared journals, with "Computers & Education" and "Educational Technology & Society" receiving the highest total submissions from both universities, indicating a common emphasis on the intersection of education and technology.

Of NIE's top 10 journals, five are not present in NTNU's list. These include "Asia Pacific Journal of Education" (n=7), "Educational Research for Policy and Practice" (n=2), and "Pedagogies" (n=1) with relatively low submission rates from NTNU. On the other hand, "Australasian Journal of Educational Technology" (n=26) and "Asia Pacific Education Review" (n=13) have attracted a more considerable number of submissions from NTNU.

Similarly, five journals that rank in NTNU's top 10 are not featured in NIE's equivalent list. These encompass "Journal of Research in Education Sciences" (n=0), "Thinking Skills and Creativity" (n=1), and "Eurasia Journal of Mathematics Science and Technology Education" (n=0), where NIE's submission rates are notably low. However, "Interactive Learning Environments" (n=24) and "International Journal of Science and Mathematics Education" (n=21) have drawn a substantial number of submissions from NIE.

## 4.2 Author Keywords Analysis

We found that, of the 6,903 keywords used by NTNU and NIE, only 502 are common, indicating either varied terminology for similar concepts or a broad scope of distinct research areas between the two institutions. Figure 6 shows the top 10 most frequently used keywords across both universities.

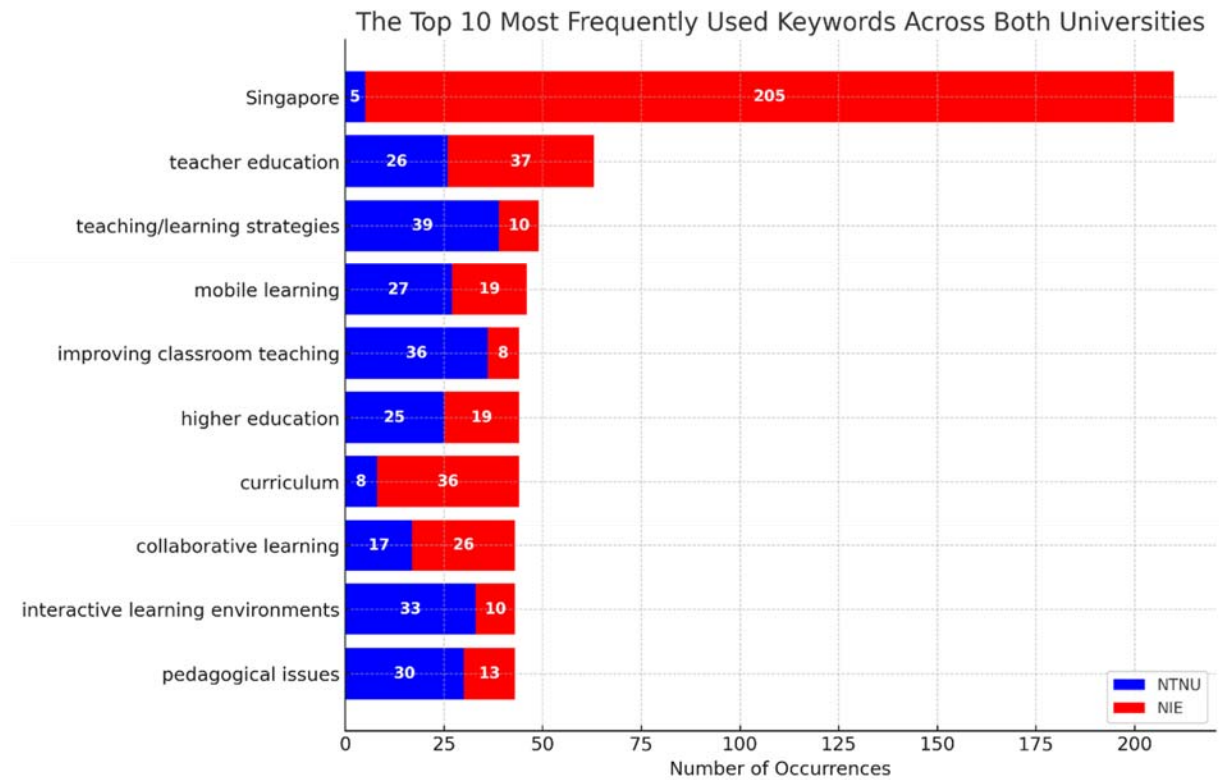


Figure 6.

Figures 7 to 9 chart the top 10 keyword usage from 1999 to 2022. Figure 7 showcases the keywords that top the list when combining the usage from both NTNU and NIE. Figure 8 focuses on NIE's top 10 keywords, also showing NTNU's usage, while Figure 9 does the reverse. Each subplot represents a keyword, with NTNU marked by solid blue lines and circles, and NIE by dashed red lines.

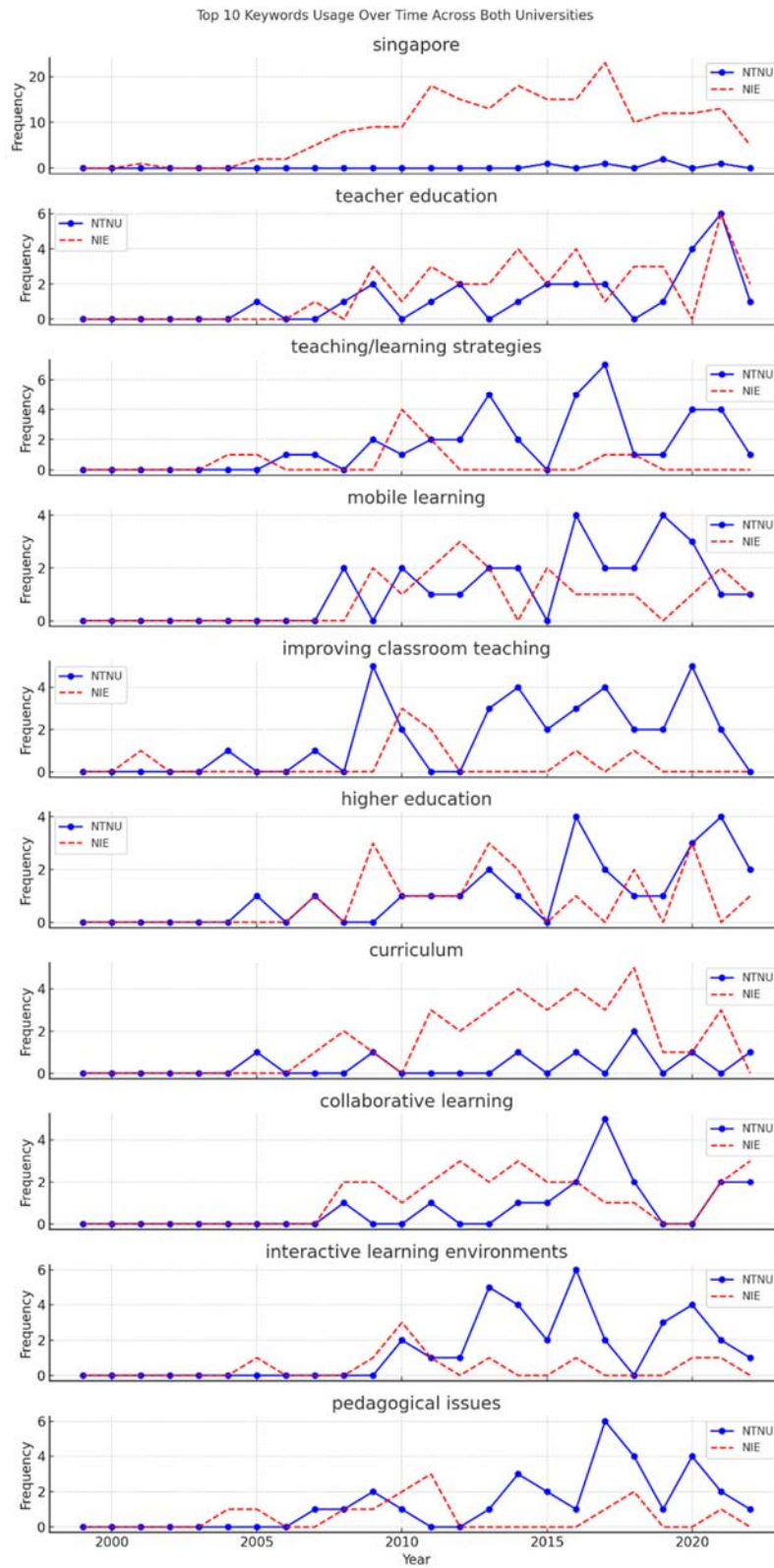


Figure 7.

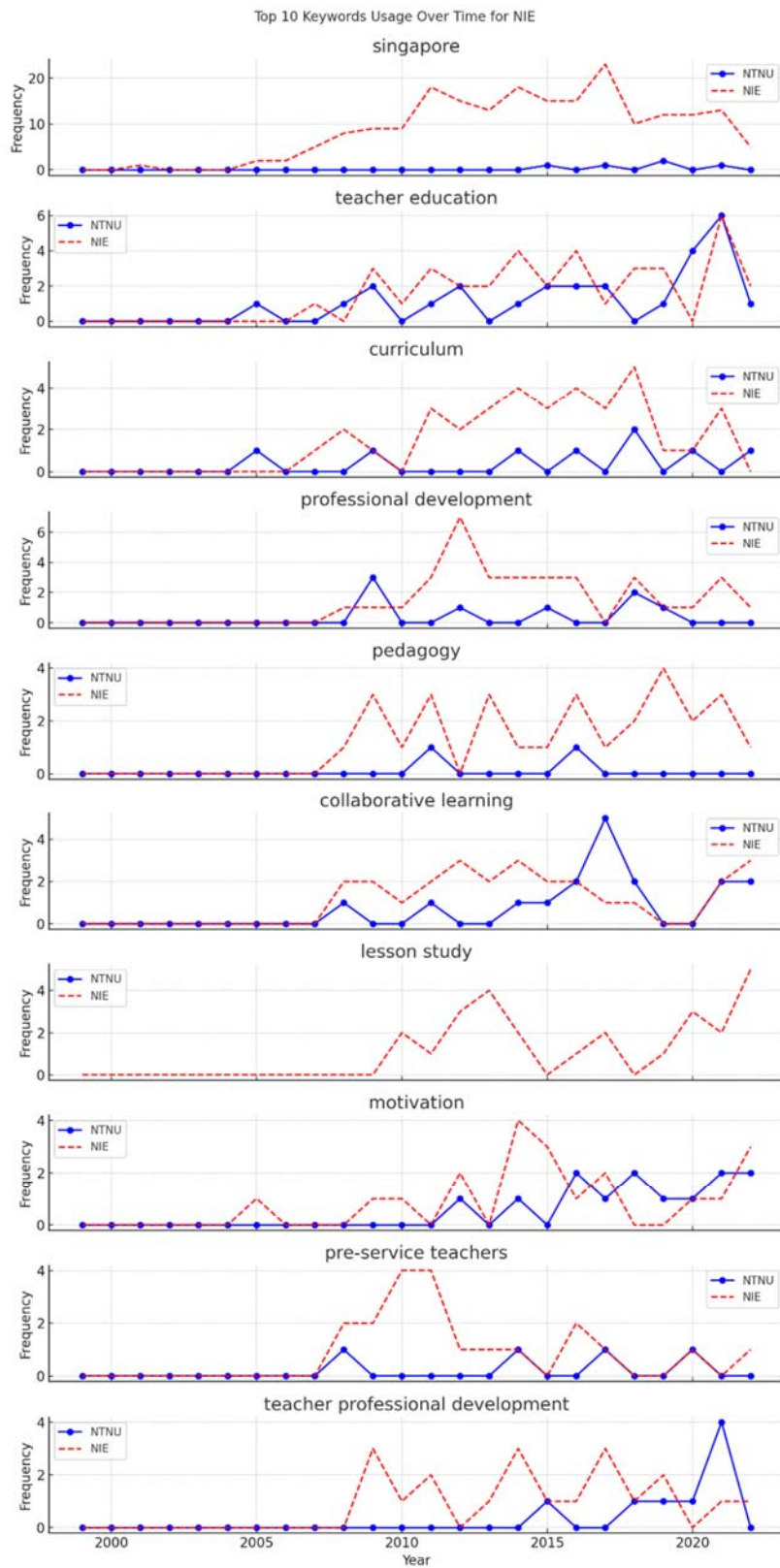


Figure 8



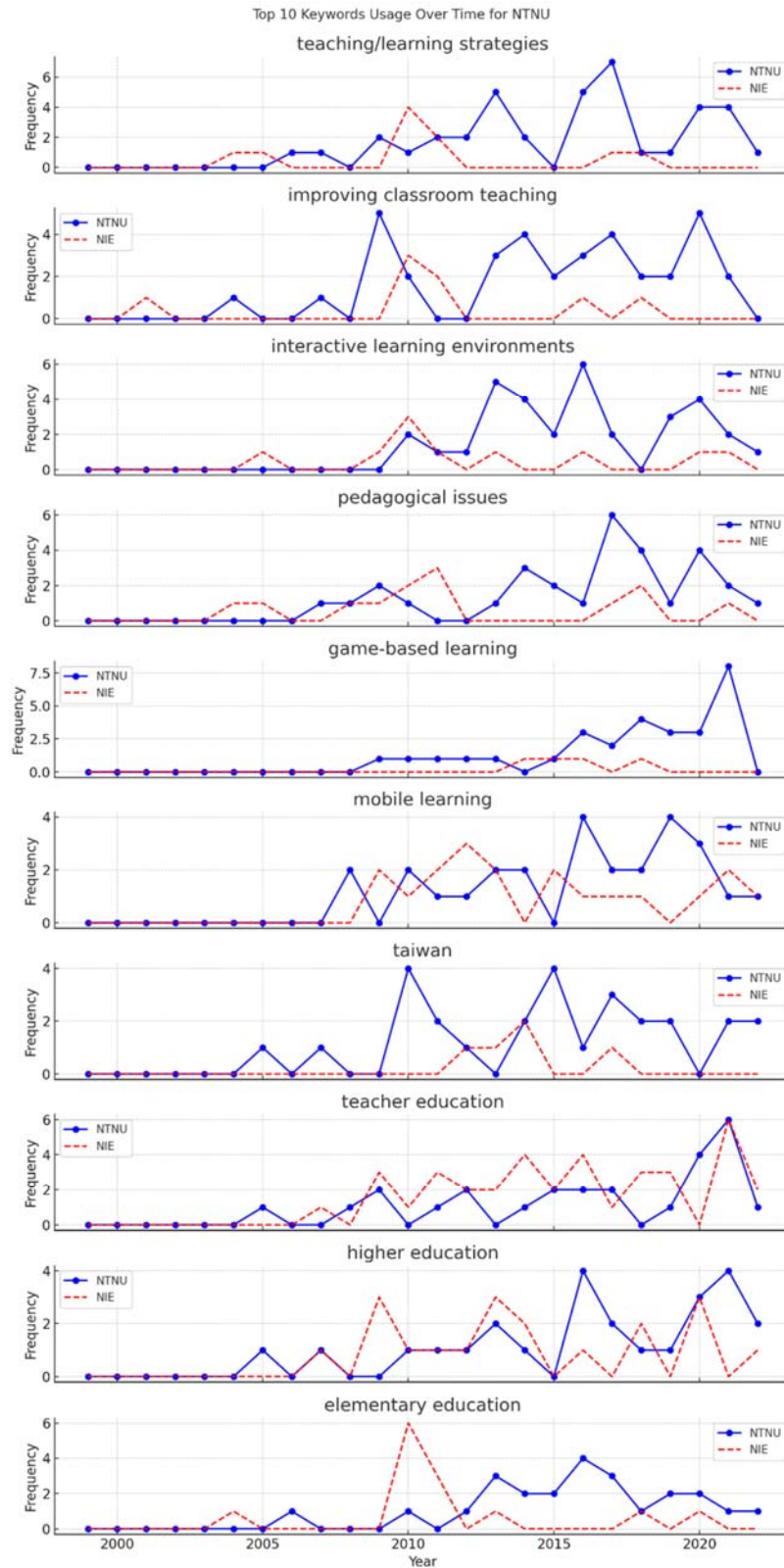


Figure 9. Top 10 Keywords Usage Over Time for NTNU, in Comparison to NIE

Figure 7 reveals the following patterns:

- "Singapore" is a keyword heavily favored by NIE, with usage significantly rising after 2010.
- "Teacher Education" sees consistent usage at both universities, with a slight edge at NIE.
- "Teaching/Learning Strategies" remains a steady choice at NTNU, while NIE's usage is sparse, save for a surge in 2010.
- "Mobile Learning" sees increased interest from both universities from 2008 to 2015. However, while NIE's interest wanes post-2015, NTNU's remains.
- "Improving Classroom Teaching" is more commonly used by NTNU.
- "Higher Education" and "Interactive Learning Environments" find more usage at NTNU, with the latter gaining traction since 2012.
- "Curriculum" is a recurrent theme at NIE, with NTNU's interest relatively low.
- "Collaborative Learning" is more frequently mentioned at NIE, apart from a brief surge at NTNU in 2016-2017.
- "Pedagogical Issues" has been a consistent focus at NTNU since 2006.

Figure 8 highlights that "professional development", "pedagogy", "lesson study", "pre-service teachers" and "motivation" are keywords prevalent in NIE's research, but find minimal usage at NTNU. An exception is "Teacher professional development," which sees a spike at NTNU in 2021.

Figure 9, on the other hand, showcases NTNU's growing emphasis on "Game-based learning" since 2015, a trend not echoed by NIE.

#### **4.3 Paper Classification Using ERIC Categories**

Utilizing 41 ERIC categories, we classified 342 papers from NTNU and NIE. Excluding "reviews" and "non-research articles," the most predominant category is "Educational Process: Classroom Perspectives." While NIE primarily focuses on this category, NTNU's primary emphasis lies in "Learning and Perception," as visualized in Figure 10 (with NIE represented by red bars and NTNU by blue bars).

Categories like "Agriculture and Natural Resources," "Disabilities," "Health and Safety," "Labor and Employment," "Languages," and "People and Cultures" have minimal representation, with only one paper each. Categories absent for both institutions include 'Business, Commerce, and Industry', 'Counseling', 'Economics and Finance', 'Equipment', 'Facilities', 'Government and Politics', 'Human Geography', 'Occupations', 'Publication/Document Types', and 'Social Problems'.





Figure 10.

In Figure 11, cross symbols represent ERIC thesaurus categories, detailing the distribution of research papers between NIE and NTNU. The cross size reflects the combined paper count for both institutions in that category. Its position indicates whether one institution dominates a category or if the category is exclusive to one institution. For clarity, only categories with more than four papers are labelled.

NIE outnumbers NTNU in these categories: 'Educational Process: Classroom Perspectives', 'Research and Theory', 'Educational Process: Societal Perspectives', 'Mathematics', 'Subjects of Instruction', and 'Bias and Equity'. Conversely, NTNU leads in 'Individual Development and Characteristics', 'Learning and Perception', 'Science and Technology', 'Educational Process: School Perspectives', 'Language and Speech', and 'Arts'.

Exclusive categories for NIE include 'Physical Education and Recreation', 'Social Processes and Structures', 'Students, Teachers, School Personnel', 'Disabilities', and 'Peoples and Cultures'. For NTNU, unique categories comprise 'Communications Media', 'Health and Safety', 'Labor and Employment', 'Languages', 'Reading', 'Tests and Scales', and 'Agriculture and Natural Resources'.

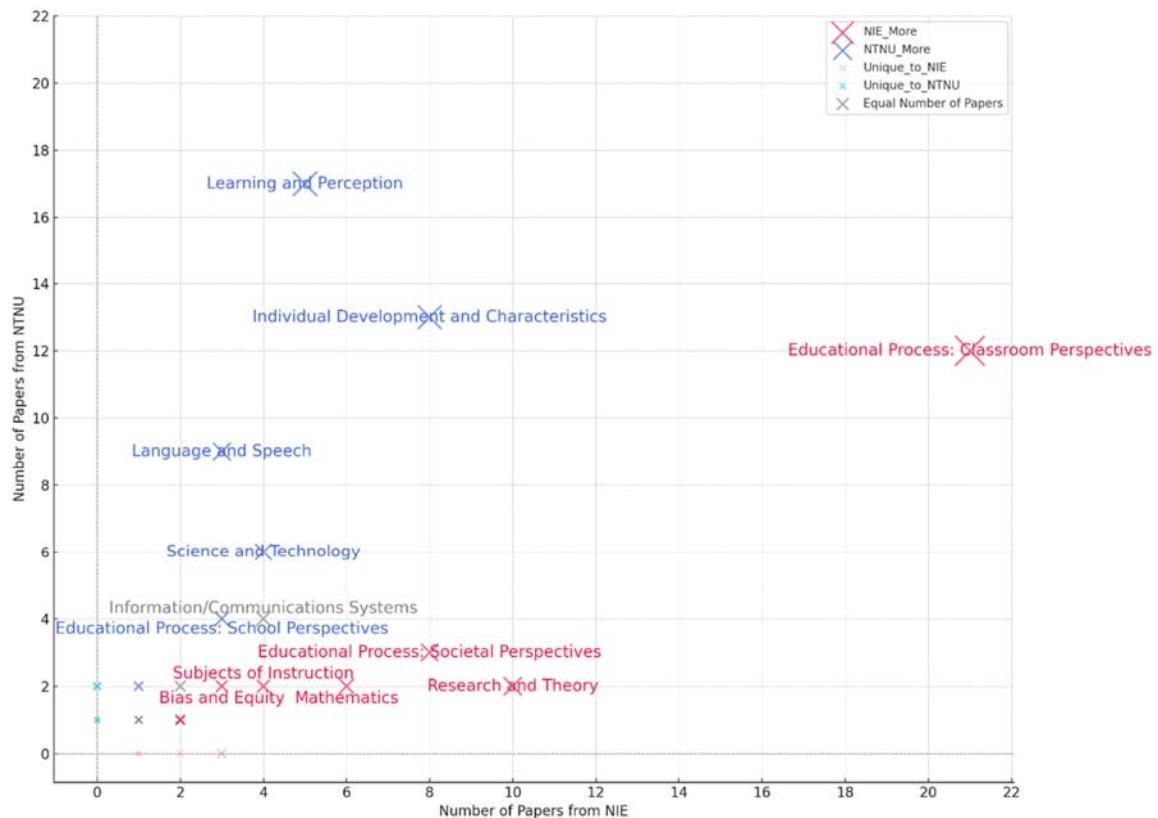


Figure 11. Chart showing ERIC categories that 1) NIE has more papers than NTNU, 2) NTNU has more papers than NIE, 3) are unique to NIE and 4) are unique to NTNU

## 5. DISCUSSION

### 5.1 Journal Submission Patterns of NIE and NTNU Researchers

Both NIE and NTNU have experienced an uptick in research outputs, as indicated by an increase in unique publication venues and paper submissions. Specifically, NIE's growth was particularly pronounced from 2008 to 2014 and later reached a plateau, while NTNU observed a steady growth trajectory, especially between 2010 and 2021. These institutional trends mirror the global research landscape. For instance, Tosun (2021) highlighted significant publication surges in 1980, 2008, and 2019. Similarly, Huang et al. (2020) noted an increased publication rate between 2008–2014, with a substantial uptick starting in 2015.

A notable trend in the research from both institutions is the rise in co-authorship, suggesting a move towards collaborative research endeavors. This aligns with findings from Sezgin et al. (2022), who documented an increased prevalence of multi-authorship in educational research, emphasizing its evolving, collaborative, and international character.

Despite these similarities, divergences in publishing strategies between NIE and NTNU have been observed. NIE researchers exhibit a more diverse range of publications and a higher volume of output. In contrast, NTNU researchers, while also prolific, tend to contribute more papers to individual journals than

their NIE peers. This suggests distinct publication strategies or institutional preferences between the two entities.

## 5.2 Unique and Shared Research Interests of NTNU and NIE Researchers: Insights from Journal Submissions

Research submission data reveals both NTNU and NIE emphasize the intersection of education with technology. Consistent with Tosun (2021), both institutions predominantly submit to "Computers & Education" and "International Journal of Science Education" — reflective of global educational research trends.

Furthermore, when we explore journals receiving significant submissions from both institutions, yet not top-ranked for either, more collaborative potential emerges. Notable shared interests are evident in the "Australasian Journal of Educational Technology" (NIE=36, NTNU=26), "Asia Pacific Education Review" (NIE=32, NTNU=13), "Interactive Learning Environments" (NIE=24, NTNU=71), and "International Journal of Science and Mathematics Education" (NIE=21, NTNU=50). These shared interests, spanning educational technology, science and mathematics education, and interactive learning environments within the Asia Pacific context, could spur collaborative endeavors.

On the other hand, divergences in journal submissions underscore unique research priorities. NIE's frequent submissions to the "Asia Pacific Journal of Education", "Educational Research for Policy and Practice", and "Pedagogies" could suggest a particular emphasis on policy, practice, and pedagogical studies within the Asia Pacific. This aligns with Nylander and Tan (2022), who pinpoint Singapore's research predominantly focuses on pedagogical practices. In contrast, NTNU's substantial submissions to "Journal of Research in Education Sciences", "Thinking Skills and Creativity", and "Eurasia Journal of Mathematics Science and Technology Education" may indicate a focus on creative thinking skills and STEM education.

## 5.3 Keyword Trends: Distinguishing NIE and NTNU's Research Focuses

A close examination of keyword usage from NIE and NTNU over the years illuminates the evolving research emphases of both institutions:

- **Regional versus Global Focus:** The keyword "Singapore" is dominant in NIE's research, reflecting a strong regional focus. Conversely, NTNU's lower usage of "Taiwan" suggests a more global or non-region-specific research approach. This divergence may indicate NIE's role in shaping Singapore's education system and its commitment to tackling local educational challenges, while NTNU may be oriented towards broader, more universally applicable research.
- **Pedagogical Practices, Strategies, and Issues:** Both universities frequently use "Teacher Education," but their contrasting usage of "Teaching/Learning Strategies," "Improving Classroom Teaching," and "Pedagogical Issues" implies diverging research interests and approaches. NTNU's consistent usage of these keywords suggests a systematic exploration of pedagogical methodologies, instructional enhancement, and broader pedagogical challenges. In contrast, NIE's intermittent usage might indicate a more targeted approach, perhaps focusing on specific strategies or interventions.
- **Technology Integration in Education:** The surge in "Mobile Learning" from 2008-2015 at both universities aligns with the global trend of integrating technology into education. However, NTNU's sustained interest post-2015, coupled with the higher frequency of "Interactive Learning Environments" and the emerging focus on "Game-based learning" since 2015, suggests a continued emphasis on investigating the transformative potential of technology in education. In contrast,

NIE's decreased usage of "Mobile Learning" and lower frequency of "Interactive Learning Environments" might reflect a shift towards other emerging areas of educational research.

- **Collaboration vs. Individual Learning:** NIE's higher usage of "Collaborative Learning" could reflect a belief in the value of social learning strategies. Conversely, NTNU's consistent usage of "Interactive Learning Environments" and "Game-based learning" could signify a focus on individualized, technology-enhanced learning.
- **Profession Development and Higher Education:** The keywords "professional development," "pedagogy," and "pre-service teachers" are more frequently used in NIE research papers, suggesting a higher interest in research areas pertaining to professional development in education. On the contrary, NTNU's negligible usage of these keywords suggests less focus on these topics. Rather, NTNU's higher usage of "Higher Education" could suggest a focus on issues and practices in tertiary education.

#### 5.4 Keyword Patterns in NIE and NTNU Publications vs. Global Trends

Our bibliometric analysis, set against the backdrop of global educational research, reveals both clear parallels and noteworthy differences. A significant alignment is observed in the top keywords from both the global studies by Huang et al. (2020) and Tosun (2021) and our analysis. Terms such as "Higher education", "Interactive learning environment", "Teaching/learning strategies" and "Teacher education" are prominently featured. These keywords underscore universally relevant themes, indicating foundational topics that have widespread resonance in educational research.

However, certain keywords prominent in global studies were notably absent from our top ten list, including "Human capital", "Computer-mediated communication", "Media in education", "Equity and social justice" and "Gender". The absence of digital themes, like "Computer-mediated communication" and "Media in education", might suggest either a different pace of digital adoption or a unique set of research priorities in Singapore and Taiwan. The lack of emphasis on "Gender" and "Equity and social justice" might allude to specific socio-cultural perspectives, implying that these issues might be enveloped within broader topics rather than isolated as separate research avenues. The diminished presence of "Human capital" could suggest a regionally focused, pedagogy-centric research environment, emphasizing the quality and process of education over its economic aspects.

#### 5.5 Insights from ERIC Category Classification: Unique and Shared Research Interests of NIE and NTNU

The distribution of research papers across ERIC categories reveals a strong emphasis by both NTNU and NIE on "Classroom Perspectives", "Learning and Perception", and "Individual Development". Conversely, areas like "Government and Politics", "Economics and Finance", "Counseling", and "Human Geography" seem less prominent in the research outputs from these institutions. However, it's essential to recognize that the absence or scant presence in specific categories doesn't inherently suggest a disinterest or neglect of those areas. For a more holistic comprehension of the research nuances at these institutions, a meticulous examination of individual papers within each category, accompanied by a qualitative content review, would offer deeper insights.

A notable observation from the data is the dominant presence of both institutions within the "Educational Process: Classroom Perspectives" category. NIE's larger volume of papers in this category suggests an especially deep concentration or expertise. Additionally, both institutions have showcased research under "Individual Development and Characteristics", with NTNU slightly ahead. Furthermore, NIE's distribution of papers points towards a highly focused research interest, given that the volume of papers in other categories is markedly less compared to the "Educational Process: Classroom Perspectives"

category. This concentrated approach aligns with literature findings that depict Singapore's research methodology as centralized and practically-oriented (Nylander & Tan, 2022).

In contrast, NTNU displays a more diversified research interest, spanning topics such as "Learning and Perception", "Individual Development and Characteristics", and "Language and Speech". This eclectic approach resonates with Tosun (2021)'s observation of Taiwan as a dynamic contributor in diverse educational fields, covering domains like "Teaching Strategies", "E-Learning", "Pedagogical Issues", and more.

## **6. CONCLUSION & FUTURE WORK**

Our analysis of research outputs from NIE and NTNU over the years has provided insights into their evolving academic landscapes. *Publication Dynamics*: Both NIE and NTNU have witnessed growth in their research outputs, reflecting a broader global trend. There's evident variability in publishing strategies, with NIE showcasing greater publishing diversity, while NTNU researchers frequently submit to specific journals. *Keyword Analysis*: Analysis of top journal submissions indicates a shared emphasis on the intersection of education and technology. However, specific journals hint at potential collaboration areas and unique research focus points for each institution. There are shared and distinct keyword trends between NIE and NTNU, reflecting both shared concerns and unique institutional priorities. Globally resonating themes like "Higher Education" and "Interactive Learning Environment" are consistently prevalent in research from both institutions. Yet, there are clear regional deviations, with keywords like "Human Capital" and "Gender" less frequent in Singaporean and Taiwanese research. *ERIC Category Insights*: A strong research emphasis at both institutions centers on "Classroom Perspectives", "Learning and Perception", and "Individual Development and Characteristics". However, the distribution reveals a more specialized focus for NIE, whereas NTNU has a more diversified interest.

In summation, while NIE and NTNU both contribute substantially to global educational research trends, they also manifest distinctive research priorities. Their collective output emphasizes not just global themes but also region-specific nuances, possibly influenced by their respective socio-cultural and institutional contexts.

A first future work includes expert validation, which is to engage NIE and NTNU researchers to validate and contextualize the study's findings. Their insights can help confirm whether the keyword usage trends identified align with their lived institutional experiences and domain knowledge. Where discrepancies exist, they can provide valuable explanations and identify factors driving the evolution of research focus over the past two decades.

A second direction would be a more in-depth analysis of the keyword dataset using advanced machine learning techniques. A word embedding model, such as Word2Vec, could be employed to analyze semantic similarities between different keywords, potentially unearthing related research themes across a broader scope. Network analysis could further be applied to the co-occurrence of keywords to elucidate the structure and interconnections between research topics at the two universities. This could reveal unique insights into the evolution and interrelation of research themes over time.

## APPENDIX. Interface Of the Automated Content Classification System

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Review:139	
刊名	JOURNAL OF RESEARCH IN EDUCATION SCIENCES
年份	2021
題名	Between "Push" and "Pull"?-An Analysis of Taiwan's "Brain Drain" and Possible Solutions from the Perspective of Push-Pull Theory: The Examples of Ph.D. Holders in the U.S
關鍵字	brain drain; globalization; students overseas; Push-Pull Theory; In-and-Out System
作者	Jheng, Ying-Jie Chang, Chen-Wei
摘要	In response to the effects of globalization, to keep ahead of the competition countries worldwide strive to cultivate more talented people through higher education systems as well as by recruiting talent from other countries, particularly Ph.D. holders. The Taiwan government, which is no exception in this fight for talent, faces the challenge of "brain drain." This study, rooted in "Push-Pull Theory," first examined the possible "push," "pull," and personal factors that exacerbate the brain drain phenomenon in Taiwan (i.e., emigration of Ph.D. holders from Taiwan to other countries) and then provided some possible solutions. To this end, the study interviewed 14 Ph.D. holders who chose to stay in the United States after graduating. According to the current results, the "push" is related to the weakness of Taiwanese higher education (i.e., red tape during the recruitment process, the prevalence of nepotism, and the unclear roles of professors). By contrast, the "pull" of the United States are related to the strength of its higher education (i.e., the simplicity of the recruitment process, the lack of nepotism, and the roles of professors being clearly defined). Furthermore, personal factors, particularly those involving policies that draw talented people overseas, include instability and lack of long-term plans. Based on the results, the end of the study offers some policy suggestions, including creating an "In-and-Out System," building a "Bonding System," and simplifying the application process.
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choice ...	
<input checked="" type="radio"/> Human Geography(1)	
<input type="radio"/> Educational Process: Classroom Perspectives(1)	
<input type="button" value="確認"/>	

## REFERENCE

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# Long-term Progress of DOI Links on Wikipedia

## Comparative Analysis of English and Japanese Wikipedia from 2015 to 2023

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### ABSTRACT

*Background.* Scholarly documents referenced on Wikipedia play important roles in improving the quality of Wikipedia articles, and the references using DOI links are desirable for permanent access and correct identification. However, few studies have conducted long-term observation and analysis of the addition of DOI links for scholarly references on Wikipedia.

*Objectives.* The study aims to clarify the long-term trends in the scholarly references on the English and Japanese Wikipedia from 2015 to 2023 using DOI links and associated Wikipedia articles.

*Methods.* We extracted DOI links and Wikipedia articles containing them from Wikipedia dump files. Additionally, we obtained DOI Registration Agency (RA), Crossref metadata, and Essential Science Indicators categories, integrating them accordingly. We investigated (1) the statistics of DOI links and associated Wikipedia articles, (2) the difference and product sets from Wikipedias, (3) the top contents highly referenced on each Wikipedia, and (4) distributions of the DOI registration years/published years on DOI links newly added to English and Japanese Wikipedia.

*Results.* (1) The diversities of RAs for DOI links increased in both Wikipedia from 2015 to 2023. (2) DOI links referenced in both Wikipedias increased five times from 2015 to 2023. Notably, unique DOI links referenced on Japanese Wikipedia (not overlapping with English Wikipedia) increased ten times. (3) DataCite DOIs have emerged among the top five contents in English and Japanese Wikipedia as of 2023. Three of the top five contents in Japanese Wikipedia were JaLC DOIs, all written in Japanese. (4) For DOI links added after 2015, most references in both Wikipedia point to scholarly articles published before 2015.



*Contributions.* We clarified the long-term progress of adding DOI links as scholarly references on English and Japanese Wikipedia from 2015 to 2023. The findings of this study contribute to understanding the characteristics of DOI links referenced on Wikipedia and the trend of activities related to scholarly content on Wikipedia communities, as well as applications to Altmetrics studies.

## INTRODUCTION

Along with the digitization of scholarly communication, numerous scholarly documents have been referenced and used on the Web. One of the changes arising from the development and dissemination of scholarly information infrastructures on the Web is the utilization of scholarly documents by various people and communities, including readers other than traditional ones, such as researchers and specialists. As such an example, there are many references and access to scholarly documents via Wikipedia. According to Crossref, which is the largest DOI registration agency and assigns Digital Object Identifiers (DOIs) to scholarly documents at a large scale, Wikipedia is one of the largest referrers of Crossref DOIs as of 2015 (Bilder, 2015).

Scholarly documents referenced on Wikipedia as information sources play important roles in both complementing Wikipedia's core content policy of "verifiability," "neutral point of view," and "no original research," and improving the quality of Wikipedia articles. For permanent access and correct identification of each content, referencing the resource as URIs using DOI (i.e., DOI links, which is consisted of [https://doi.org/\[DOI\]](https://doi.org/[DOI])) is desirable. In addition, it is essential for each language Wikipedia to be added new DOI links as many as possible continuously to cover the wide and latest academic knowledge for the general public. Therefore, long-term observation and analysis of the addition of DOI links as scholarly references on Wikipedia are necessary to understand their trends.

Traditional citation analysis in the field of bibliometrics has focused on long-term analysis of citation relationships among scholarly articles (e.g., citing/cited half-life). On the other hand, references/mentions to scholarly articles on the Web have been actively studied as Altmetrics, which stands for alternative metrics research (Priem, Taraborelli, Groth, & Neylon, 2011; Sugimoto, Work, Larivière, & Haustein, 2017). However, few studies focused on long-term observation and analysis of scholarly communication through the Web have been conducted so far, regardless of their importance in traditional citation analysis. As one of the few such studies, Taylor (2023) analyzed over a decade evolving trends of five Altmetrics sources, i.e., Twitter, Mendeley, News, Blogs, and Policy documents. But the analysis of the long-term trends in scholarly references on Wikipedia is still lacking so far, to the best of our knowledge.

In particular, most previous studies of scholarly references on Wikipedia have analyzed these references on the latest version of each Wikipedia article at the time point when each investigation was conducted; hence, few studies have investigated the long-term progress in scholarly references on Wikipedia. In addition, the authors previously revealed that most DOI links on Japanese and Chinese Wikipedia articles were imported through the translation from English Wikipedia articles (Kikkawa, Takaku, & Yoshikane, 2016); however, whether this trend has continued over time is unclear. In addition, the number of DOIs registered by Japan Link Center, the only DOI registration agency in Japan, has been increasing rapidly since 2016 (Japan Link Center, 2023). Thus, the number of scholarly references corresponding to these DOIs could be growing in Japanese Wikipedia, but the current status of these references is unknown. Therefore, the investigation from these perspectives is essential for revealing the current status of scholarly references on Wikipedia and identifying what kind of support is needed to enhance these references.

Considering this background, as one of the earliest studies, we clarify long-term progress in scholarly references on Wikipedia as an online encyclopedia community through a comparative analysis of DOI links referenced on English and Japanese Wikipedia as of March 2015 and July 2023. Specifically, we examine (1) changes in the number of DOI links and Wikipedia articles containing them, (2) changes in the overlap of DOI links within/between English and Japanese Wikipedia from 2015 to 2023, (3) the top contents highly referenced on English and Japanese Wikipedia in 2015 and 2023, and (4) the relationship between DOI registration year and published year of each content and addition to Wikipedia articles, i.e., the relationship between DOI links newly added to these Wikipedia since March 2015 and the DOI registration years and published years of the corresponding DOI links.

## **RELATED WORK**

### **Analysis of scholarly references on Wikipedia**

Scholarly bibliographic references on Wikipedia have been analyzed considering various perspectives: (1) whether the scholarly articles published in high-impact factor journals tend to be more referenced on Wikipedia (Nielsen, 2007; Teplitskiy, Lu, & Duede, 2017); (2) whether the scholarly articles published in open access journals tend to be more referenced on Wikipedia (Fenner & Lin, 2014; Pooladian & Borrego, 2017; Teplitskiy et al., 2017); (3) whether the references on Wikipedia are usable as a data source for research evaluations (Kousha & Thelwall, 2017); (4) investigations regarding the characteristics of Wikipedia articles with scholarly references (Pooladian & Borrego, 2017); (5) investigations regarding the references focused on specific identifiers (e.g., DOI, arXiv, ISSN, and ISBN) (Halfaker, Bahodir Mansurov, Redi, & Taraborelli, 2019; Kikkawa et al., 2016; Kikkawa, Takaku, & Yoshikane, 2020b) or research fields (Kousha & Thelwall, 2017; Pooladian & Borrego, 2017); and (6) the editors and their edits for adding scholarly references to Wikipedia (Kikkawa, Takaku, & Yoshikane, 2020a, 2021, 2023).

Of the previous studies described above, the closest one to this study is Kikkawa, Takaku, & Yoshikane (2016), which analyzed DOI links referenced in the English, Japanese, and Chinese Wikipedia as of March 2015. They revealed that the majority of DOI links on Japanese and Chinese Wikipedia overlapped with English Wikipedia due to the translation from English Wikipedia articles to Japanese or Chinese Wikipedia articles. While Kikkawa, Takaku, & Yoshikane (2016) and this study are common in analyzing DOI links on English and Japanese Wikipedia, this study differs in conducting a comparative analysis of these Wikipedia between 2015 and 2023 to reveal whether the high overlap rate of DOI links as of 2015 is still seen on these Wikipedia as of 2023 or not, along with the factors. For other previous studies, see the Section 2.1 in Kikkawa, Takaku, & Yoshikane (2023).

### **Long-term analysis of scholarly communication on the Web**

Several studies have analyzed scholarly communication on the Web, such as the scholarly use of social media and Altmetrics (Sugimoto et al., 2017); however, little is known about long-term trends of scholarly communication on the Web platforms, including Wikipedia.

As one of the few such studies, Fang & Costas (2020) focused on the speed of references/mentions to scholarly articles on the Web, and they proposed new indicators such as the Velocity index, Altmetric half-life, and Altmetric time delay. They reported that the velocity of Altmetric data accumulation varies from the service, for instance, slow pace in accruing data on Wikipedia, while very fast on Reddit, Twitter, etc. Taylor (2023) investigated the long-term trends of Altmetric behaviors on Twitter, Mendeley, News, Blogs, and Policy documents, and reported that quickness and slowness on the start/end of attention for scholarly articles vary from the platforms. These studies and this study are common in analyzing long-term trends of scholarly mentions/references on the Web, but this study differs in focusing on DOI links

referenced on English and Japanese Wikipedia, and investigating the trend of overlaps between/within Wikipedia.

## MATERIALS AND METHODS

### Dataset

We built the dataset using the method proposed by the authors (Kikkawa, Takaku, & Yoshikane, 2016, 2020b, 2022), shown in Figure 1. Concretely, the following steps were carried out.

**Step 1** We extracted DOI links and Wikipedia articles containing them from Wikipedia using dump files provided by Wikimedia Foundation (Wikimedia Foundation, 2023). We filtered the target to the DOI links referenced in the main namespace, i.e., the namespace for encyclopedia articles. The target was Japanese Wikipedia as of March 13th, 2015, and July 1st, 2023, and English Wikipedia as of March 4th, 2015, and July 1st, 2023, respectively. The extraction conditions were the same as those used by Kikkawa, Takaku, & Yoshikane (2016).

**Step 2** We identified the Registration Agency (hereinafter, “RA”) for each DOI and removed invalid DOIs using the Web API “Which RA?” (DOI Foundation, 2020, 2022).

**Step 3** We obtained Crossref metadata for each DOI whose RA was Crossref (hereinafter, “Crossref DOI”) using the Crossref REST API (Crossref, 2018, 2023) and extracted ISSN numbers for retrieving research field in the Step 4.

**Step 4** We associated the research fields of the Essential Science Indicators (ESI) categories with each DOI by matching ISSN numbers to the ESI journal list (Clarivate, 2023). This list represents journal names, research fields consisting of 22 categories, and ISSN numbers.

We stored the data obtained through the steps above in the dataset.

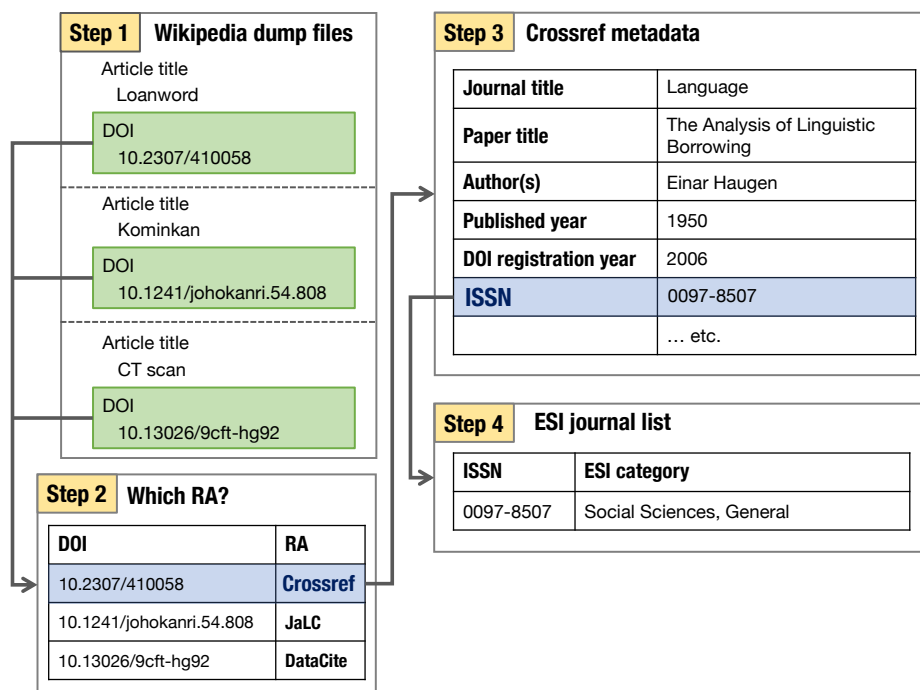


Figure 1. Overview of building the dataset

Table 1 shows data fields of the sample record in the dataset of English Wikipedia as of 2023. In this example, the DOI “10.2307/410058” is referenced in the English Wikipedia article “Loanword” as a DOI link (<https://doi.org/10.2307/410058>). The corresponding content to this DOI is the scholarly article titled “The Analysis of Linguistic Borrowing” authored by Einar Haugen, and published in the journal “Language” in 1950. The corresponding ESI category is “Social Sciences, General,” and the DOI was registered in 2006. The published year and DOI registration year were derived from the value of the key “issued” and “created” of Crossref metadata; the former is the earliest year of published in print or published online, and the latter is the year when the DOI was first registered (Crossref, 2018).

**Table 1.** Data fields of the dataset

#	Field	Example
1	Page title	Loanword
2	DOI	10.2307/410058
3	Registration Agency	Crossref
4	Journal title	Language
5	Paper title	The Analysis of Linguistic Borrowing
6	Authors	Einar Haugen
7	Published year	1950
8	DOI registration year	2006
9	ISSN	0097-8507
10	ESI category	Social Sciences, General

## Analysis Methods

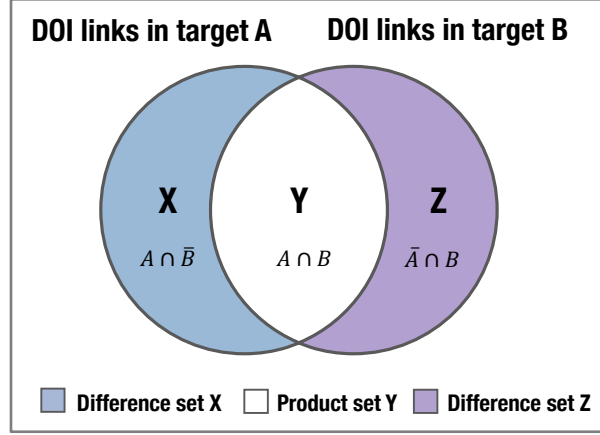
The following analyses were performed using the dataset of English and Japanese Wikipedia as of 2015 and 2023, described in the previous section. Each analysis corresponds to analysis topics (1) to (4), respectively, in the introduction section.

### *(1) Basic statistics of DOI links referenced on English and Japanese Wikipedia.*

We counted and observed the changes in the total and unique numbers of DOI links and the corresponding Wikipedia articles, along with unique DOIs by RAs. In addition, we obtained the basic statistics of the number of appearances for each DOI link and the number of DOI links per Wikipedia article.

### *(2) Overlap of DOI links within/between English and Japanese Wikipedia from 2015 to 2023.*

We obtained and analyzed the following overlaps of DOI links on two Wikipedias shown in Figure 2: (a) the difference and product sets of DOI links referenced on the same language Wikipedia between as of 2015 and as of 2023 within English and Japanese Wikipedia, respectively, and (b) the difference and product sets of DOI links referenced on the different language Wikipedia, i.e., English and Japanese Wikipedia, between as of 2015 and as of 2023, respectively.



**Figure 2.** Overview of analysis of unique and common DOI links between two Wikipedias.

*(3) Top contents highly referenced on English and Japanese Wikipedia in 2015 and 2023.*

We identified the top content most frequently referenced on English and Japanese Wikipedia in 2015 and 2023, respectively. We analyzed characteristics of the top 5 contents highly referenced on each Wikipedia based on the number of total appearances and the Wikipedia articles containing the corresponding DOI link, as well as the change in top content between 2015 and 2023 in the same language Wikipedia. In addition, we investigated RA and the research field for the top 5 contents.

*(4) Relationship between DOI links newly added to English and Japanese Wikipedia since March 2015 and the DOI registration years and published years of the corresponding DOI links.*

We identified DOI links added after March 2015 to English and Japanese Wikipedia, i.e., DOI links that did not exist as of March 2015 but existed as of July 2023 on these Wikipedia, respectively, using the difference set of DOI links between the same language version of Wikipedia. In addition, we investigated both the year when each DOI was first registered and the earliest published year in print or online based on Crossref metadata to clarify that how many DOI links added to English and Japanese Wikipedia after March 2015 were newly published contents or newly registered DOI.

## RESULTS AND DISCUSSIONS

### Basic statistics of DOI links referenced on English and Japanese Wikipedia

Table 2 shows the numbers of total and unique DOIs referenced on English and Japanese Wikipedia (hereinafter, “enwiki” and “jawiki,” respectively) as of March 2015 and as of July 2023, along with the number of corresponding Wikipedia articles. “Growth” in this table means the growth ratio from 2015 to 2023. For instance, the growth in the number of total DOIs on enwiki is 169.73% ( $= 2,491,399 / 1,467,903 * 100$ ).

For both English and Japanese Wikipedia, the total and unique DOIs and the number of corresponding Wikipedia articles increased consistently from 2015 to 2023. Especially, the growth in total numbers of DOIs from 2015 to 2023 in jawiki is 725.43%, showing a noticeable increase.

**Table 2.** Basic statistics of the datasets

	enwiki			jawiki		
	2015	2023	Growth	2015	2023	Growth
# of total DOIs	1,467,903	2,491,399	169.73%	28,509	206,819	725.43%
# of unique DOIs	515,441	1,696,943	329.22%	25,185	149,681	594.33%
# of unique Wikipedia articles	165,897	569,364	343.20%	9,665	45,862	475.52%

Table 3 shows descriptive statistics such as max, mean, median, mode, and standard deviation (SD) of the number of appearances for each DOI link and the number of DOI links per Wikipedia article on enwiki and jawiki. As for enwiki, all values except for the maximum value in the number of DOI links per Wikipedia article decreased from 2015 to 2023. On the other hand, all values in jawiki as of 2023 were equal to or greater than those values as of 2015. This result shows that DOI links referenced on enwiki could have been deleted or replaced with other ones, more actively compared to jawiki.

**Table 3.** Descriptive statistics of the number of appearances for each DOI link and the number of DOI links per Wikipedia article

	# of appearances for each DOI link					# of DOI links per Wikipedia article				
	<i>max</i>	<i>mean</i>	<i>median</i>	<i>mode</i>	<i>SD</i>	<i>max</i>	<i>mean</i>	<i>median</i>	<i>mode</i>	<i>SD</i>
enwiki 2015	12,400	2.85	2	2	25.24	532	8.85	4	2	16.07
enwiki 2023	4,181	1.47	1	1	7.84	541	4.38	2	1	9.78
jawiki 2015	41	1.13	1	1	0.70	165	2.95	1	1	5.02
jawiki 2023	1,474	1.38	1	1	4.12	417	4.51	2	1	9.01

Table 4 shows the total number of DOIs by RAs on enwiki and jawiki as of 2015 and as of 2023. In this table, the items with asterisk show that Japan Link Center (hereinafter, “JaLC”) is involved in the DOI registration (Japan Link Center, 2023). JaLC is the only RA in Japan, and is also a member of Crossref and DataCite; thus, JaLC registers either its own DOIs, Crossref DOIs, or DataCite DOIs, corresponding to “JaLC,” “Crossref via JaLC,” and “DataCite via JaLC,” respectively, in Table 4.

With the exception of “Public” on enwiki, the total number of DOIs registered by each RA increased from 2015 to 2023. For DOIs registered by Public referenced on enwiki as of 2015, the redirect URIs are either “http://cellmolbiol.com” or “http://prp.contentdirections.com/mr/cupress.jsp/doi=[DOI]”. These URIs were inaccessible due to unresolvable host names as of August 2023, showing the removal of the inaccessible DOI links referenced on enwiki.

RAs not referenced as of March 2015 but were referenced as of July 2023 were CNKI (China National Knowledge Infrastructure) and EIDR (Entertainment Identifier Registry) in enwiki, and Airiti, CNKI, EIDR, and ISTIC (Institute of Science and Technology Information of China) in jawiki. Airiti is the only RA in Taiwan; CNKI, Airiti, and ISTIC are RAs in China; and EIDR assigns DOIs to contents related to entertainment, such as movies, television shows, radio programs, and podcasts, etc. (DOI Foundation, 2022). Thus, the total number of DOIs on enwiki and jawiki was increasing, and DOIs assigned to various types of content registered by a greater variety of RAs were referenced using DOI links.

Focusing on the difference in the number of references, the highest number was Crossref DOIs both in enwiki and jawiki (approximately 1 million and 120,000, respectively), showing the greatest increase in the number of DOIs registered to scholarly articles. RAs with a difference of more than 10,000 cases were DataCite on enwiki, and JaLC and Crossref via JaLC on jawiki. These results indicate that the number of references using DOI links to research data on enwiki and to content from Japanese publishers and academic societies on jawiki is particularly increasing from 2015 to 2023.

**Table 4.** Total number of DOIs by Registration Agencies on English and Japanese Wikipedia. Asterisk (\*) shows the items in which Japan Link Center (JaLC) is involved in the DOI registration.

RA	enwiki			jawiki		
	2015	2023	Difference	2015	2023	Difference
Airiti	2	223	221	0	12	12
CNKI	0	520	520	0	22	22
Crossref	1,462,704	2,460,860	998,156	26,202	144,989	118,787
Crossref via JaLC *	3,839	5,216	1,377	1,732	24,669	22,937
DataCite	452	19,700	19,248	13	465	452
DataCite via JaLC *	0	0	0	0	1	1
EIDR	0	100	100	0	0	0
ISTIC	95	652	557	0	32	32
JaLC *	11	1,130	1,119	551	36,442	35,891
KISTI	49	447	398	2	64	62
mEDRA	220	1,817	1,597	1	75	74
OP	178	716	538	2	33	31
Public	353	18	-335	6	15	9
<b>Overall</b>	<b>1,467,903</b>	<b>2,491,399</b>	<b>1,023,496</b>	<b>28,509</b>	<b>206,819</b>	<b>178,310</b>

Note: The number of enwiki and jawiki as of 2015 is partly different from the values shown in Kikkawa, Takaku, & Yoshikane (2016) because we used the data of RA as of July 2023. RA may change even for the same DOI over time.

### Overlap of DOI links within/between English and Japanese Wikipedia from 2015 to 2023

Table 5 shows overlaps of unique DOI links within the same language version of English and Japanese Wikipedia as of 2015 and 2023. According to the 2023 - 2015 difference sets, 71.71% as of 2023 in enwiki and 83.44% in jawiki of the unique DOI links were not referenced on enwiki and jawiki as of 2015, respectively. On the other hand, looking at the difference sets of 2015 - 2023, 35,365 (equivalent to 6.86%) and 393 (equivalent to 1.56%) unique DOI links referenced on enwiki and jawiki as of 2015, respectively, were removed. Thus, some references with DOI links have been deleted, although the percentages are small. In addition, similar to the trend observed in Table 3, it would be interpreted that more active replacing and deleting DOI links were performed in enwiki compared to those activities in jawiki.

**Table 5.** Overlaps of unique DOI links within the same language version of English and Japanese Wikipedia as of 2015 and 2023

	enwiki				jawiki			
	2015 - 2023		2023 - 2015		2015 - 2023		2023 - 2015	
<b>Difference set</b>	<b>35,365</b>	<b>6.86%</b>	1,216,867	71.71%	<b>393</b>	<b>1.56%</b>	124,889	83.44%
<b>Product set</b>	480,076	93.14%	480,076	28.29%	24,792	98.44%	24,792	16.56%
<b>Total</b>	<b>515,441</b>	<b>100.00%</b>	<b>1,696,943</b>	<b>100.00%</b>	<b>25,185</b>	<b>100.00%</b>	<b>149,681</b>	<b>100.00%</b>

Table 6 shows overlaps of unique DOI links between English and Japanese Wikipedia as of 2015 and 2023. For example, “jawiki - enwiki” in 2015 shows that 19.94% (5,023 of 25,185) of different DOI links on jawiki as of 2015 were not referenced on enwiki as of 2015.

From “jawiki - enwiki” for 2015 and 2023, the number of DOI links referenced on jawiki that do not overlap with enwiki increased approximately ten times (from 5,023 to 51,420) from 2015 to 2023, and their share for the entire jawiki increased 14.41 percentage points (from 19.94% to 34.35%). Focusing on the “enwiki - jawiki” product sets, the number of DOI links referenced on both enwiki and jawiki increased approximately five times (from 20,162 to 98,261) from 2015 to 2023, and their share for the entire enwiki increased by 1.88 percentage points (from 3.91% to 5.79%).

These results show that the number of DOI links referenced on both jawiki and enwiki from 2015 to 2023 has increased while the number of DOI links referenced on jawiki only has increased. As pointed out by Kikkawa, Takaku, & Yoshikane (2016), most of the DOI links referenced on both enwiki and jawiki would be copied from enwiki articles to jawiki articles through the translation, and this kind of activities continued after March 2015; and this is the reason that there were many DOI links referenced on both enwiki and jawiki in 2023. On the other hand, the considerable growth in the percentage of the “jawiki - enwiki” difference sets from 2015 to 2023 shows that more DOI links not derived from the translations of enwiki articles have been increasing since 2015 in jawiki. This trend matches the result in Table 4 in the point that jawiki in 2023 actively referenced JaLC DOIs, i.e., the content of academic societies and publishers in Japan.

**Table 6.** Overlaps of unique DOI links between English and Japanese Wikipedia as of 2015 and 2023

	2015				2023			
	jawiki - enwiki		enwiki - jawiki		jawiki - enwiki		enwiki - jawiki	
<b>Difference set</b>	<b>5,023</b>	<b>19.94%</b>	495,279	96.09%	<b>51,420</b>	<b>34.35%</b>	1,598,682	94.21%
<b>Product set</b>	20,162	80.06%	20,162	3.91%	98,261	65.65%	98,261	5.79%
<b>Total</b>	<b>25,185</b>	<b>100.00%</b>	<b>515,441</b>	<b>100.00%</b>	<b>149,681</b>	<b>100.00%</b>	<b>1,696,943</b>	<b>100.00%</b>

### Top contents highly referenced in English and Japanese Wikipedia in 2015 and 2023

Tables 7 and 8 show the top 5 highly referenced DOIs on enwiki as of 2015 and 2023, respectively. For instance, “10.1073/pnas.242603899” was the 1<sup>st</sup> ranked DOI and was referenced 12,400 times from 6,200 enwiki articles as of 2015 (#1 in Table 7).



From Table 7, all of the top five contents in enwiki as of 2015 were Crossref DOIs assigned to scholarly articles. Except for #4, the top contents were scholarly articles related to human genes in the field of molecular biology and cell biology. From the values between the number of appearances and the number of Wikipedia articles of the corresponding DOI, the same DOI is referenced multiple times from the same Wikipedia articles as of 2015. The reason why there are many references to certain DOIs of scholarly articles related to molecular biology and cell biology is that ProteinBoxBot, the bot editor to add these references to enwiki, performed the automatic edits at a large scale (Kikkawa, Takaku, & Yoshikane, 2020b, 2022; Wikipedia, 2021).

**Table 7.** Top 5 highly referenced DOIs on English Wikipedia as of 2015

#	DOI RA Research field	# of appearances # of Wikipedia articles	Bibliographic information
1	10.1073/pnas.242603899 Crossref Multidisciplinary	12,400 6,200	Mammalian Gene Collection (MGC) Program Team. (2002). Generation and initial analysis of more than 15,000 full-length human and mouse cDNA sequences. <i>Proceedings of the National Academy of Sciences</i> , 99(26), 16899–16903.
2	10.1101/gr.2596504 Crossref Molecular Biology & Genetics	8,764 4,382	The Status, Quality, and Expansion of the NIH Full-Length cDNA Project: The Mammalian Gene Collection (MGC). (2004). <i>Genome Research</i> , 14(10b), 2121–2127.
3	10.1038/ng1285 Crossref Molecular Biology & Genetics	5,720 2,860	Ota, T., Suzuki, Y., Nishikawa, T., et al. (2004). Complete sequencing and characterization of 21,243 full-length human cDNAs. <i>Nature Genetics</i> , 36(1), 40–45.
4	10.1007/bf00171763 Crossref Space Science	2,890 1,445	Menzel, D. H., Minnaert, M., Levin, B., et al. (1971). Report on Lunar Nomenclature by the Working Group of Commission 17 of The IAU. <i>Space Science Reviews</i> , 12(2), 136–186.
5	10.1038/nature04209 Crossref Multidisciplinary	2,756 1,378	Rual, J.-F., Venkatesan, K., Hao, T., et al. (2005). Towards a proteome-scale map of the human protein–protein interaction network. <i>Nature</i> , 437(7062), 1173–1178.

From Table 8, the top 5 contents in enwiki as of 2023 were Crossref DOIs assigned to the scholarly articles, except for #3, which is DataCite assigned to the dataset of spider catalog. As for #3, the catalog is referenced from the short and incomplete Wikipedia articles called “stub articles” related to spiders. #1 and #2 are the same items as the top two contents in Table 7; although the ranking has not changed since 2015, the number of appearances and the number of Wikipedia articles decreased from 2015. This change is caused by the event that ProteinBoxBot was blocked from editing due to “malfunctioning of the bot, violation of approval conditions or bot policy” in April 2021 (Wikipedia, 2021). After that, the templates that ProteinBoxBot used for adding the corresponding DOI links to Wikipedia articles were deleted (Wikipedia, 2019). This would also be leading a decrease in the statistic values on enwiki from 2015 to 2023, as shown in Table 3. Others, #4 and #5 were scholarly articles in the field of Space Science.

**Table 8.** Top 5 highly referenced DOIs referenced on English Wikipedia as of 2023

#	DOI RA Research field	# of appearances # of Wikipedia articles	Bibliographic information
1	10.1073/pnas.242603899 Crossref Multidisciplinary	4,181 4,181	Mammalian Gene Collection (MGC) Program Team. (2002). Generation and initial analysis of more than 15,000 full-length human and mouse cDNA sequences. <i>Proceedings of the National Academy of Sciences</i> ,

#	DOI RA Research field	# of appearances # of Wikipedia articles	Bibliographic information
			99(26), 16899–16903.
2	10.1101/gr.2596504 Crossref Molecular Biology & Genetics	3,022 3,022	The Status, Quality, and Expansion of the NIH Full-Length cDNA Project: The Mammalian Gene Collection (MGC). (2004). <i>Genome Research</i> , 14(10b), 2121–2127.
3	10.24436/2 DataCite N/A	2,796 2,796	Gloor, D., Nentwig, W., Blick, T., et al. (2017). <i>World Spider Catalog</i> .
4	10.1134/s1063773712050015 Crossref Space Science	2,153 2,153	Anderson, E., & Francis, Ch. (2012). XHIP: An extended hipparcos compilation. <i>Astronomy Letters</i> , 38(5), 331–346.
5	10.1051/0004-6361/201833051 Crossref Space Science	2,126 2,126	Gaia Collaboration, Brown, A. G. A., Vallenari, A., et al. (2018). Gaia Data Release 2: Summary of the contents and survey properties. <i>Astronomy &amp; Astrophysics</i> , 616, A1.

Tables 9 and 10 show the top 5 highly referenced DOIs on jawiki in 2015 and 2023, respectively. All of the top five contents in jawiki as of 2015 were Crossref DOIs assigned to scholarly articles or books. Research fields associated with these scholarly articles are either “Space Science” or “Plant & Animal Science.” On the other hand, the top five contents in jawiki as of 2023 were three JaLC DOIs, one DataCite DOI, and one Crossref DOI, indicating that the contents provided by academic societies or publishers in Japan assigned JaLC DOIs and data set assigned DataCite DOIs were widely referenced.

As for JaLC DOIs (#1, 2, and 4 in Table 10) are the contents written in Japanese. In addition, #1 is “停車場一覽 昭和 41 年 3 月現在 (A list of stations of railways, automobiles, and sea routes as of March 1966)” published by the Japan National Railroad (currently, the Japan Railways) published in around 1966, and the DOI assigned to the electronic version hosted by the digital collection of the National Diet Library in Japan is referenced as an information source for the office management codes of the stations. #2 is “世界哺乳類標準和名目録 (Catalogue of standard Japanese names for the mammals of the world)” referenced as a source of information on Japanese names in jawiki articles on mammal species.

Comparing the top 5 contents between jawiki in 2015 and 2023, there are trends referencing JaLC DOIs and DataCite DOIs more actively in 2023. Also, the top contents had been referenced approximately once from each article in 2015, but these contents tend to be referenced multiple times from the same article in 2023. These trends are contrary to those in enwiki, suggesting that jawiki as of 2023 is not in the stage to replace or remove existing DOIs but in the stage to add new DOI links as references.

**Table 9.** Top 5 highly referenced DOI links referenced on Japanese Wikipedia as of 2015

#	DOI RA Research field	# of appearances # of Wikipedia articles	Bibliographic information
1	10.1086/504701 Crossref Space Science	41 40	Butler, R. P., Wright, J. T., Marcy, G. W., et al. (2006). Catalog of Nearby Exoplanets. <i>The Astrophysical Journal</i> , 646(1), 505–522.
2	10.1787/health_glance-2013-en Crossref N/A	29 29	OECD. (2013). <i>Health at a Glance 2013: OECD Indicators</i> . OECD.

#	DOI RA Research field	# of appearances # of Wikipedia articles	Bibliographic information
3	10.1086/382905 Crossref Space Science	26 26	Karachentsev, I. D., Karachentseva, V. E., Huchtmeier, W. K., et al. (2004). A Catalog of Neighboring Galaxies. <i>The Astronomical Journal</i> , 127(4), 2031–2068.
4	10.1007/s10511-006-0002-6 Crossref Space Science	24 24	Karachentsev, I. D., & Kashibadze, O. G. (2006). Masses of the local group and of the M81 group estimated from distortions in the local velocity field. <i>Astrophysics</i> , 49(1), 3–18.
5	10.1111/j.1095-8339.2009.00996.x Crossref Plant & Animal Science	17 17	THE ANGIOSPERM PHYLOGENY GROUP. (2009). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG III. <i>Botanical Journal of the Linnean Society</i> , 161(2), 105–121.

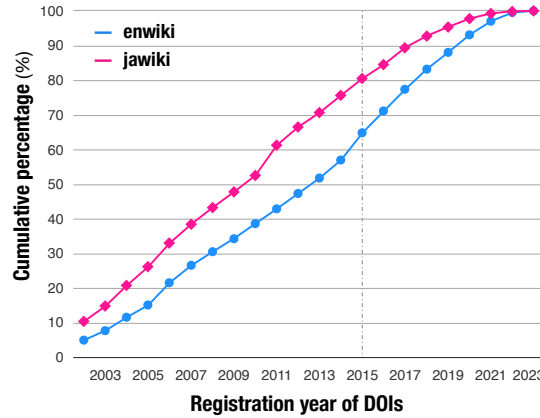
**Table 10.** Top 5 highly referenced DOIs referenced on Japanese Wikipedia as of 2023

#	DOI RA Research field	# of appearances # of Wikipedia articles	Bibliographic information
1	10.11501/1873236 JaLC N/A	1,474 738	日本国有鉄道. 停車場一覧 昭和 41 年 3 月現在. 日本国有鉄道.
2	10.11238/mammalianscience.58.s1 JaLC N/A	310 289	川田伸一郎, 岩佐真宏, 福井大, et al. (2018). 世界哺乳類標準和名目録. <i>哺乳類科学</i> .
3	10.1051/0004-6361/201833051 Crossref Space Science	115 64	Gaia Collaboration, Brown, A. G. A., Vallenari, A., et al. (2018). Gaia Data Release 2: Summary of the contents and survey properties. <i>Astronomy &amp; Astrophysics</i> , 616, A1.
4	10.14988/pa.2017.0000013201 JaLC N/A	83 42	Akira T. (2013). The big six corporate complexes in the twilight : early 2000s in Japan. <i>The Doshisha Business Review</i> , 64(5), 330–351.
5	10.15468/39omei DataCite N/A	71 70	Registry-Migration.Gbif.Org. (2022). <i>GBIF Backbone Taxonomy</i> [Data set]. GBIF Secretariat.

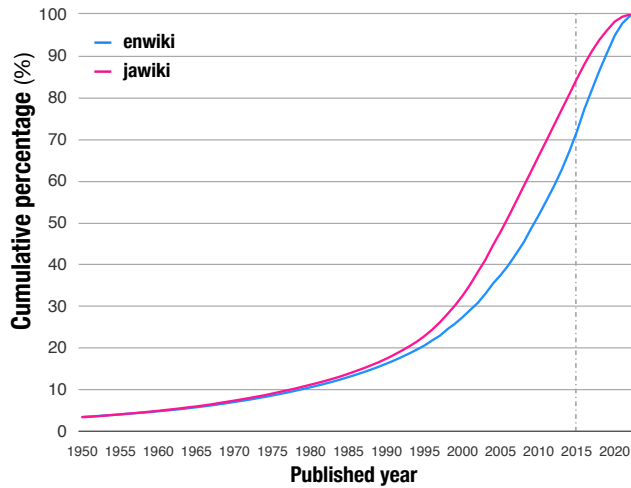
### Relationship between DOI links newly added to English and Japanese Wikipedia since March 2015 and the DOI registration years and published years of the corresponding DOI links

Figure 3 shows distributions of the DOI registration years on DOI links newly added to English and Japanese Wikipedia since March 2015. Here, we extracted DOI registration years based on Crossref metadata from the difference set of “2023 - 2015” on enwiki and jawiki, respectively, and plotted their cumulative percentages.

Both enwiki and jawiki show linear trends, indicating that DOIs registered in each year were added to these Wikipedia without major bias. The majority of DOIs in enwiki and jawiki were registered before 2015, accounting for 64.79% in enwiki and 80.48% in jawiki (dashed line in this figure), indicating that the editors in both Wikipedia actively added the DOI links which are already available in 2015. This result indicates that it is still necessary to add new content with DOI registered before 2015 using DOI links to enwiki and jawiki. According to the gap in their percentages, this tendency is stronger in jawiki than in enwiki.



**Figure 3.** Distributions of the DOI registration years on DOI links newly added to English and Japanese Wikipedia since March 2015



**Figure 4.** Distributions of the published years on DOI links newly added to English and Japanese Wikipedia since March 2015

Figure 4 shows distributions of the published years on DOI links newly added to English and Japanese Wikipedia since March 2015. Here, we extracted published years based on Crossref metadata from the difference set of “2023 - 2015” on enwiki and jawiki, respectively, and plotted their cumulative percentages.

The majority of references on enwiki and jawiki were published before 2015 (dashed line in this figure), accounting for 71.75% and 84.42%, respectively. Although a low percentage, the contents published by 1950 were referenced on enwiki and jawiki as the oldest of published years, accounting for 3.33% and 3.26%, respectively.

From Figures 3 and 4, the most DOI links newly added since 2015 correspond to the DOIs registered DOI before 2015 and published before 2015 for both enwiki and jawiki. These results indicate that enwiki and jawiki were in the situation of adding scholarly references published before 2015 for the majority of the period of 2015 to 2023, rather than activities to add scholarly references of the articles published since 2015. In addition, it would be considered that jawiki, as a latecomer in adding DOI links compared to enwiki, needs to add more new references involving DOI links or fill DOI links to existing references without DOI information.

## CONCLUSION

We conducted a comparative analysis of DOI links on English and Japanese Wikipedia as of March 2015 and July 2023 to reveal (1) changes in the number of DOI links and Wikipedia articles containing them, (2) changes in the overlap of DOI links within/between English and Japanese Wikipedia from 2015 to 2023, (3) the top contents highly referenced on English and Japanese Wikipedia in 2015 and 2023, and (4) the relationship between DOI registration year and publication year of each content and addition to Wikipedia articles. Through the analysis, the following points were clarified.

(1) The total number of DOI links and the diversities of Registration Agencies for DOI links increased in both Wikipedia from 2015 to 2023. Active reorganizing and deleting DOI links were observed in English Wikipedia, such as deleting specific references added at a large scale by ProteinBoxBot.

(2) The number of DOI links referenced in both English and Japanese Wikipedia from 2015 to 2023 has increased. As for Japanese Wikipedia, the original DOI links, not derived from the translations from English Wikipedia, have been increasing since 2015.

(3) In 2015, the top five most frequently referenced contents were Crossref DOIs in both Wikipedia. However, DataCite DOIs made the top five in both Wikipedia as of 2023. In addition, for Japanese Wikipedia as of 2023, three of the top five contents are JaLC DOIs, all written in Japanese. This result suggests that a rise in native language references on Japanese Wikipedia leads to a decrease in overlap with English Wikipedia.

(4) For DOI links added after 2015, most references in both Wikipedia point to scholarly articles published before 2015. Japanese Wikipedia, as a latecomer in adding DOI links compared to English Wikipedia, would need to add more new references involving DOI links or to fill DOI links to existing references without DOI information.

The future task is to conduct further detailed observation and analysis of long-term trends in the English and Japanese Wikipedia, as well as to identify long-term trends in the Wikipedia community as a whole, including the other language versions. In addition, it is needed to investigate the relationship between the rapid growth of English and Japanese Wikipedia seen in around 2000 and the diffusion of digital publishing of scholarly articles since 2000.

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# User Study of a Knowledge Graph Visualization Interface to a Digital Archive Collection:

## Initial Results

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### ABSTRACT

*Background.* Current information retrieval systems are mainly record-centric, displaying lists of metadata records in response to user queries. Recently there is interest in representing information in knowledge graphs and graph database management systems, with more emphasis on representing relations between entities, concepts and resources. Such knowledge graph systems require new types of user interfaces that can present relational or linked information more effectively, and support user interaction with the knowledge graph. Graph (network) visualization is an obvious solution for presenting knowledge graph information. Though there are instances of knowledge graph visualization interfaces on the Web, there has been no user study of such interfaces.

*Objectives.* This paper reports initial results of a user study of a knowledge graph visualization interface to a digital archive collection—to find out to what extent novice users can understand linked information presented in a graph visualization after a short training session, and also whether users can interact with the graph visualization to find relational information.

*Methods.* Users are asked to perform six information-finding tasks using the graph visualization interface. Their interaction with the interface is captured as screen recordings using the Zoom Meetings software.

*Results.* A qualitative analysis of 20 screen recordings indicates that, after a 15-minute training session, users are generally able to interact effectively with the graph visualization, interpret the graph to identify relational information, use a filter menu to reduce the complexity of the graph, use different graph layouts and operations to make the graph easier to read, and scan the graph to locate relevant nodes and links. However, users have different approaches and preferences in how they interact with the graph to locate information, and some appear more comfortable with the interface than others.

*Contributions.* This is possibly the first user study of a knowledge graph visualization interface. Insights were gained on the issues users are likely to encounter with such interfaces and how these issues may be addressed.



## INTRODUCTION

Current information retrieval systems, including digital library systems, digital heritage portals and search engines, are mainly record-centric or item-centric: they display lists of metadata records in response to user queries. Their user interfaces reflect the record-centric nature of the databases. Users are very familiar with such systems and interfaces, including the affordances of the interfaces, how to interact with and navigate the interfaces, how to interpret the search results displayed, and how to retrieve records from the database by submitting query keywords or clicking on hyperlinks on the interface. Users still do not know how to craft and reformulate search queries to obtain comprehensive retrieval, but there is perhaps less need for query formulation skills when retrieval systems can do fuzzy matching and employ AI techniques. Through extensive experience, users have acquired good mental models of these systems and interfaces to guide their interaction with the interfaces.

These information retrieval systems and their interfaces have many limitations which most users are not aware of. They are not developed to help users identify conceptually related resources and ideas, except perhaps for the subject headings, keywords or classification code field which users may not understand how to use. These systems and interfaces do not support browsing by specific types of conceptual relationships or retrieving sets of items with particular relationship patterns to help users integrate related information.

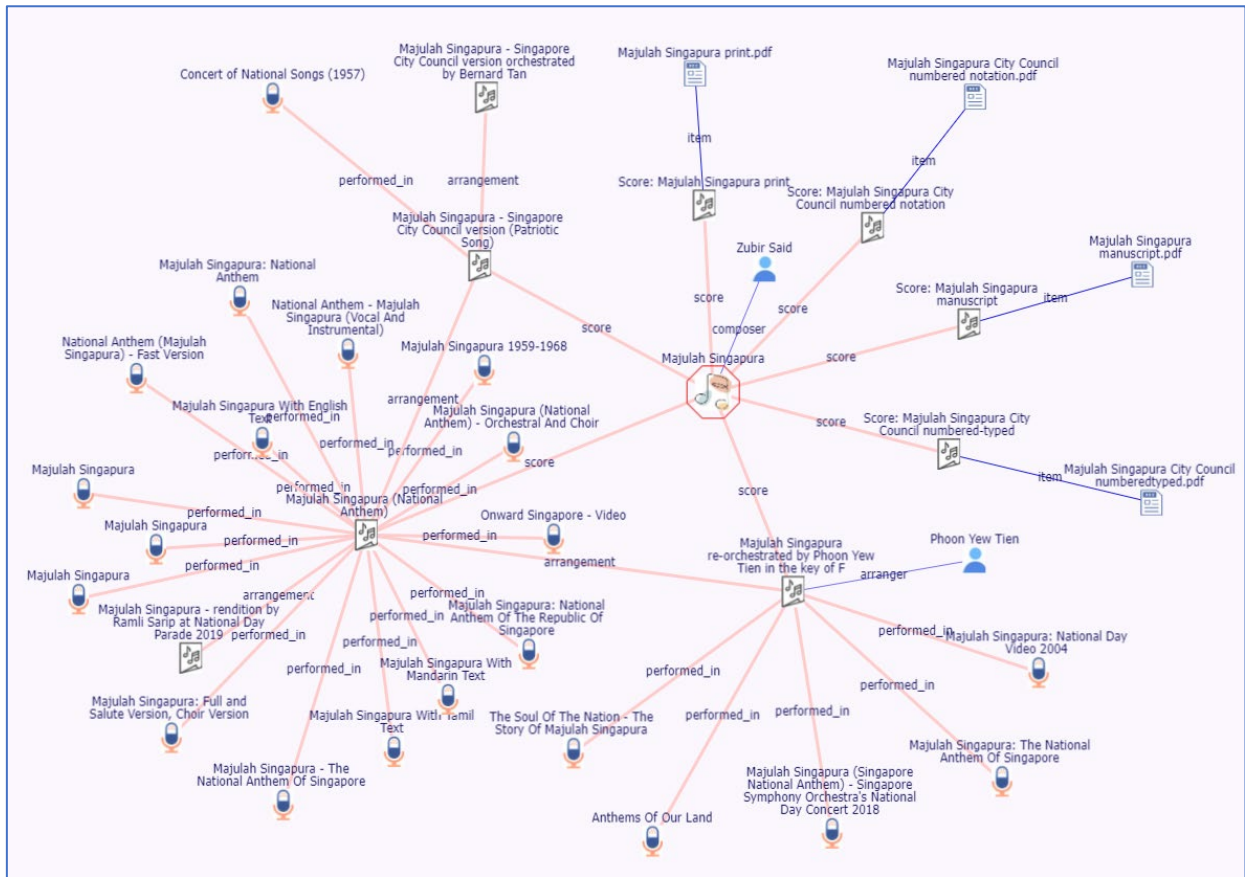
Recently there is interest in representing information in knowledge graphs and graph database management systems, which focus on representing relational information—relations between entities, concepts and resources. Knowledge graph systems can support users in browsing conceptually related entities and concepts, in linking and integrating information, and in synthesizing a narrative on a topic based on a set of related information. Such knowledge graph systems require new types of user interfaces that can present the relational or linked information effectively, and support users in interacting with the linked information to accomplish research, learning and professional tasks. Graph (or network) visualization is an obvious solution for presenting knowledge graph information. Though there are some instances of knowledge graph visualization interfaces on the Web, there has been no user study of such interfaces.

This paper reports preliminary results of a user study of a knowledge graph visualization interface with the objectives:

1. to find out to what extent novice users can read a graph visualization to identify desired relational (linked) information after a short training session;
2. to find out what issues the users have in interacting with the interface and graph visualization to find relevant relational information.

The knowledge graph system used for the case study is the Zubir Said Knowledge Graph visualization interface (<https://ZubirSaid.sg>) that provides access to the personal digital archive of Zubir Said (1907-1987) at the Nanyang Academy of Fine Arts (NAFA), Singapore. Zubir Said was a pioneer song-writer in Singapore in the post-World War II period, and was the composer of the Singapore national anthem *Majulah Singapura*. His family donated his personal archive to NAFA, including handwritten music scores, letters and other documents, photographs, and audiovisual materials (including recordings of interviews). The first author of this paper was invited to develop a system and interface to provide access to selected digitized resources from the collection, and to support study and research. Figure 1 gives a screenshot of a graph visualization of related resources centered on *Majulah Singapura*.

The first part of the user study (reported in this paper) focuses on user-graph interaction and interpretation in information-finding tasks—to find specific types of relational information or to answer factual questions focusing on relationships between entities, concepts and resources. The second part of the



**Figure 1. Graph visualization of resources centered on *Majulah Singapura*, the Singapore national anthem**

user study, which is on-going, focuses on whether users are able to synthesize a narrative on a topic, based on a knowledge graph visualization.

It is stressed that this is not really an evaluation of the graph visualization interface, as we are continually improving the interface as issues are identified. Rather, the purpose is to identify issues users are likely to have with knowledge graph visualization interfaces in general, and likely misconceptions and inaccuracies in users' mental models of the system and interface, which will have been conditioned by users' prior experience with *traditional* information retrieval systems.

## PREVIOUS USER STUDIES OF GRAPH VISUALIZATION

Previous user studies of graph visualizations have focused on standalone graph visualizations that were not used as interfaces to a backend graph database. They have focused on user finding and recognizing topological (structural) patterns in the graph, rather than on deriving or learning semantic or conceptual information. Previous papers on the design of graph visualization have focused on the "aesthetic criteria", and do not take into account the semantics represented by individual nodes and links, and do not investigate user-graph interaction to make sense of the semantics and to synthesize a narrative understanding.

Von Landesberger et al. (2011), who summarized user studies of graph visualizations up to that point, noted that the studies involved user tasks that were more "low-level" and not semantic-based,

including topology-based tasks such as finding adjacent nodes or determining connection between nodes; attribute-based tasks such as searching for nodes with specific attribute values and finding links of certain types; and graph operations such as zooming, panning and linking nodes. Von Landesberger et al. pointed out that for user analysis of a displayed graph, understanding the meaning of the nodes and edges is important, and that the display of node labels is an important issue as even smaller graphs can be overcrowded with labels.

Yoghourdjian et al. (2018) found similar types of user studies, and categorized the tasks used in the studies into four main types:

1. Topology-based tasks—that required participants to identify node adjacency, common connection, connectivity, and finding paths between two nodes (the most common task);
2. Attribute-based tasks—requiring participants to identify nodes and links with certain attribute values.
3. Browsing tasks—requiring following or revisiting a path in a sparse graph;
4. Overview, high-level or abstract tasks—that do not require a detailed understanding of the graph, focusing on general characteristics.

## **STRUCTURE AND CONTENT OF THE ZUBIR SAID KNOWLEDGE GRAPH**

A graph visualization interface displays only a subset of the knowledge graph stored in the graph database system, retrieved by a query. The “topology” or relational structure of the displayed graph naturally depends on the structure of the knowledge graph in the graph database. As the Zubir Said personal archive contains many types of documents, including music notations of songs, photographs, letters, personal documents (e.g., passport) and audiovisual materials, the knowledge graph was initially developed based on existing relevant ontologies: Music Ontology (modelled after FRBR), Schema.org, DBpedia, CIDOC-CRM, Biographical Ontology, IPTC Photo Metadata Standard 2019.1, Simple Event Model, and Dublin Core Terms.

However, the structure of some of these ontologies are too complicated for user-facing interfaces. For example, the complete FRBR structure when applied to music and performance requires the user to traverse many links to get from the MusicalWork to Expression (music score), to another arrangement of the music score, to Performance, to Sound or VideoRecording, to Manifestation (perhaps a published DVD), and finally to Item to access the AudioFile, VideoFile, ImageFile or PDF file. We simplified the structure by dropping Manifestation nodes, Sound and VideoRecording, and instead link the Expression nodes (i.e., music score) directly to the VideoFile and AudioFile nodes.

The interface and graph visualization design has been discussed in detail in an earlier paper (Khoo et al., under review). Briefly, each node in the graph visualization has a node label displayed on the node or above it, implying that a *label* property is assigned to every node in the knowledge graph. Other node properties (i.e., metadata) are displayed in a pop-up text display panel, called the Info Box, when the user clicks on the node (thus selecting it). Links between nodes are labeled with its relationship type. Properties assigned to links are also displayed in the Info Box, when the user selects the link.

The aesthetic design of the nodes and the links (arrows) are specified by specifying shape, size, color, border and label properties. We used different shapes and colors for different entity types (classes)—for example, the octagon shape for Musical Work, and rounded rectangle for Person. We had initially not used icons to represent nodes, believing that icons would distract from the node labels. However, so many participants of the user study recommended using icons that we reconsidered our decision. We found that colored icons do not distract from the node labels, provided their colors are carefully adjusted to be less

saturated, so as not to attract too much attention. The icons used in ZubirSaid.sg were carefully selected (from iStock.com) to be evocative of the node type.

We did not use arrowheads in the graph display, as the direction of the relations is usually clear from the context. We had learnt from a previous project that arrowheads are obtrusive and distract from other graph elements such as the text labels. However, for other knowledge graph systems we have developed, we have found it necessary to display arrowheads to indicate the direction of the relations. We use a hollow *vee* as arrowhead, finding that a hollow arrowhead (as opposed to a solid fill) makes the arrowhead less obtrusive and yet clear.

The Zubir Said Knowledge Graph is implemented in a Neo4j graph database management system, one of the most popular graph database software (G2.com, 2023; DB-Engines, 2023). The Cytoscape.js JavaScript graph visualization library is used to realize the graph visualization on users' Web browsers. Cytoscape was initially developed for visualizing gene expression data, molecular interaction networks and biological pathways (Cytoscape Consortium, 2018; Shannon et al., 2003). The JavaScript library version, Cytoscape.js, was developed separately for data visualization in Web applications (Franz et al., 2016).

## STRUCTURE OF THE INTERFACE

The Web interface has four main parts:

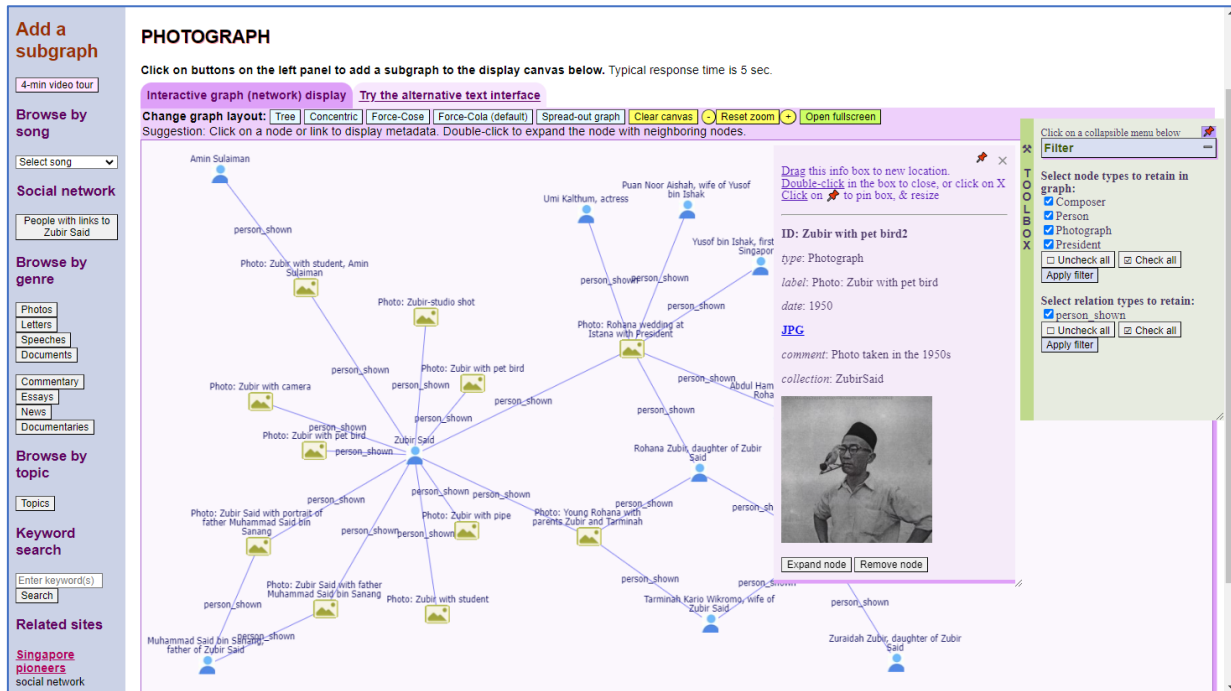
1. *A search menu panel*—listing canned queries and a keyword search box;
2. *A graph visualization canvas*—to display search results as a graph visualization;
3. *A pop-up text display panel, called Info Box*—to display text, including properties assigned to a selected (i.e., clicked on) node or link;
4. *A filter menu*—to allow the user to specify constraints to reduce the number of nodes and links displayed.

Figure 2 shows the overall Web interface. The graph visualization canvas occupies most of the screen, with a pop-up Info Box to display properties of a selected node or link, and a sliding panel on the right offering filter options (checkboxes) for removing nodes and links of particular types.

The search menu panel is shown in Figure 3. Three main types of queries are offered in the search menu:

1. *Thematic queries*—canned queries that the user can execute by clicking on the associated buttons. Thematic queries are focused on particular resource genres such as photographs and letters, or particular topics, or types of social network.
2. *Entity-centric subgraphs*—for example, a subgraph centered on the person *Zubir Said* or the composition *Majulah Singapura*. The dropdown menu lists all the available songs for the user to select.
3. *Keyword search box*—allows the user to enter keywords to retrieve a set of records (nodes) to display.

The graphs retrieved and displayed by these queries are just “starter graphs”. The user can interact with the graph display and expand individual nodes with neighbor nodes that are linked to it. Submitting multiple queries (by clicking on multiple buttons on the search menu panel) adds and merges multiple subgraphs to form a bigger combined graph on display canvas. This allows the user to examine possible links between multiple subgraphs. This is different from typical search engine and database interfaces, where submitting a new query will generate a new search result display.



**Figure 2. Web interface showing search menu panel (left), graph visualization canvas (center), pop-up Info Box (draggable), and filter menu panel (sliding from the right)**

The graph visualization is programmed to respond to clicks (or corresponding taps on touch surfaces), double-clicks and right-clicks (two-finger taps):

- single-click on a node selects the node and displays its properties (metadata) in the pop-up Info Box.
- right-click or double-click on a node retrieves neighbor nodes from the database (i.e., nodes directly linked to the right-clicked node in the knowledge graph).

Nodes can be repositioned by using the mouse (or finger touch) to drag the node to a different position.

As Figure 2 illustrates, the Info Box also displays thumbnail images and hyperlinks when the information is stored as properties of the node. Clicking on a thumbnail displays the corresponding high-resolution image. Clicking on a hyperlink displays an external webpage or a resource in the collection. Two buttons are also provided in the Info Box to remove the node from the display, and to expand the node with neighbor nodes. The Info Box can be dragged and repositioned, and also resized. A filter menu is displayed in a slider panel which slides into view when the graph size exceeds 50 nodes

Buttons on the menu bar of the display canvas allow the user to apply different graph layout algorithms: Tree layout, Concentric layout, Force-cose (a force-directed layout), Force-cola (a force-directed but dynamic layout, where an animation of the layout shows how the algorithm incrementally improves the layout), Spread-out (which applies Force-cose and then stretches the graph to occupy the whole canvas). Zoom-in, zoom-out and zoom reset buttons are provided. The zoom reset button is useful in an unexpected way: if the displayed graph has disappeared off the screen for some reason, the reset button will centralize the graph display, in addition to resetting to the default zoom level. The mouse scroll button can conveniently be used to zoom in and out. However, we found in the study that the mouse for many Windows computers does not have smooth scrolling, so that the zoom level is often too high or too low. We added the + and – buttons so that users can zoom in and out in controlled intervals.

## STUDY METHOD

The first part of the user study (reported in this paper) involved 20 adult participants over 21 years old with at least a Bachelor's degree who were Singapore citizens or permanent residents. The limitation to Singapore citizens and permanent residents was because the content of the archival collection involved the Singapore national anthem, its composer and Singapore history, which will be more familiar to and of more interest to Singaporeans and permanent residents. As data collection is time consuming—carried out one participant at a time—only a small number of participants can be involved. As the analysis is mainly qualitative, it is expected that saturation of issues and insights identified in the user sessions will be reached within 20 participants. Email invitations were sent to student email groups in the schools that the authors taught at, as well as to friends and former students of the authors. The participants were compensated SGD20 on completion of their session.

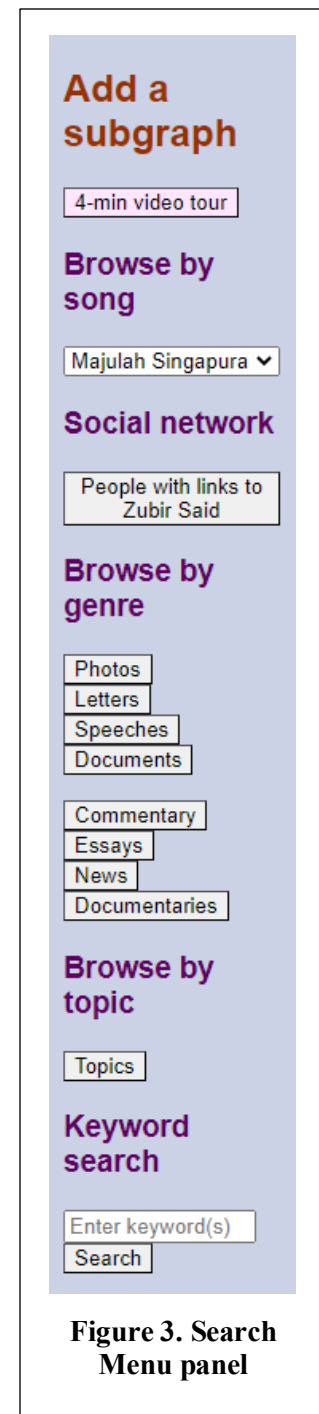
The user sessions took about one hour each, and was conducted via the Zoom Meetings videoconferencing system. Each participant was emailed a task worksheet which first requested demographic and background information. The participant was then asked to watch a 3 to 4-minute video tour of the interface (available from the interface), after which the participant was guided to play with the interface for 10 minutes, trying out the graph operations shown in the video.

Then the participant was asked to perform six information-finding tasks, basically to submit a query on the interface, and examine and interact with the graph visualization to find a particular type of relational information. The six user tasks are discussed in detail in the Results section. A screen recording of the user-interface interaction was captured using the Zoom Meetings system for later analysis. The study was approved by the Institutional Review Board of Nanyang Technological University (reference number IRB-2022-171).

Few people are familiar with graph visualizations that present information as entity or concept nodes linked by relationships, and few will have experience interacting with a graph visualization to change the display or retrieve more information from the database. Our expectation is that users will approach the knowledge graph interface with a mental model more appropriate for typical information retrieval systems that are record-centric. So, the analysis of the user-interface interaction is done with a view towards identifying in what ways the user's mental model is inaccurate based on their screen "behavior". From this, we identify ways in which the interface design and graph visualization can be improved to guide the user to revise the user's mental model.

## RESULTS

In this Section, we discuss each information-finding task participants were asked to accomplish, and the type of relational information it "tests" the users on. Due to paper space constraints, we focus our report on insights obtained from analyzing the screen recordings of the user-interface interaction. Results derived



**Figure 3. Search Menu panel**

from demographic and background information, timings of task completion and quantitative analysis are left to a later paper.

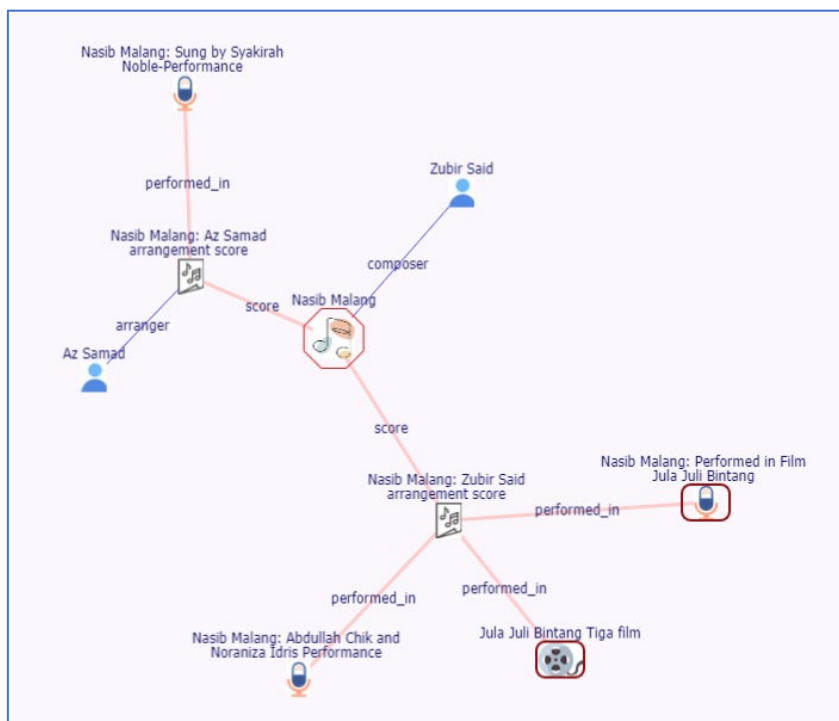
**Task 1. Find two songs that Zubir Said wrote for movies. What are the titles of the two songs and the movies in which they were sung? [Tip: On the left panel, click on *Browse by song* to select a song, and explore the network display.]**

We discuss Task 1 in some detail to illustrate the approach we take in analyzing the user-interface interaction. This task (as well as the other five tasks) requires the user to submit an initial query to the graph database to retrieve a subgraph that may contain the desired information. For Task 1, the task worksheet offers a tip (or hint) to select individual songs from the *Browse by song* dropdown menu on the left panel. Selecting a song (e.g., *Nasib Malang*) from the dropdown menu will display an item-centric graph centered on the song node (see Figure 4). In other words, the users are expected to check song by song to find out whether each song is linked to a movie.

Examining the graph shown in Figure 4, users are expected to trace the path:

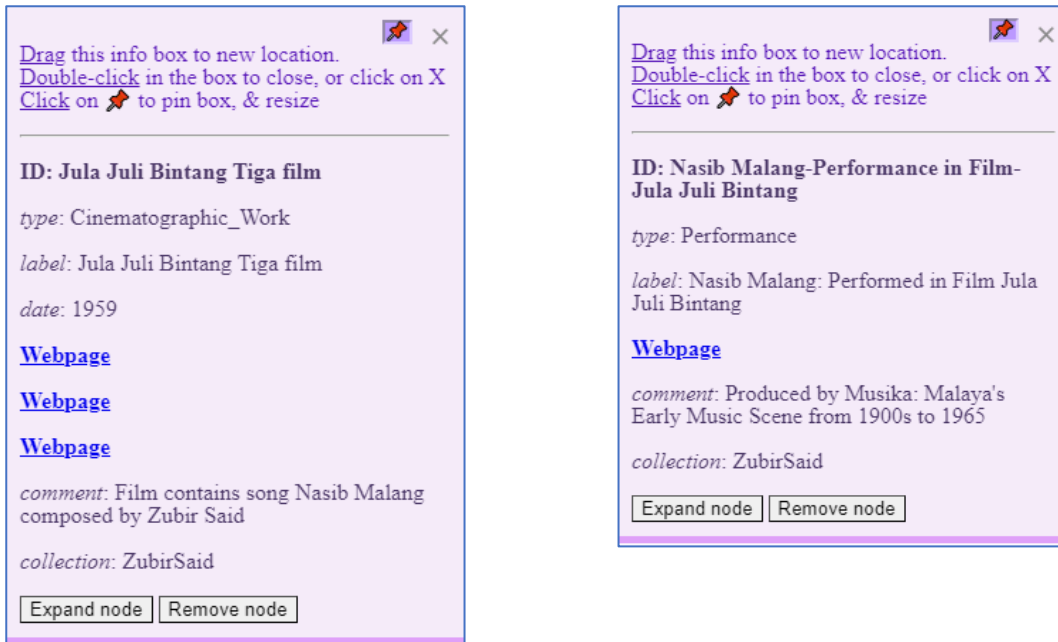
(Musical Work: **Nasib Malang**)—[score]—(Score: Nasib Malang-Zubir Said arrangement)  
—[performed\_in]—(Cinematographic Work: **Jula Juli Bintang Tiga**)

This path indicates that the song *Nasib Malang* was sung in the movie *Jula Juli Bintang Tiga*. Thus, if the user follows the tip to display item-centric graphs centered on individual songs, then the users need to trace the link path from a *Musical Work* node to a *Cinematographic Work* (or *Performance*) node to get the answer. Sometimes, a node label may contain the desired information. For example, the Performance node *Nasib Malang: Performed in Film Jula Juli Bintang* provides the answer within the node label text.



**Figure 4. Item-centric graph for the song node *Nasib Malang* (Misfortune), showing the path to the film node *Jula Juli Bintang Tiga***





**Figure 5. Metadata text for a *Cinematographic Work* node and *Performance* node displayed in the Info Box.**

Alternatively, the user may get the answer (or confirm the answer) by clicking on the *Cinematographic Work* node or *Performance* node to read the metadata text displayed in the Info Box. See Figure 5 for two examples of metadata text displayed in the Info Box.

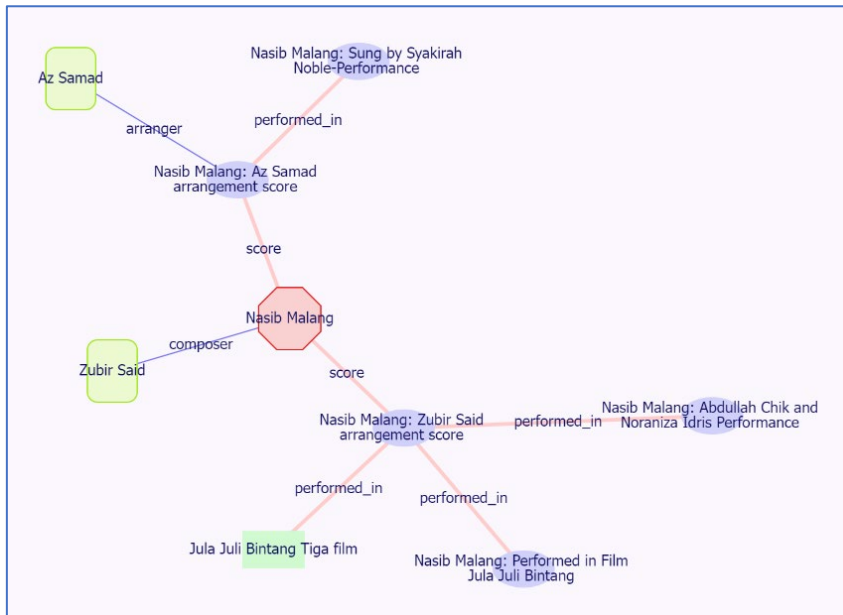
So, the user can find the desired information in multiple ways:

1. Purely from the graph, by tracing the link path from a song node to a film node;
2. From a node label text, as the node labels are designed to be informative (serving as a record title);
3. From the metadata assigned to the node, displayed in the pop-up Info Box when the node is clicked on;
4. Some combination of the above—for example, tracing the path from a song node to a film node, and then confirming by clicking on the node to read the metadata.

Out of 18 users who displayed subgraphs centered on individual songs, 12 (two-thirds) obtained the answer solely from the graph without clicking on the node to read the metadata. Another 5 users clicked on the node to check the metadata. This indicates that most users are able to interpret the semantics of the graph display, though it is not clear whether they paid attention to the link labels, or read just the node labels, or assumed that the linked nodes are related.

One challenge for the user is that the terms used in the task description (i.e., *song* and *movie*) have to be matched with the terminology used in the graph: *Musical Work* and *Cinematographic Work* entity types, and the keyword *film* in the node labels. Users were generally able to recognize the terms used in the graph that match the terms used in the task description. However, they encountered some difficulty if they submitted a keyword search for *movie*, as *film* is the preferred term in the knowledge graph. However, as *movie* happens to be used in the *comment* property of two nodes, the user will still obtain a partial answer to the task question.





**Figure 6. No-icon version of the same graph as Figure 4**

The first 16 participants worked with the no-icon version of the graph (illustrated in Figure 6). The nodes are represented as bubbles, and users have to read the node labels to find out what entity type each node represents. Icons were later added to the graph to provide a visual clue of the entity type (e.g., film). The last 4 participants worked with the icon-version of the graph. We did not notice a substantial improvement in user performance, except that 2 users were able to spot the film node very promptly. However, we think that the icon-version of the graph visualization is more readable and more pleasant looking!

Fourteen participants followed the tip for the initial search query, but 2 of these lost confidence in the approach and turned to other search queries after displaying 1 or 2 songs. The recommended query adopts the method of checking song by song—retrieving a subgraph centered on each song, and tracing a path from the song to a film node. However, 6 participants had no confidence in this approach and, as mentioned earlier, 2 more lost confidence after trying 1 or 2 songs. These participants probably couldn't imagine how checking individual songs can determine whether the song was composed for a movie! Instead, the 6 participants searched for *People with links to Zubir Said* (3), *Topics* (2), and *All* (document genres).

Four participants performed a keyword search for *movie* or *movies*, as a fallback option (i.e., not the initial search). This may reflect the influence of search engines. The interface currently displays the search result of a keyword search as a set of individual nodes without links. Such a display is similar to the item-centric search result display of traditional information retrieval systems. A keyword search for *movie(s)* retrieves two nodes that happen to contain the word *movie* in the *comment* property.

Thirteen participants used the filter menu to remove some nodes or links—to simplify the graph for easier scanning. This happened even when the graph was small enough for easy scanning, in the researchers' view. This suggests that users are comfortable with using the checkboxes in the filter menu to remove or retain node/link types.

**Task 2. Find two “City Council” versions of Majulah Singapura. Display the music scores (PDF files) in the Web browser. Compare the two versions of the score. How are the scores different? [Tip: On the left panel, click on *Browse by song* and select *Majulah Singapura*.]**

This task seeks to find two particular scores or arrangements of *Majulah Singapura*. The “City Council” versions are early versions of the song before it was adjusted to become the Singapore national anthem. Our interest is not so much whether the user can identify differences between the two scores (which may require musical knowledge), but that the user can locate two specific versions of the song.

Following the search tip to display a subgraph centered on *Majulah Singapura* will display 37 nodes shown in Figure 1. This is basically a graph scanning test to locate the term *City Council* in the node labels. Most of the participants (18 out of 20) followed the search tip. Of these, 4 did not manage to spot the “City Council” nodes from scanning the graph.

A graph with 37 nodes is not too big for scanning, but the no-icon version of the graph had some overlapping node labels which prompted some users to use different methods to spread out the graph by manually dragging some nodes further apart (3 participants) or applying other layout options (Tree, Concentric, and Spread-out) (7 participants).

Twelve participants used the filter menu to good effect—to reduce the graph size and complexity so that the desired “City Council” nodes could be spotted more easily. Users who applied the filter to select *Score* nodes (5 participants) and *score* links (3 participants) were the most successful in simplifying the graph to spot *City Council* nodes quickly.

**Task 3. What is Zubir Said’s wife’s name? [Tip: Click on the button *People with links to Zubir Said*]**

Clicking on the search button *People with links to Zubir Said* displays a graph with 68 nodes, which is considerably bigger than the 37 nodes for the previous task. As *wife* is a relation between a man and a woman, the user is expected to look for a *wife* link. The answer is indicated by both the *spouse* link as well as the node label *Tarminah Kario Wikromo, wife of Zubir Said* (see Figure 7).

Most of the users used the filter menu to reduce the graph size by checking the checkboxes for specific node types and/or link types. Users spent considerable effort working on the filter menu. The more eagle-eyed participants spotted the *spouse* link checkbox. Removing all links except the *spouse* link will highlight the answer. Nine participants used the *spouse* link filter to locate the answer. Two other participants spotted the *spouse* link in the graph (without applying a filter). This indicates that about half the participants were able to use labeled links to locate relational information.

The other half of the participants found the answer by spotting the word *wife* in the node label *Tarminah Kario Wikromo, wife of Zubir Said*. Eleven participants applied the filter to limit to Person nodes (in combination with other node types and sometimes *spouse* link). This approach was effective in reducing the graph size for the user to scan Person nodes to spot “wife” in the node label.



**Figure 7. Spouse link between *Zubir Said* and *Tarminah Kario Wikromo***

**Task 4. Find at least one person (other than Zubir Said) who appears in at least three of the photos.**  
[Tip: Click on the button Photos]

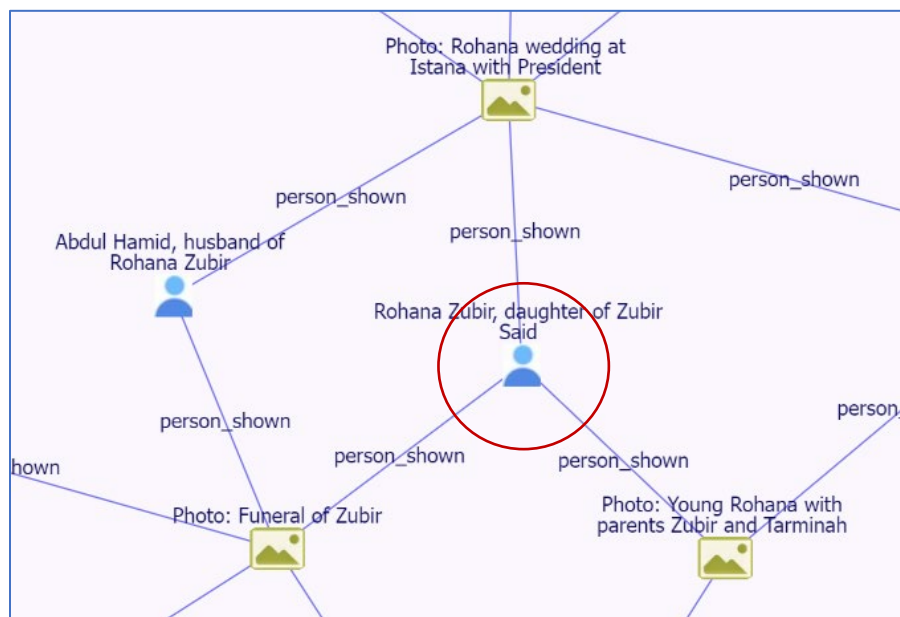
**Task 5. Find two persons who appear *together* (i.e., co-occur) in two photos**

Tasks 4 and 5 are related, focusing on identifying relationship structures:

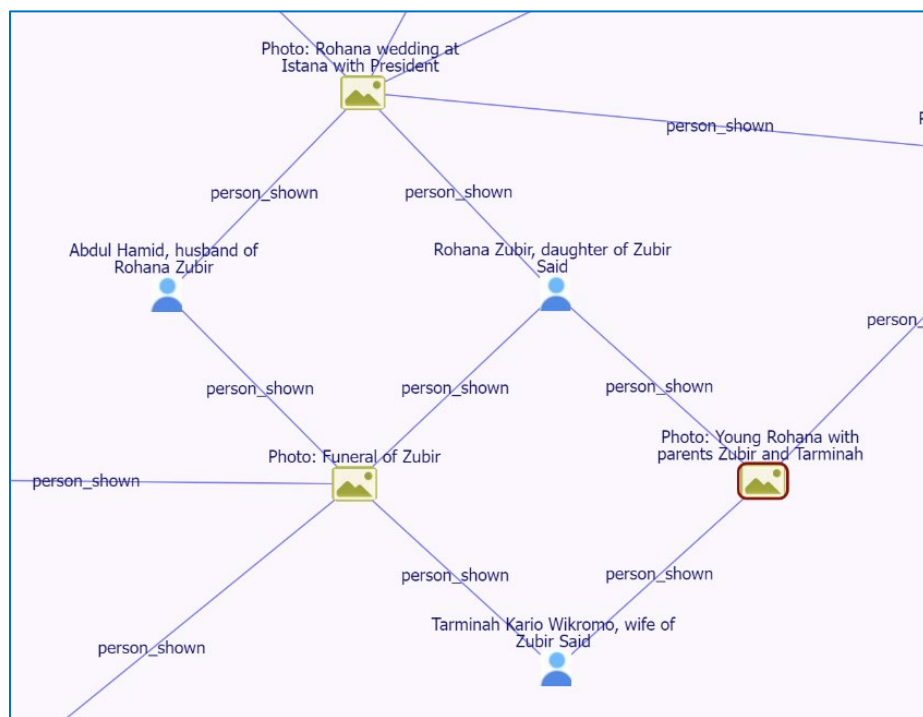
1. Identify a Person node with links to three Photo nodes (Task 4). Figure 8 shows part of the graph with the *Rohana Zubir* node having three links to three photos.
2. Identify two Person nodes with links to the same two Photo nodes, forming the vertices of a square (Task 5). Figure 9 shows *Abdul Hamid* node and *Rohana Zubir* node forming opposite vertices of a square structure. Similarly, *Rohana Zubir* and *Tarminah Kario Wikromo*.

Twelve participants found the desired relationship structures in the graph, for both Task 4 and 5. This indicates that they were able to make semantic sense of the graph structure.

The alternative approach is to read the metadata of individual Photo nodes for the names of persons in the photos. This approach requires the user to remember the names listed for each photo—to identify recurring names! This approach reflects the traditional record-centric mental model of reading individual records to extract information. Six users did this for Task 4 and 5. For the remaining 2 participants, it was not clear what approach they used to get the answers.



**Figure 8. Part of a graph showing the *Rohana Zubir* node (circled in red) having three links to three photos**



**Figure 9. Part of a graph showing Abdul Hamid and Rohana Zubir co-appearing in two photos, as do Rohana Zubir and Tarminah Kario Wikromo**

**Task 6. Find out whether Zubir Said composed the national anthem of Malaysia. [Tip: Click on the button *Letters*]**

The relevant information is in a letter between Zubir Said and a Malayan government office. The letter is part of a sequence of 3 letters on the topic of *national anthem for the Federation of Malaya* (before the formation of Malaysia) (see Figure 10). Few users will expect the desired information to be in a letter.

Clicking on the *Letters* query button (following the tip) retrieves 78 nodes. We consider a graph size of over 50 nodes to be too big to scan for node labels containing the terms *national anthem* and *Malaysia*. Indeed, 15 participants reduced the graph size by applying a filter.

Of the 5 participants who didn't start with the *Letters* query, 3 started with the *Topics* query. This can lead to the correct answer, as there is a Topic for *National anthem for Federation of Malaya*. One participant started with *Documents*, another with *News* and the last used the graph from the previous task. The users were trying to figure out what kind of subgraph may contain the desired information (not trusting the search tip offered in the worksheet).

Three of the 20 participants failed to find the answer due to the following reasons. One failed to apply a filter. Another didn't manage to spot the correct node despite trying all sorts of graph operations. The third searched for *Documents* and *Commentary*, submitted a keyword search for *Malaysia* (whereas it should be *Malaya*), and expanded the node *Topic of national anthem* with neighbor nodes. The *Topic of national anthem* refers to the Singapore national anthem; there is a separate Topic node for *National anthem for Federation of Malaya*, which the user did not notice.

## Conclusion

We report initial results of a user study of a knowledge graph visualization interface to find out to what extent novice users can read a graph visualization to identify relational information, and the issues they have interacting with the interface and graph visualization. The participants were given about 15 minutes of training, including watching a 3 to 4-minute video tour.

Analysis of the Zoom screen recordings of 20 user sessions indicate that the majority of users were able to interpret the knowledge graph visualization to find particular types of relational information. However, as the semantics of relations are reflected in the link labels and often also in the node labels, it was not always clear whether the user found the relational information based on the link or on the node label. It may be both. For example, in Figure 7 the link label *spouse* is reinforced by the node label *Tarminah Kario Wikromo, wife of Zubir Said*. Such redundancy of information seems to be desirable to afford the user multiple ways to find a relational fact. We designed our graph visualization to have longer node labels to serve a similar function as record titles.

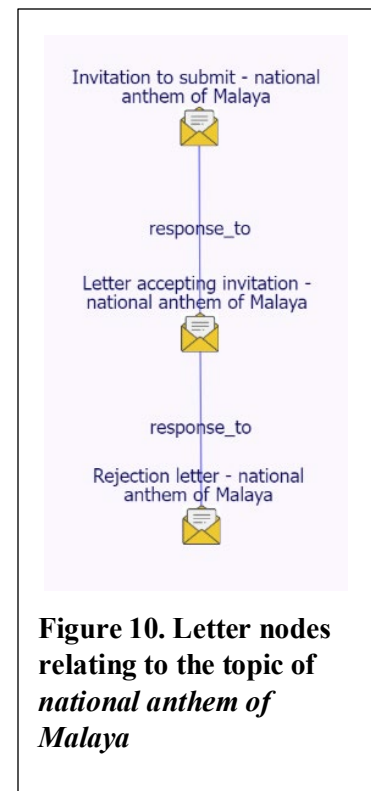
As all users are expected to be familiar with traditional information retrieval systems and search engines, the knowledge graph and visualization should be designed with the assumption that some users will apply a record-centric mental model when interacting with the interface. For example, the user may (perhaps inadvertently) remove all the links from the visualization, and display only the nodes—in effect, an item-centric search result display. In this situation, node labels that look like titles as well as informative metadata stored in the nodes (displayed in the Info Box panel when a node is clicked on) will be helpful to the reader. A few users clicked on individual nodes one after another, to examine their metadata in the Info Box. Thus, one advantage of a graph visualization is that it offers labeled links and link patterns to support information integration, but can be simplified to an item-centric search results display.

Users were found to be quite comfortable interacting with a busy graph visualization to simplify the graph for easier scanning or to make it more readable:

- Several users pulled or dragged individual nodes out to examine the links or node labels. Others dragged the nodes apart to reposition them, to make the graph more readable.
- A majority of users tried different layout functions—to see if the graph becomes more readable, and sometimes a different layout helps the user to spot the desired information.
- Most of the users were comfortable using the filter menu to remove some node or link types.

Users were able to scan a graph visualization to spot relevant keywords in the node labels. Scanning is more difficult in two-dimensional space. Some layout options (e.g., tree layout and concentric layout) re-arrange the nodes in a regular sequence structure that appear to help users' scanning. Removing all links from a graph sometimes results in a sequential layout that supports linear scanning.

A knowledge graph database system is still a kind of information retrieval system, with the additional complication of labeled links and linked structure. Thus, query formulation is still an important issue for retrieving a subgraph that contains the desired information. Some users clearly couldn't understand how the recommended query (given as a search tip in the task description) could retrieve the desired



**Figure 10. Letter nodes relating to the topic of national anthem of Malaya**

relational information. They attempted their own queries which sometimes led to the desired information. However, when the retrieved subgraph did not contain the desired information, a few users could not figure out how to reformulate the query or which other type of query to attempt. The keyword search box appears to be a fallback option for users, and thus keyword searching still needs to be considered in designing the metadata content of the nodes in a knowledge graph.

## ACKNOWLEDGEMENTS

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## Session 2: Information Seeking and Information Behavior

ALIEP 2-1 Psychological Mechanisms of Information Seeking Initiation in Online Learning: Focus on Resilience, Self-Regulated Learning Strategies, and Active Class Attitudes  
(Masaki Takeda and Satoru Suto)

ALIEP 2-2 Relationships among Causation, Coping Strategies, and Information-Seeking Strategies Regarding Perceived Lack of Understanding in Learning  
(Rie Kominami and Masaki Takeda)

ALIEP 2-3 Pet Parents on Spotlight: Information Behavior of Filipino Pet Owners  
(Dominique De Guzman)

ALIEP 2-4 Sexual Beliefs of Librarians and its Impact on the Satisfaction and Healthcare Practice of Users of Philippine Health Sciences Libraries: A Mixed Method Study  
(Simon Philip Sacramento, Clark Anthony Trovela and Ian Dominic Sipin)

# Psychological Mechanisms of Information Seeking Initiation in Online Learning

Focus on Resilience, Self-Regulated Learning Strategies,  
and Active Class Attitudes

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## ABSTRACT

*Background.* Online learning is being introduced to accommodate diverse learning styles and increase learner independence. It allows learners to listen to repeated explanations at their own pace according to their own level of understanding and to relate what they learn from other sources spontaneously. The psychological state of the learner is one of the most important factors influencing learning success and engagement. Despite online learning being a novel learning environment that could cause anxiety, learners can maintain or even improve their learning performance by adapting well to anxious situations. Thus, resilience – the process or ability to adapt well in the face of difficulties or threats – may influence learning performance in online learning.

*Objectives.* Based on previous studies, it was hypothesized that resilience would lead students to use self-regulated learning strategies, improve their active class attitudes, compensate for missing information by information seeking, or engage in developmental learning in order to achieve the expected learning outcomes. In this study, we attempted to test the hypothesis by focusing on (1) the relationship between resilience, self-regulated learning strategies, and independent teaching attitudes and (2) resilience and the allocation of time resources.

*Methods.* Two surveys were administered to undergraduate students: a questionnaire survey and an experience sampling survey. The former was conducted from 8 to 14 July 2021, while the latter was conducted from 15 to 21 July 2021.

*Results.* Among the self-regulated learning strategies impacted by resilience, regulation of motivation, cognition, and behavior promote active class attitudes. Motivation, cognition, and behavior are regulated by the desire to demonstrate one's ability; emotions can also influence the outcome.

*Contributions.* Creating an environment in which adequate support is readily available and recognized was shown to increase the robustness of learning behavior, and human support was also revealed to be particularly effective. This may be an important finding when considering specific interventions to enhance learning effectiveness in the future.

## RESEARCH BACKGROUND

Online learning was introduced to diversify learning styles and improve students' independence. It allows learners to listen to repeated explanations at their own pace, according to their own level of



understanding, or develop their learning from other information sources on the spot and relate it to what they have learned previously. In addition, online learning was adopted to not only prevent the spread of new coronavirus infections but also continue education during the pandemic, leading to its explosion on a global scale. Because online learning is a novel environment for many learners, their anxiety during learning is assumed to be high. In this study, online learning is defined as the most popular form of learning in which a series of actions – such as watching lecture videos, submitting assignments, and answering questions – are carried out online.

The psychological state of the learner is one of the most important factors that influence their commitment to and, consequently, success or failure in, learning (Mazur, 2015). In a study focusing on the psychological state of the learner engaged in online learning, Nagata and Takeda (2021) found that when learners' interest in learning is high, and feel that they are not able to learn as they expected, anxiety during learning increases. Similarly, Takeda et al. (2021) also revealed that learners' anxiety during learning inhibits their active class attitudes. By contrast, it was also found that anxiety during learning is suppressed when information literacy, such as the level of operating information devices, is high (Nagata and Takeda, 2021) and that learners actively search for information during online learning (Takeda, 2021). In other words, it can be inferred that learners are unable to take these actions when their information literacy is low, causing their anxiety during learning to increase. In the result, the active class attitude is low.

Studies that have addressed the effects of anxiety, particularly state anxiety, during or on learning have reported improved learning performance despite high state anxiety (McAllister, 2009). This suggests that learners may maintain or even improve their learning performance when they successfully adapt while in a state in which they feel anxious. The process or ability to adapt well despite such difficulties or threats is commonly described as resilience (Masten, 1990). In other words, it is possible that individual differences in resilience capacity may impact learning performance in online learning as well.

The process by which resilience improves performance related to learning predicts the use of self-regulated learning strategies (McAllister, 2009; Masten, 1990). Self-regulated learning strategies are described as learners' active involvement in their own learning processes in terms of metacognition, motivation, and behaviour, which they deliberately apply and control to achieve their learning goals (Zimmerman, 1986; Zimmerman, 1989). These strategies are often used when anxiety during learning is high (Ito, 2003). However, the mechanism by which self-regulated learning strategies are used when anxiety during learning is high has not been clarified. Based on studies by McAllister (2009), it is hypothesized that the self-regulated learning strategy is used when resilience is activated, the active class attitude is improved, and students take actions such as supplementing missing information by information seeking or conducting developmental learning to achieve the expected learning outcomes.

The use of self-regulated learning strategies is complexly related to cognition and behaviour and highly variable depending on the situation. Therefore, an investigation using the experience sampling method may be effective. This method involves taking measurements several times a day, at

fixed or random times, over several days, on subjects in their daily lives. It has high ecological validity because it is free from unnecessary influences of unusual environments such as laboratories, and it is easy to capture the true state of the participants in their daily lives. Furthermore, responses are requested several times a day by online push notifications, the thoughts, judgments, feelings, and actions of the participants can be recorded without any time interval, thus minimising recall bias. And, since multiple observations are included for the participants, the temporal resolution is high and, by using a multilevel model, intra- and inter-individual effects can be analysed (Hofmann & Patel, 2014). Thus, it can be said that the experience sampling method allows a more detailed study of the dynamism of information-seeking and learning behaviour.

Based on the above, in order to test the aforementioned hypothesis, this study aims to clarify two points: (1) that resilience acts on self-regulated learning strategies and improves active class attitudes, and (2) that information seeking takes place in the mechanism of action. In testing the hypotheses, there are two points in which this study can be validated. The first point aims to elaborate by modelling the psychological state of the learner, and the second aims to capture not only the complexity and temporal nature of self-regulated learning strategies but also their manifestation as actual behaviour by focusing on the allocation of time resources. By modelling, this study aims to link learners' psychology, cognition, and information seeking in online learning, which is essential for evaluating its nature and effectiveness.

## **RESEARCH METHODS**

Two surveys were administered to undergraduate students: a questionnaire survey and an experience sampling survey. The questionnaire survey asked questions about resilience, active class attitudes, and self-regulated learning strategies. In the experience sampling survey, students were asked to report their behaviour, time spent, degree of concentration on learning and exploration (concentration), and degree of achievement (achievement) at regular intervals. The questionnaire survey was conducted from 8 to 14 July 2021, while the experience sampling survey was conducted from 15 to 21 July 2021 (reported twice a day).

### **Participants**

Two subjects (class A and B) were considered for the survey, with the intention of establishing the conditions under which approximate learning behaviour occurs, and the students studying these subjects were the participants. Ethical considerations included explaining that participation in the survey was voluntary, that there would be no disadvantage in responding, and that individuals would not be identified. Finally, 72 consenting participants were included in the study.

### **Subjects Surveyed**

psychology (class A) and career design (class B) class were investigated. Class A is an elective class for second-year students and class B is a compulsory class for first-year students. Both classes were

conducted through online learning. At the time of the survey, the university had both online and face-to-face courses, depending on the class, and students were able to attend classes at the university.

### **Questionnaire Survey**

The questionnaire survey was conducted online. Participants initiated their responses by clicking on the URL of the survey form, which was sent to them in advance via a learning management system. Responses were set up in such a way that participants could only submit their answers once during the survey period. The survey first asked about basic attributes such as undergraduate faculty, sex, and age. Questions on resilience, self-regulated learning strategies, and active class attitudes were then asked. In this study, Saito et al.'s scale (2011; four items) was used to measure resilience. In addition, Hatano et al.'s scale (2011; 5-item method) was used to measure self-regulated learning strategies. Another Hatano et al.'s scale (2013; 5-item method) was used to measure active class attitudes. As these variables are considered to be influenced by culture, society, and the educational environment, these scales that have proven validity and reliability in Japan were used.

### **Experience Sampling Survey**

The experience sampling survey was conducted online. Notifications requesting responses were sent daily at 9 am (Time 1, T1) and 6 pm (Time 2, T2) during the study period. Participants submitted their responses after receiving notifications on their smartphones or tablets. At T1, participants were asked to enter their responses from 6 pm on the previous day to 9 am on the same day, and at T2, they were asked to enter their responses from 9 am to 6 pm on the same day. Responses could only be submitted once per time point and only on the same day. At each time point, participants were asked to answer, in one-hour units, the amount of time they spent on each of the following activities: taking classes, assignments for classes, independent study and research related to classes (excluding assignments), activities related to daily life (housework, eating, dressing, bathing, shopping, etc.), hobbies and rest (excluding sleep), and conversations and correspondence with family and friends. In addition, they were asked to rate their level of concentration and achievement while engaging in these activities by selecting the one most applicable option from among five, ranging from 'agree' to 'completely disagree' for the items 'I was able to concentrate' and 'I was able to achieve what I needed to do'. All survey items and response methods were identical at T1 and T2.

## **RESULTS**

Of the 72 participants, 38 (52.78%) who submitted responses at all time points were included in the final analysis. The characteristics of the analysed participants' were as follows: faculty: 17 humanities, 4 education, 6 science, and 11 agriculture; sex (self-identified): 26 female, 12 male; grade: 19 first-year, 2 second-year, 9 third-year, and 8 fourth-year students; mean age 19.11 years ( $SD = 0.95$ ).

## Relationship between Resilience, Self-Regulated Learning Strategies, and Active Class Attitudes

Tables 1–3 depict the results of the factor analysis (maximum likelihood method, Promax rotation) for each scale. For the Resilience Scale in Table 1, although a five-factor structure was used in previous studies, a four-factor structure was judged to be optimal for this study based on parallel analysis and factor loadings. The measure for model fit was  $CFI = .71$ ,  $RMSEA = .04$  and for internal consistency was  $\omega = .87$ . Therefore, the goodness of fit and stability of the model were judged to be sufficient to withstand analysis. Each factor was categorised under ‘significant others’, ‘competence’, ‘social support’, and ‘positive perception’ with reference to previous studies. The ‘affinity’ in the previous study was merged with the social support factor. For the Self-Regulated Learning Strategies Scale in Table 2, two items with low factor loadings (‘I change the way I organise depending on the lesson or task’ and ‘I check my understanding so far in class’) were excluded from the analysis and a three-factor structure was deemed appropriate ( $CFI = .97$ ,  $RMSEA = .02$ ,  $\omega = .90$ ). Based on these results, these factors were named ‘motivational adjustment strategies’, ‘cognitive/behavioural adjustment strategies’, and ‘emotion-regulation strategies’. Finally, the Active Class Attitudes Scale in Table 3 was judged to have a one-factor structure, as in previous studies, and the factor was named ‘active class attitudes’ ( $CFI = .95$ ,  $RMSEA = .07$ ,  $\omega = .94$ ).

**Table 1**

*Results of Factor Analysis for the Resilience Scale*

	F1	F2	F3	F4	Commonality
<b>Significant others</b>					
I think I have met people in my life who have been very important to me	<b>.95</b>	-.02	.05	.04	.93
I have someone I think is important	<b>.82</b>	-.14	.13	.09	.69
I have someone who has had a positive impact on my life	<b>.81</b>	-.02	.08	.09	.71
I have someone I admire and respect	<b>.54</b>	.04	-.02	.23	.39
My School life has been fulfilling so far	<b>.38</b>	.31	-.16	.12	.31
<b>Competence</b>					
I think if I work hard I can become a respectable person	-.20	<b>.81</b>	.02	.18	.66
I don't see much of a connection between working hard and being happy	-.23	<b>.75</b>	.38	.13	.63
I believe that if I work hard I can do anything I set my mind to	.13	<b>.62</b>	-.03	-.17	.44
There is a person to talk to or place to go to if I have any problems	.01	<b>.56</b>	.38	-.29	.64
I don't want to ask others for help, even when I'm going through a tough time	.34	<b>.53</b>	-.09	-.05	.30
I do my best, no matter what	.29	<b>.40</b>	.03	.07	.36
I will not give up, no matter how difficult the situation	.10	<b>.40</b>	.12	-.14	.25
I believe I have the power to achieve my goals	.29	<b>.34</b>	-.04	-.14	.26
<b>Social support</b>					
I often need someone to listen to me when I'm going through a difficult time	-.01	-.16	<b>.99</b>	-.13	.88
When I'm not feeling well, there are people who notice and encourage me	.17	.01	<b>.66</b>	-.27	.56
Talking to people doesn't bother me	-.11	.08	<b>.63</b>	.39	.61
I'm the one with a lot of friends	.12	.13	<b>.46</b>	.42	.56
I usually have someone who knows exactly how I feel	.33	.13	<b>.38</b>	-.13	.40
I have someone to complain to	.32	-.09	<b>.33</b>	-.09	.23
<b>Positive perception</b>					
I remain optimistic that not everything is bad	.07	.16	-.27	<b>.90</b>	.88

I can laugh it off when things go bad	.03	-.05	-.16	<b>.84</b>	.71
I always try to look on the bright side of things	.16	-.21	.04	<b>.80</b>	.68
I do not dwell on the uncontrollable	.02	-.26	-.06	<b>.58</b>	.38
When I am not sure what the outcome will be, I always think of the best side	.09	.07	.27	<b>.47</b>	.37
I like talking to people around me about different things.	-.05	.30	.37	<b>.42</b>	.53

**Table 2**

*Results of Factor Analysis for the Self-Regulated Learning Strategies Scale*

	F1	F2	F3	Commonality
<b>Motivational adjustment strategies</b>				
When bored in class, I try harder to concentrate	<b>.98</b>	-.15	-.16	.84
I strive to concentrate when I lose interest in class work	<b>.84</b>	-.04	.09	.71
I strive to concentrate when thoughts start to blur during class	<b>.81</b>	-.04	.13	.66
Even if uninterested in the content of the lesson, I motivate myself to listen to what is being said	<b>.77</b>	.05	-.05	.62
Even if uninterested in the content of the lesson, I make an effort to understand it	<b>.74</b>	.06	.01	.60
I stay motivated to take classes even if they don't interest me	<b>.64</b>	.22	-.17	.61
I consider what I need to understand in class	<b>.40</b>	.01	.05	.17
I rethink learning methods to suit the content of lessons	<b>.37</b>	.11	.19	.22
<b>Cognitive and behavioural adjustment strategies</b>				
I plan and learn	-.21	<b>.95</b>	-.05	.97
I plan and study before exams	-.11	<b>.91</b>	-.07	.77
I plan my study schedule for the week and follow it	.02	<b>.71</b>	-.10	.55
I plan and study as much as I can	.19	<b>.60</b>	.23	.52
I think about what I am going to learn before I go to class	.00	<b>.55</b>	-.08	.32
I have a general understanding of new material before I learn it in class	.06	<b>.50</b>	.01	.28
I check to see if I remember previous material before class	.20	<b>.47</b>	.23	.39
I work on timed learning assignments	.10	<b>.47</b>	.04	.27
If I do not fully understand the content in class, I will try to understand it later	.31	<b>.41</b>	.01	.37
I set aside a specific amount of time to study	.32	<b>.34</b>	-.16	.35
<b>Emotion-regulation strategies</b>				
When things go wrong, I tell myself not to worry	-.02	.03	<b>.92</b>	.83
I avoid overthinking the situation.	-.17	-.02	<b>.86</b>	.76
I try not to worry too much if things seem worse than I anticipated	.07	.02	<b>.80</b>	.65
When I feel insecure wondering whether things will work out, I tell myself it will be okay	.19	-.11	<b>.65</b>	.49

**Table 3**

*Results of Factor Analysis for the Active Class Attitudes Scale*

	F1	Commonality
<b>Active class attitudes</b>		
I work on a task until I am satisfied with the results	<b>.89</b>	.80
I strive to do as well as possible on assigned reports and assignments	<b>.83</b>	.69
I finish the report to my satisfaction	<b>.80</b>	.64
Classes involve just listening blankly (reverse scale)	<b>.80</b>	.64
I consider myself a highly motivated learner.	<b>.78</b>	.60
I often complete reports and assignments for the sake of just submitting them (reverse scale)	<b>.77</b>	.60
I put minimal effort into a task (reverse scale)	<b>.76</b>	.57
I am willing to participate in class	<b>.73</b>	.53

I consider myself a proactive learner	.72	.52
I attend classes with the feeling that all I need is to get credits (reverse scale)	.70	.48
I like to study	.56	.32

Table 4 displayed the correlation coefficients between the respective subscales. It reveals that significant others had moderate positive correlations with competence ( $r = .38, p < .01$ ) and active class attitudes ( $r = .39, p < .01$ ). Competence was found to be moderately positively correlated with all but positive perception and emotion-regulation strategies. Social support was found to have a moderate positive correlation with cognitive and behavioural adjustment strategies, while positive perception was found to have a strong positive correlation with emotion-regulation strategies. Motivational adjustment strategies were found to have a medium-to-strong positive correlation with cognitive and behavioural adjustment strategies and active class attitudes. In the subscales of active class attitudes and self-regulated learning strategies, positive correlations were found between active class attitudes and both motivational as well as cognitive and behavioural adjustment strategies.

**Table 4**

*Correlation Coefficients between Subscales*

	1	2	3	4	5	6	7	8
1. Significant others	-							
2. Competence	.38**	-						
3. Social support	.28*	.39**	-					
4. Positive perception	.13*	.13*	.10*	-				
5. Motivational adjustment strategies	.26*	.32**	.11*	.15*	-			
6. Cognitive and behavioural adjustment	.17*	.42**	.36**	-.12*	.46**	-		
7. Emotion-regulation strategies	.23*	.13*	.12*	.76**	.08	-.15*	-	
8. Active class attitudes	.39**	.44**	.09	.02	.71**	.68**	-.10*	-

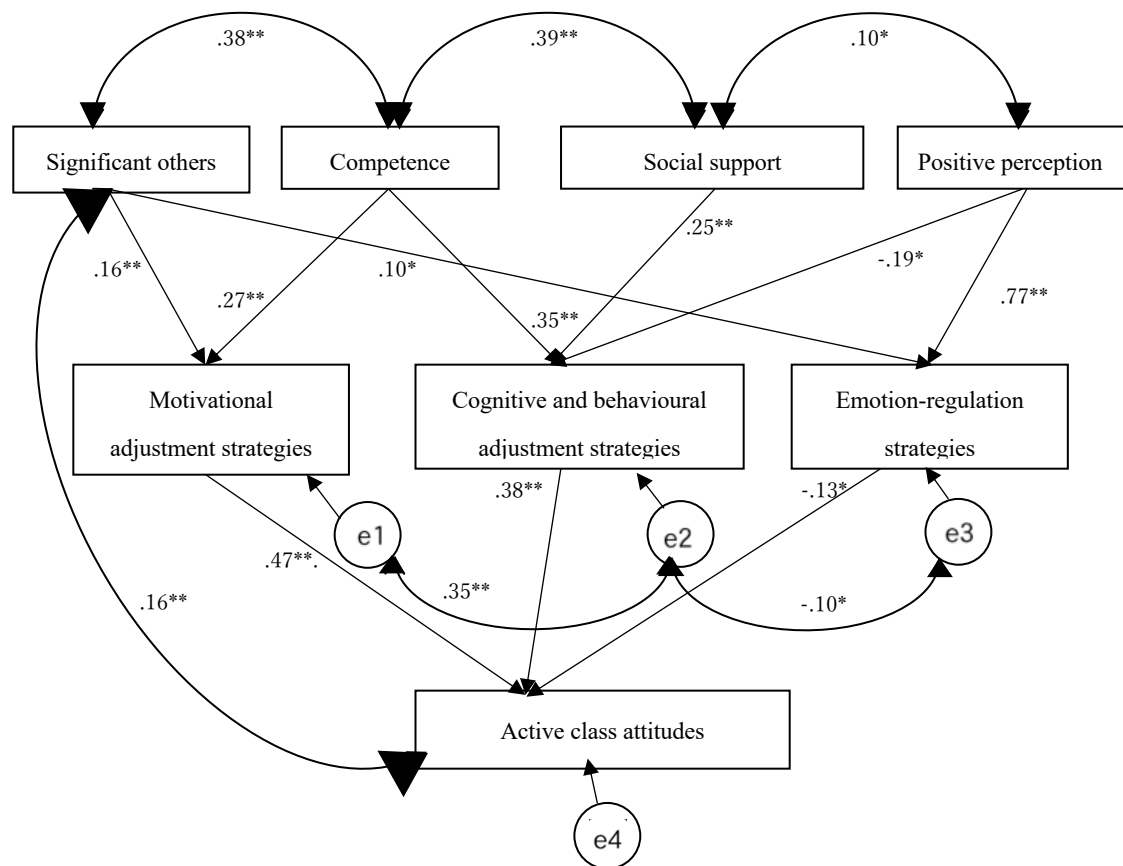
\*  $p < .05$ , \*\*  $p < .01$

An analysis of covariance structures was then conducted to examine the processes by which resilience influences self-regulated learning strategies and active class attitudes (Fig. 1). The model fit was generally good (GFI = 1.00, AGFI = .92, CFI = .93 and RMSEA = .01).

In Figure 1, the path from resilience to self-regulated learning strategies reveals that motivational adjustment strategies are influenced by competence (.27). In addition, cognitive and behavioural adjustment strategies are influenced by both competence (.35) and social support (.25). Furthermore, emotion-regulation strategies are heavily influenced by positive perceptions (.77). The subsequent paths from resilience and self-regulation learning strategies confirm that motivational adjustment strategies (.47) and cognitive and behavioural adjustment strategies (.38) have a significant impact and promote active class attitudes. On the other hand, emotion-regulation strategies were found to undermine active class attitudes (.13), although the impact was weak. Additionally, significant others were shown to have a direct, although weak, influence on promoting active class attitudes (.16), as well as an indirect influence via self-regulated learning strategies (.17).

**Figure 1**

*Causal Model of Resilience, Self-Regulated Learning Strategies, and Active Class Attitudes (only significant paths shown; \*  $p < .05$ , \*\*  $p < .01$ )*



## Allocation of Time Resources

### Overall Trends

Table 4 shows the allocation of time resources to learning-related behaviours (classes, assignments, and related information seeking) for T1 and T2. Table 5 depicts the allocation of time resources to life-related behaviours (eating, bathing, clubbing, working, part-time jobs, rest, etc. (excluding sleep), as well as face-to-face and non-face-to-face interactions with others) during the respective time periods.

**Table 4**

*Allocation of Time Resources to Learning-Related Behaviours (SD)*

	Class	Task	Information seeking
T1	.58(1.04)	1.04(1.47)	.30( .60)
T2	1.19 (1.41)	1.40(1.59)	.37( .82)

**Table 5***Allocation of Time Resources to Life-Related Behaviours (SD)*

	Lifestyle	Club	Work	Rest	Interaction
T1	2.08(1.52)	.11( .54)	.71(1.49)	1.81(2.12)	1.63(2.00)
T2	1.94(1.23)	.33(1.11)	.63(1.53)	1.84(1.74)	1.58(2.00)

*Relationship between Resilience and Time Resource Allocation, Concentration, and Achievement*

For the Resilience Scale responses, the total score was calculated as the sum of each item. The total score was then divided into two groups: high-resilience group (mean + 1 *SD*,  $n = 19$ ) and low-resilience group (mean - 1 *SD*,  $n = 19$ ).

Table 6 shows the allocation of time resources to learning-related behaviours, while Table 7 shows the allocation of time resources to life-related behaviours for the high- and low-resilience groups. In learning-related behaviours, both groups spent time on assignments, attending classes, and information seeking, in that order. However, specific time spent on information seeking was only 0.11 hours in the low-resilience group, compared to 0.56 hours in the high-resilience group ( $t(36) = 2.14$ ,  $p < .05$ ).

In terms of life-related behaviours, all groups spent the most time on lifestyle activities (e.g. eating and bathing). The high-resilience group spent the most time on interaction, whereas the low-resilience group spent the most time on rest. A t-test on these showed that the high-resilience group spent less time on rest than did the low-resilience group ( $t(36) = 2.63$ ,  $p < .05$ ).

The results confirmed that the high-resilience group rated their concentration during information seeking higher than did the low-resilience group (Table 8;  $t(22) = -2.23$ ,  $p < .05$ ).

**Table 6***Relationship between Resilience and Allocation of Time Resources to Learning-Related Behaviours (SD)*

	Class	Task	Information seeking
High Resilience	.85( .58)	1.31( .82)	.56( .38)
Low Resilience	.92( .46)	1.13( .71)	.11( .23)

**Table 7***Relationship between Resilience and Allocation of Time Resources to Life-Related Behaviours (SD)*

	Lifestyle	Club	Work	Rest	Interaction
High Resilience	2.03( .84)	.15( .22)	.51( .65)	1.53(1.61)	1.74(1.52)
Low Resilience	1.98( .81)	.29( .40)	.80( .65)	2.12( .81)	1.47(1.10)



**Table 8***Relationship between Resilience, Concentration, and Achievement Scores (SD)*

		Class	Task	Information seeking
High Resilience	Concentration	3.60( .60)	3.82( .89)	4.57( .60)
	Achievement	3.87( .39)	3.93( .86)	4.51( .95)
Low Resilience	Concentration	3.76( .56)	3.90( .80)	3.83( .95)
	Achievement	4.10( .58)	4.14( .72)	4.14( .57)

**DISCUSSION**

Based on previous studies, this study hypothesized that resilience would lead to the use of self-regulated learning strategies, improved active class attitudes, and the ability to compensate for missing information by information seeking or engaging in developmental learning towards the expected outcomes. We attempted to test the hypothesis by focusing on (1) the relationship between resilience, self-regulated learning strategies, and active class attitudes and (2) resilience and the allocation of time resources. While interpreting the results and discussion, it should be noted that this study was conducted in a mixed environment of online and face-to-face learning.

First, the results of the analysis of covariance structures of the relationship between resilience, self-regulated learning strategies, and active class attitudes are discussed. In the path from resilience to self-regulated learning strategies, it was found that motivational adjustment strategies were influenced by competence, and cognitive and behavioural adjustment strategies were influenced by both competence and social support. In addition, emotion-regulation strategies were found to be heavily influenced by positive perception, while significant others had a direct positive effect on active class attitudes. It was also confirmed that motivational as well as cognitive and behavioural adjustment strategies promote active class attitudes. On the other hand, emotion-regulation strategies were found to inhibit active class attitudes. Significant others were shown to have a direct influence on promoting active class attitudes, as well as an influence via self-regulation learning strategies.

The factors named competence in the present study included items such as ‘I think I can become a respectable person if I work hard’ and ‘I think I have the ability to achieve my goals’. This seems similar in nature to the concept of competence proposed by White (1956). According to White (1956), competence is the potential that a person already has and the desire to actively work with the environment to fulfil that potential. Social support represents the perception of the environment and assistance from the surroundings, and positive perceptions indicate a tendency to optimistically evaluate the external world.

The results of the current study, so far, can be summarised and interpreted as follows: Within self-regulated learning strategies, the regulation of motivation, cognition, and behaviour promotes active class attitudes. Motivation, cognition, and behaviour are regulated by the desire to demonstrate one’s abilities, with emotion playing an indispensable role in the background; an optimistic view of the parties involved was found to inhibit active class attitudes. In other words, it is important to want to

demonstrate and improve one's abilities under conditions of a certain level of anxiety and tension. This is consistent with the finding that higher state anxiety improves learning performance (McAllister, 2009). It also supports the findings of Nagata and Takeda (2021) that those with higher anxiety regarding exploration during learning tend to cognitively process more advanced information.

On the other hand, regarding the influence of resilience on active class attitudes via self-regulated learning strategies, as mentioned above, despite many elements being completed by the individual on his/her own, a point of contact was found where others can be involved. This is the link between social support, cognitive and behavioural adjustment strategies, significant others, and active class attitudes. In other words, creating an environment in which adequate support is readily available and recognised increases the robustness and independence of learning behaviour. Human support, in particular, has a significant impact and effect, increasing resilience and promoting active class attitudes, both directly and indirectly.

Second, the relationship between resilience and the allocation of time resources is discussed based on the results of a survey using the experience sampling survey method. Compared to the low-resilience group, the high-resilience group spent more time on information seeking as a learning-related behaviour, while the low-resilience group spent less time on rest. The high-resilience group rated the degree of concentration in information seeking higher than did the low-resilience group. In summary, it can be said that people with high resilience make up time by cutting down on time for rest and seek information related to learning in a concentrated state.

In terms of the results concerning the allocation of time resources, it can be said that in the mixed online and face-to-face learning environment examined in this study, information seeking and the related allocation of time resources characterised the high- and low-resilience groups. This suggests that the state or nature of high resilience is, in the context of learning, expressed in the behaviour of attempting to overcome it through information seeking. The close link between learning and information seeking has been discussed in the past and their deep relationship and mutual influence has been reiterated.

## **CONCLUSION**

In this study, the model revealed that resilience influences active class attitudes through self-regulated learning strategies, and that in an environment where face-to-face and online learning are mixed, in part, actual behaviour is expressed in the form of allocating time resources to information-seeking behaviour, which can be evaluated. In previous studies in the context of learning and education, we have mainly discussed high and low resilience and learning performance. Therefore, an important finding can be considered to have been achieved in that a link between resilience and performance – that is information seeking – has been empirically demonstrated. In the context of information behaviour, learning has been recognised as a strong motivator for information seeking and the psychological factors of the actor as important components of information behaviour, although the details have not been sufficiently elaborated. Against this background, Takeda (2021), Nagata and Takeda (2021), and Takeda et al. (2021)

have empirically discussed the relationship between active class attitudes, anxiety, and information-seeking behaviour during learning. It has been suggested that information seeking is conducted as a result of resilience, and it can be said that the understanding of the process and mechanism of resilience have been advanced in this study.

There is room for further investigation into specific intervention methods. Reducing time for rest to engage in information-seeking was shown to accelerate understanding and overcome learning difficulties, but it goes without saying that rest is also important. It may be necessary to develop an effective and easy-to-use information search system. Finally, because the study was conducted in an environment where online and face-to-face learning were mixed, the results regarding the allocation of time resources should be interpreted cautiously.

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# Relationships among Causation, Coping Strategies, and Information-Seeking Strategies Regarding Perceived Lack of Understanding in Learning

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## ABSTRACT

*Background.* To sustain learning, it is necessary to overcome the difficulties of not knowing or not being able to perform certain tasks during the learning process. Indeed, coping with a lack of understanding depends on its cause. Recent research has also found that one coping strategy for overcoming the lack of understanding is information-seeking. However, the psychological mechanisms behind the sequence of causation, coping, and information-seeking have not been clarified.

*Objectives.* The synthesis of previous studies leads to the hypothesis that causation during lack of understanding influences coping strategies and information-seeking strategies differ depending on the coping strategy. This study aims to clarify the causal relationship between causation, coping, and information-seeking strategies during lack of understanding and to test the hypothesis. Furthermore, it aims to provide further insight into the different aspects of search depending on the coping strategy.

*Methods.* The study targeted 264 undergraduate students at University A and 119 undergraduate students at University B. The survey was conducted between 18 April and 29 May 2023. As part of the survey procedure, the Uniform Resource Locator (URL) of the survey form was distributed via the learning management system. The survey used the Causation of Lack of Understanding Scale, Coping Strategies for Lack of Understanding Scale, and Information-Seeking Strategies Scale. Four of the respondents who agreed to cooperate in the interview were additionally interviewed.

*Results.* The results showed that during lack of understanding, causation influenced coping strategies, and coping strategies affected the information-seeking strategies. Specifically, regarding the relationship between causation and coping strategies in lack of understanding, it was found that poor class attitudes, poor teaching, and difficulty with content promoted giving up, dependence on friends, and investigating the cause and continuing to think about it, respectively. Moreover, regarding the information-seeking strategies during lack of understanding, giving up suppressed the implementation of interpersonal resources, whereas dependence on friends promoted it. Combining the analysis of the subscale scores and interviews, it can be said that when students undergo a lack of understanding, they tend to attribute it to insufficient preparation and review; in such cases, they tend to promote re-doing as a coping strategy. This study showed that when re-doing was used as a coping strategy, the students attempted to overcome the problem through their own efforts and this did not lead to information-seeking. Conversely, most of the causation and coping strategies that led to a path to information-seeking involved cases in which the participants believed there were causes for their lack of understanding other than themselves.

*Contributions.* This study empirically clarified the relationships among causation, coping strategies, and the corresponding information-seeking strategies during lack of understanding. In addition, the findings suggest appropriate interventions according to the psychological processes identified in this study.

## INTRODUCTION

Learning and information-seeking behaviours are inseparable. The latter is not the goal of the search itself, but is performed to compensate for the missing information in certain situations such as when learning new things. Specifically, actors compare their existing information with the newly presented one, judge how the latter is related to and positioned regarding the former, and determine what information is absent (Dervin, 1998). In other words, the information-seeking behaviours are generated by noticing missing information through the learning behaviours. In the fields of library and information science, many studies on information-seeking behaviours examine them in relation to learning, precisely because of this background.

In recent years, Japan has taken steps to encourage information-seeking during learning, such as research learning and online learning. First, research learning refers to ‘learning activities such as summarising and writing down one’s own ideas based on knowledge and experience after reading texts and materials in order to nurture the ability to think, judge, and express (Ministry of Education, Culture, Sports, Science and Technology, 2008); these activities are incorporated in each subject area. In these studies, students ‘learn not only the techniques and skills to find the necessary materials from a variety of sources, but also to select information that suits their purposes independently from among the information, analyse and evaluate it, reconstruct the information, verify it and present it’ (Mizuho Research & Technologies Ltd, 2008). Accordingly, the aim is to cultivate information literacy to survive in an information society, in addition to the ability to think and express, by having students search for information rather than being taught in a one-way manner. Furthermore, in response to a report by the Central Council for Education, the Ministry of Education, Culture, Sports, Science and Technology set up the development of online learning as an initiative to promote independent learning to guarantee the quality of higher education (Central Education Council, 2012). In fact, it has been shown that online learning promotes a proactive attitude towards learning, and that students develop their learning by using various means to investigate those parts that they do not understand or want to comprehend more by themselves (Takeda, 2021). Thus, information-seeking during learning contributes to the cultivation of information literacy and the improvement of learning effectiveness; further, its usefulness is attracting attention every year. Thus, in recent years, the educated generation has actively searched for information during learning, when they do not fully understand what they need to learn. However, the process of information-seeking as a coping mechanism for the lack of understanding in learning remains unexplored.

Coping with a lack of understanding has been found to depend on its cause (Kosugi, 2008). It has been found that the less proactive students are in their learning, the less likely they are to try to cope with a lack of understanding, being more likely to hesitate or give up coping. Many students who give up coping perceive their own attitudes towards the class as poor. Nevertheless, it is also known that

many students attempt to manage and overcome their lack of understanding by themselves. However, Kosugi's work (2008) insufficiently presents the specific methods students take to overcome these difficulties. Rowley and Urquhart (2007) state that learning experience about information sources determines whether information-seeking takes place and the choice of information sources. Thus, it can be inferred that people who have experienced deepening their learning through information-seeking use it when trying to deal with and overcome the lack of understanding independently. Kosugi (2008) explains that 'self-help', 'giving up', and 'dependence on friends' are ways of coping with a lack of understanding. In this case, the sources of information used in the information search are expected to differ.

Taken together, these hypotheses lead to the premise that the causation behind a lack of understanding influences the coping strategies (Kosugi, 2008), and that the information-seeking strategies differ according to the coping strategies (Takeda, 2021; Rowley & Urquhart, 2007). Thus, this study aimed to clarify the causal relationship between causation, coping, and information-seeking strategies as coping strategies regarding a perceived lack of understanding in learning and to test the aforementioned hypothesis. Furthermore, the different aspects of exploration depending on the coping strategies will be shown.

## **LITERATURE REVIEW**

To sustain learning, learners must overcome the difficulties they encounter when they do not understand or cannot perform tasks during their learning. This is due to the importance of learners feeling that they are in control of their environment (Rotter, 1966), which motivates them to learn, in addition to progressing in their learning. Similarly, Decharms and Carpenter (1968) explained that the motivation to continue learning differs according to the concepts of origin and pawn, the states of being driven by one's own will and someone else's, respectively. These two theories indicate that the perception that if you do it, you will get as much out of it as you do is the driving force that sustains learning. Thus, coping with a lack of understanding has important implications beyond progressing.

In a survey measuring the motivation to learn among university students, Kosugi (2008) investigated the cause behind insufficient understanding and how these students cope with it regarding their motivation to learn. This study was conducted in relation to learning motivation; a scale was developed based on a preliminary survey (104 participants) using free descriptions, and the survey was conducted on 437 university students. Factor analysis, analysis of variance, and multiple regression analysis were conducted on the obtained data to clarify the factors and coping strategies that constitute the causation behind lack of understanding. The results showed that the causation consisted of three factors: poor classroom attitude, inefficient teaching, and insufficient preparation/review. The coping strategies included self-help, giving up, and dependence on friends. Multiple regression analysis demonstrated that willingness to learn, causation, and coping were interrelated; moreover, when the willingness to learn was high, students actively coped with the situation based on causation. In contrast, when students had a high awareness of learning as an obligation and low motivation to learn, they

reported being unable to cope with the lack of understanding. Thus, there is a process of causation and coping before overcoming a lack of understanding, and coping differs depending on the causation. It has also been suggested that coping may lead to different persistence levels and outcomes in learning.

One possible coping strategy is information-seeking. It is known that information-seeking attempts to compensate for some missing information (Dervin, 1998; Kuhlthau, 1991, Wilson, 1999). Among previous studies, Kuhlthau's (1991) well-known study presented a model of information-seeking behaviours in relation to learning and divided them into six stages: among these stages, the 'initiation' stage is described as when people realise their inadequate knowledge and have to work on a task; however, this has been assumed and not specifically indicated. In contrast, Wilson (1997) stated that even if the necessary information is lacking, whether the information search is initiated depends on other factors. He explained that information-seeking is a process of coping with the stress experienced due to insufficient information when the need for information is recognised. Specifically, when people lack understanding, if they are strongly motivated by the task, are aware of having inadequate knowledge or information and feel strongly stressed by it, then information-seeking may be performed to cope with the lack of understanding. Takeda (2021) showed that in online learning, information-seeking is indeed performed when relating the learned matters to existing knowledge, conducting developmental learning, and during incomprehensible matters. However, the psychological processes that attempt to cope with such matters remain unclarified.

## **METHODOLOGY**

### **Survey Targets and Procedures**

The study population comprised 264 and 119 undergraduate students from the Faculty of informatics and Education at University A and the Faculty of Literature at University B, respectively. The subjects of the survey were taking the same courses at their respective universities. The survey was conducted between 18 April and 29 May 2023. As a part of the survey procedure, the Uniform Resource Locator (URL) of the survey form was distributed through a learning management system. Subsequently, an explanation of the survey was provided orally through the system. Four respondents agreed to participate in the interviews and were selected based on their grade and sex. Ethical considerations, such as explaining that participation and responses were voluntary, there was no relationship between the participation or responses and class evaluations, there were no other benefits or disadvantages, and that the response data would be managed, were regarded.

### **Survey Items and Scales Used**

The survey primarily assessed the students' basic demographics (faculty, sex, and age). Subsequently, their causes of lack of understanding and how they coped with it in general were examined. For the items related to the causation of and coping with a lack of understanding, the Causation of Lack of Understanding Scale (Kosugi, 2008) and Coping Strategies for Lack of Understanding Scale (Ito & Shinto, 2004) were used, respectively. Finally, the Information-Seeking Strategies Scale (Igarashi,



2003) was employed to determine the tendencies towards information-seeking strategies. For each item on scales, the participants were requested to select the most applicable option from the following alternatives: five (very applicable), four (somewhat applicable), three (neither applicable nor inapplicable), two (inapplicable), and one (not applicable at all). In a previous study, the aforementioned scales incorporated three subscales each, which are as follows: the Causation of Lack of Understanding: poor classroom attitude, inefficient teaching, and insufficient preparation/review; the Coping Strategies for Lack of Understanding Scale: self-help, giving up, and dependence on friends; and the Information-Seeking Strategies Scale: implementing interpersonal resources, implementing mass media resources, and independence in information-seeking. In this study, considering the participants' mother tongue and educational environment, all scales were adopted as those developed in Japan, and their validity and reliability were confirmed in several studies.

## FINDINGS

### Factors Comprising Each Scale

Of the 383 survey participants from Universities A and B, 139 (36.29%) who responded were included in the analysis. Tables 1–3 show the results of the factor analysis (maximum likelihood method and promax rotation).

In this study, based on a parallel analysis and factor loadings, the Causation of Lack of Understanding Scale's (Table 1) three-factor structure was revised; 'inefficient teaching' was divided into 'poor teaching' and 'difficulty with content'. Finally, a four-factor structure of 'poor classroom attitude', 'poor teaching', 'difficulty with content', and 'lack of preparation/review' was judged to be the most appropriate. The model fit was judged to be adequate, with a Tucker–Lewis Index of .83 and root mean square error of approximation (RMSEA) of .04; the fit and stability of the model were judged to be sufficiently secure. Regarding the Coping Strategies for Lack of Understanding Scale (Table 2), 'self-help' from the previous studies was divided into 'investigating the cause', 'continuing to think', and 're-doing'. Finally, it was judged to have a five-factor structure: 'giving up', 'dependence on friends', 'investigating the cause', 'continuing to think', and 're-doing' (Tucker–Lewis Index = .91, RMSEA = .08). As in previous studies, a three-factor structure was judged appropriate for the Information-Seeking Strategies Scale (Tucker–Lewis Index = .77, RMSEA = .07).

**Table 1.** *Factor analysis: Causation of Lack of Understanding Scale*

	F1	F2	F3	F4	commonality
<b>Poor classroom attitude</b>					
Because I would not concentrate in class.	<b>.92</b>	.11	-.14	-.12	.90
Because I did not listen to the teacher very well.	<b>.91</b>	.00	-.08	-.06	.72
Because I do not go to class trying to understand.	<b>.30</b>	.00	.19	.02	.20
<b>Poor teaching</b>					
Because the teacher's explanations were difficult.	-.05	<b>.96</b>	.28	-.06	.98
Because teaching materials and resources are insufficiently.	-.09	<b>.58</b>	-.14	.16	.43

<b>Lack of preparation/review</b>						
Because of my lack of preparation.	-.11	.09	<b>.89</b>	-.21		.56
Because of my lack of review.	-.05	-.08	<b>.75</b>	.11		.61
<b>Difficulty with content</b>						
Because the lesson content is too difficult.	-.06	.01	-.16	<b>.87</b>		.61
Because the pace of explaining the content is too fast.	-.19	.18	.10	<b>.61</b>		.51
Because they assume that the content is incomprehensible.	.25	-.07	.04	<b>.43</b>		.33

**Table 2.** *Factor analysis: Coping Strategies for Lack of Understanding Scale*

	F1	F2	F3	F4	F5	commonality
<b>Giving up</b>						
I will get through that part of the process in good time.	<b>.89</b>	.10	.18	-.03	-.10	.74
I leave that part of my life without doing anything.	<b>.80</b>	-.14	.03	.10	-.04	.66
I give up.	<b>.71</b>	-.04	-.15	-.07	.11	.61
<b>Dependence on friends</b>						
I will try to solve the problem with my friend.	-.10	<b>.92</b>	-.08	.06	-.07	.96
I borrow notes and documents from friends.	.01	<b>.59</b>	.12	.17	-.10	.40
I will be taught by someone who understands, teachers.	.04	<b>.27</b>	.01	-.19	.16	.17
<b>Investigation the cause</b>						
I think about why I do not understand.	.21	.01	<b>.62</b>	-.03	.06	.86
I clarify what I do not understand.	-.07	.05	<b>.55</b>	-.03	.00	.34
<b>Continuing to think</b>						
I will go as far as I can first.	.06	.19	-.14	<b>.54</b>	.06	.94
I keep thinking alone.	-.05	-.05	.16	<b>.25</b>	.05	.13
<b>Re-doing</b>						
I review class notes and materials.	.01	.14	-.14	.29	<b>.69</b>	.53
I am starting over from the basics.	.08	-.06	.03	.09	<b>.49</b>	.24
I will change my mind and work on it again.	-.04	-.05	.01	-.12	<b>.46</b>	.22
I look it up in dictionaries, reference books, etc.	-.04	-.02	.05	-.02	<b>.22</b>	.06

**Table 3.** *Factor analysis: Information-Seeking Strategies Scale*

	F1	F2	F3	commonality
<b>Implementing mass media resource</b>				
If I do not understand something, I look it up in a book, magazine, or website.	<b>.78</b>	.06	-.47	.89
I am the kind of person who, if I do not understand something, immediately looks it up.	<b>.69</b>	.02	-.12	.39
I gather the information I think I need myself.	<b>.69</b>	-.05	-.02	.44
When I want to know something, I look at books, magazines, or websites.	<b>.57</b>	-.06	.16	.46
I rarely look anything up on my own initiative*.	<b>.55</b>	-.08	.20	.48
I gather my own information on the matters of interest.	<b>.41</b>	-.19	.13	.25

I want to know the essence of things as well as I can.	<b>.41</b>	.06	.20	.33
I like to know a wide range of things.	<b>.40</b>	.13	.08	.24
I want to find out everything I can until I am satisfied.	<b>.39</b>	.21	.21	.39
<b>Implementing interpersonal resource</b>				
When I do not understand something, I ask someone I trust.	.01	<b>.81</b>	-.02	.65
I actively ask people when I want to find out about things that interest me.	.00	<b>.79</b>	.26	.76
When I do something new, I ask someone who knows about it.	-.03	<b>.71</b>	-.05	.49
I try to socialise with people who have extensive information.	-.03	<b>.50</b>	.31	.38
When I gather information, I do not ask anyone*.	.01	<b>.48</b>	-.29	.27
<b>Independence in information seeking</b>				
I want to stay up-to-date and informed.	-.07	.00	<b>.80</b>	.57
I want to get information promptly.	.31	.02	<b>.63</b>	.77
* inverted scale				

### Trends in Causation, Coping Strategies, and Information-Seeking Strategies

The subscale scores were obtained using item means to determine the tendencies towards causation, coping strategies, and information-seeking strategies during lack of understanding. The results showed that the following subscale scores were high in the causation of lack of understanding: lack of preparation and review (3.70,  $SD = .91$ ), poor teaching (3.16,  $SD = .94$ ), poor classroom attitude (3.07,  $SD = .93$ ), and difficulty with the content (2.92,  $SD = .71$ ). Significant differences were found between the subscale scores ( $F(3, 403) = 19.63, p < .01$ ). Therefore, multiple comparisons using the Holm method revealed that lack of preparation and review scored higher than the other three factors ( $MSe = .60, p < .05$ ).

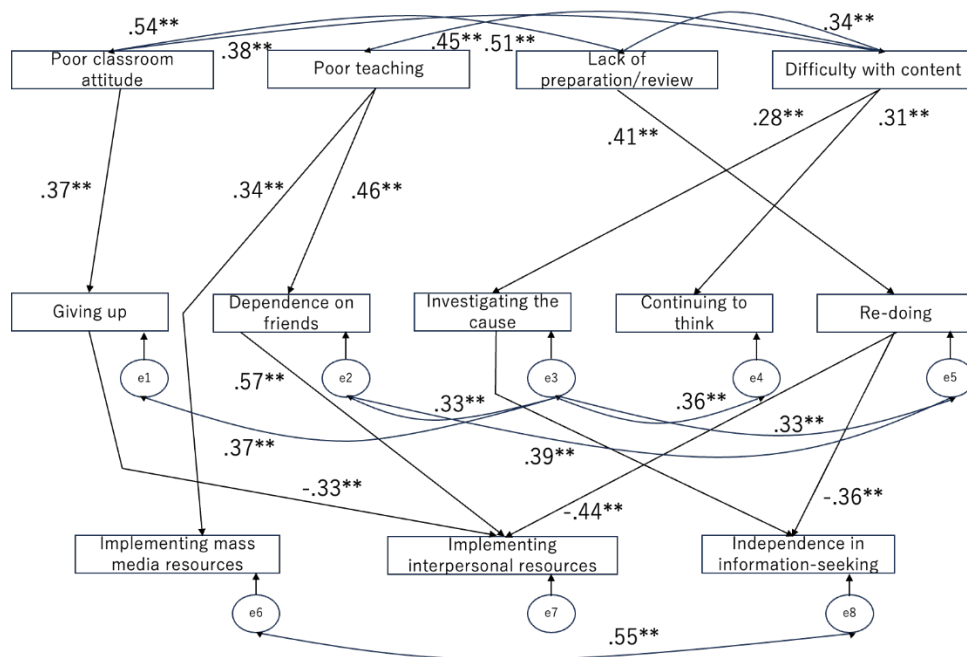
The subscale scores for coping strategies for lack of understanding were higher for re-doing (4.10,  $SD = .53$ ), investigating the cause (3.88,  $SD = .72$ ), continuing to think (3.84,  $SD = .78$ ), dependence on friends (3.71,  $SD = .81$ ), and giving up (3.24,  $SD = .75$ ). As significant differences were also found in these subscale scores ( $F(4, 504) = 22.69, p < .01$ ), a similar multiple comparison was conducted, which confirmed that giving up scored lower than all other subscales, and re-doing scored higher than giving up, dependence on friends, and continuing to think ( $MSe = .46, p < .01$ ).  $MSe = .46, p < .05$ ). Specifically, re-doing scored the highest and giving up scored the lowest as a coping strategy for lack of understanding.

Finally, the subscales included in the information-seeking strategy scored higher in the following order: implementing mass media resources (4.15,  $SD = .55$ ), independence in information-seeking (3.93,  $SD = .91$ ), and implementing interpersonal resources (3.62,  $SD = .83$ ), for which significant differences were identified ( $F(2, 302) = 16.84, p < .01$ ). Multiple comparisons, therefore, confirmed that implementing mass media resources scored the highest and implementing interpersonal resources scored the lowest on the information-seeking strategy subscale ( $MSe = .42, p < .05$ ).

### Relationships among Causation, Coping Strategies, and Information-Seeking Strategies

Covariance structure analysis was conducted to test the hypothesis that causation of lack of understanding influences the information-seeking strategies, either directly or through coping strategies regarding the lack of understanding (Fig. 1). The model fit was generally good with a goodness of fit, adjusted goodness of fit, comparative fit index, and RMSEA of 1.00, .96, .95, and .06, respectively.

Looking at the path from causation to coping strategies during lack of understanding, it was confirmed that poor classroom attitudes had a direct positive impact on giving up (.37). Furthermore, poor teaching had a direct positive influence on dependence on friends (.46), lack of preparation/review had a direct positive influence on re-doing (.41), and the difficulty of the content had a direct positive influence on investigating the cause (.28) and continuing to think (.31). Among the direct influence relationships listed here, the influence of poor teaching on dependence on friends, and lack of preparation/review on re-doing (path coefficient) were particularly significant. Poor teaching, as a subscale of causation, was found to have a positive direct influence on the information-seeking strategies subscale of implementing mass media resources, without mediating any of the coping strategies subscales (.34).



**Figure 1.** Causal model of causation, coping strategies, and information-seeking strategies during lack of understanding (only significant paths shown; \*\*  $p < .01$ )

The path from coping to information-seeking strategies during lack of understanding revealed that giving up, a subscale of coping strategies for lack of understanding, had a direct negative effect on implementing interpersonal resources, a subscale of information-seeking strategies (-.33). Other results

showed that dependence on friends had a positive effect on implementing interpersonal resources (.57) and investigating the cause on independence in information-seeking (.33). Furthermore, re-doing had a negative effect on implementing interpersonal resources (-.44) and independence in information-seeking (-.36); when re-doing was used as a coping strategy, implementing interpersonal resources and independence in information-seeking were suppressed. As no significant paths to the information-seeking strategy subscale were found for the coping strategy of continuing to think, which comprises a coping strategy for the lack of understanding, the influence of this relationship could not be determined.

Other indirect effects of the lack of understanding from causation on the information-seeking strategies could be summarised as follows: poor teaching had a positive effect on implementing interpersonal resources through dependence on friends (.26). There were also negative effects of lack of preparation/review on implementing interpersonal resources (-.18) and independence in information seeking (-.15).

### **Practical Information-Seeking During Lack of Understanding**

Semi-structured interviews were conducted to reveal the actual search for information during lack of understanding, with the intention of interpreting and discussing the hypothesis and model as well as evaluating its validity. The four participants interviewed were first- and third-year undergraduate students (one male and one female for each academic year) from the Faculty of Informatics at University A. In the interviews, the students were primarily asked about their responses and reasons for lack of understanding, and subsequently, for more details based on their answers. The average interview duration was 32 min per student.

Thus, the discourse commonly obtained among the participants was as follows: ‘Whenever I do not understand something or have a problem in my studies, I feel embarrassed to ask my friends about it in the first place’ (third-year student, female). A discourse on the same effect was obtained from all the four students. In addition, a first-year female student stated, ‘Basically, if I have a problem when I am studying, I first look back by myself and then I look it up’. Similar discourses were obtained from all four students. Further, a third-year student stated, ‘I know that it is better to deal with things I do not understand when they come up; however, when I do not have time, I tend to leave them. Eventually, I decide what to do depending on the time available’.

## **DISCUSSION**

This study aimed to clarify the relationship between causation, coping, and information-seeking strategies during lack of understanding. Based on a review of previous studies, we hypothesised that causation influences coping strategies, and that information-seeking strategies differ according to the latter during lack of understanding. Accordingly, a survey was conducted using the Causation of Lack of Understanding, Coping Strategies for Lack of Understanding, and Information-Seeking Strategies Scales during lack of understanding. A covariance structure analysis was conducted. The results showed that during lack of understanding, causation influenced coping strategies, and coping strategies affected

the information-seeking strategies. Thus, the hypothesis of the present study was supported. In addition, the tendency towards coping and information-seeking strategies during lack of understanding was analysed, and interviews were conducted to clarify the actual situation. These were conducted to assist in the interpretation and discussion of the hypothesis and model, and to evaluate its validity.

Regarding the relationship between causation and coping strategies in lack of understanding, it was found that poor class attitudes, poor teaching, and the difficulty with content promoted giving up, dependence on friends, and investigating the cause and continuing to think about it, respectively. Thus, it can be said that when students attribute their own lack of understanding to insufficient preparation and review and to poor teaching, they try to cope with it by re-learning and dependence on their friends, respectively. This is because when students do not participate appropriately in class and are aware of it, they do not try to think deeply about the problems they do not understand and tend to avoid them. However, the stronger the tendency to regard insufficient preparation or review—that is, to consider it as the result of one's own efforts—the more likely one is to attempt to resolve poor performance in learning by oneself. This is consistent with Weiner's theory of motivation to learn (Weiner, 1985).

Subsequently, regarding the information-seeking strategies during lack of understanding, giving up suppressed the implementation of interpersonal resources, whereas dependence on friends promoted it. In addition, re-doing inhibited the implementation of interpersonal resources and independence in information-seeking. The suppression of implementing interpersonal resources when coping with lack of understanding may be due to the tendency to escape problems, as described above. In addition, the aforementioned results showed that when students gave up coping, the cause was poor class attitude. Specifically, when students receive help from friends because of their lack of understanding caused by poor classroom behaviour, they are more likely to give up coping because of low self-esteem (Fisher & Nadler, 1974), loss of self-image (Sueki, 2008), and relationship concerns (Kim, Sherman, Ko, & Taylor, 2006). They are likely to resist seeking help from close friends, even if they are their partners. Therefore, it is assumed that implementing interpersonal resources during information-seeking behaviours is suppressed when coping with a lack of understanding, as also confirmed by the interview results. The interviewees further stated that they felt embarrassed to ask their friends about the things that they did not understand, which was consistent with their low self-esteem and loss of self-image. They also stated that asking questions might make them feel depressed, which is in line with the interpretation that this resistance is influenced by relational concerns. However, when they chose to rely on friends as a coping strategy, self-esteem, self-image, and relational issues were absent. Dependence on friends promoted implementing interpersonal resources when coping with the information-seeking behaviours. Finally, when attempting to cope with the lack of understanding by starting over, the tendency to solve a problem through one's own efforts (Kosugi, 2008) may not lead to information-seeking behaviours. This may have suppressed the implementation of interpersonal resources and independence in information-seeking.

The relationship between the causes of lack of understanding, coping strategies, and information-seeking strategies during lack of understanding and the mechanism of this relationship

showed that poor classroom behaviour suppressed implementing interpersonal resources through giving up, poor teaching promoted the implementation of interpersonal resources through dependence on friends, and insufficient preparation/review suppressed implementing interpersonal resources and independence in information-seeking through re-doing. The results demonstrated that implementing interpersonal resources was suppressed by students' insufficient preparation and review. Thus, causation during lack of understanding influenced information-seeking strategies through coping strategies.

Combined with the analysis of the subscale scores, it became clear that students tended to consider insufficient preparation/review as the cause of lack of understanding. As a coping strategy, the tendency to choose re-doing was rather strong and that for giving up was the weakest. Further, the results of the interviews suggested that the participants may have given up because they had insufficient time to cope with the situation. Taken together, it can be said that when students are not learning appropriately, they tend to attribute it to insufficient preparation and review; in such cases, they tend to promote re-doing as a coping strategy. The model showed that when re-doing was used as a coping strategy, the students attempted to overcome the problem through their own efforts and this did not lead to information-seeking. Conversely, in the model, most of the causation and coping strategies that led to information-seeking were cases in which the participants believed there were causes for their lack of understanding other than themselves. In the case of such causation, the tendency to search for information using nonhuman media was confirmed. Behind this tendency, the influences of self-esteem, self-image, and relational concerns have been suggested.

## **CONCLUSION**

This study empirically clarified the relationships among causation, coping strategies, and the corresponding information-seeking strategies during lack of understanding. The results indicated that some causes of lack of understanding inhibit the search for learning-related information. Developmental and proactive learning, in which the students investigate unfamiliar matters independently, is expected. It was shown that information-seeking is suppressed when the cause of lack of understanding is perceived as poor class attitude or insufficient preparation/review. This is an obstacle to developmental and independent learning; it is necessary to consider interventions that refer to the psychological mechanisms and processes identified in this study. Additionally, the search for information through friends was facilitated when lack of understanding was attributed to poor teaching. It can be said that teaching and learning among students was shown to function.

The present study did not confirm the involvement of information-seeking strategies in continuing to think, which constitutes a coping strategy for lack of understanding. The tendency to solve problems on one's own, without asking for help from teachers or friends, is also a concern.

Finally, the influence of psychological variables not included in the present study, such as self-esteem and self-image, has been suggested. Further, addressing specific issues is closely related to the allocation of time and resources for learning. Further research is needed to examine these factors in a model to gain a more comprehensive overview of the aspects influencing learning and seeking.

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**Pet Parents on Spotlight:  
Information Behavior of Filipino Pet Owners**

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**ABSTRACT**

*Background.* Numerous studies abroad have been conducted to learn more about the information behavior and use of pet owners. However, given the unique culture, practices, and pet ownership context here in the Philippines, there is a need for a study on the subject matter focused on Filipino pet owners.

*Objectives.* As such, this study investigates their practices and experiences when locating, evaluating, and utilizing pet health-related information.

*Methods.* To gather the needed data, an online survey questionnaire accessible through Google Forms was made available. A total of 188 responses from pet owners residing in the Greater Manila Area were used, where the researcher used frequency distribution and percentage methods for data organization and analysis.

*Results.* Results show that despite Filipino pet owners viewing veterinarians and animal health journals as very trustworthy pet health information sources, the internet remains as the primary and most common source for many despite it being perceived as less trustworthy. Furthermore, accessibility is seen to be the most important factor influencing the information source preference of Filipino pet owners.

*Contributions.* Shedding light to the incompetencies and challenges experienced by many Filipino pet owners in this context is vital in the implementation of initiatives that can cater to the needs of owners and their companion animals. Information professionals, animal healthcare providers, and other involved institutions working together in raising awareness and educating people with the skills and competencies needed in the proper location, evaluation, and usage of pet health-related information is just one of the many measures that can be done.

**INTRODUCTION**

Numerous studies in other countries, such as the United States, United Kingdom, and Australia, have already been tackling the subject of pet owners' pet health information behavior (Kogan et al., 2019; Kogan et al., 2021). These studies discuss how owners make use of online resources to fulfill their pet health-related information needs, and how these practices impact the subsequent actions of pet owners – such as source evaluation, making treatment-related decisions, and many more (Kogan et al., 2019; Kogan et al., 2021; Solhjoo et al., 2018). Other studies have also suggested that to address the pet health information needs of guardians and to ensure the well-being of these animals who are greatly affected by the decision-making and actions of their guardians, interventions must be done through the collaboration of information (i.e., health/veterinary librarians) and animal health professionals (i.e., veterinarians) (Dinkelman et al.,

2011; Solhjoo et al., 2019). Considering all of these, it is all more important to learn further about the information practices of pet owners.

As people, especially pet owners all over the world, become more concerned with pet well-being these past years, it is vital to further our knowledge regarding this (Solhjoo et al., 2018). And with the guardian tasked to be the primary carer of their pet's well-being, it is no doubt that conducting a study about this is crucial in identifying the practices and competencies of pet owners when it comes to addressing their companion animal's well-being and needs. Furthermore, it is vital to produce preliminary statistics on this subject so that we may identify areas of concern and create strategies that can help improve the pet welfare context.

Despite the numerous studies about pet owners overseas, there is a possibility that people from different locations or groups might differ in the way they view, obtain, and use health information for their pets (Kogan et al., 2021). This is why a study focused on the information behavior of Filipino pet owners is crucial in the context of pet health and pet ownership in the Philippines. It is also important to note that many existing studies focus only on pet owners' information practices online (i.e., websites, social media groups, etc.), thus studying pet owners' information behaviors in offline channels as well will give us an overview of the topic of concern. Specifically, the paper aims to pursue the following objectives:

1. Identify the pet health information needs of Filipino pet owners.
2. Identify the reasons of Filipino pet owners for preferring particular pet health information sources.
3. Describe how pet owners evaluate the information they find.
4. Identify the common challenges pet owners experience when seeking pet health information.
5. Identify how pet owners' behaviors and experiences affect pet health-related outcomes.

## **LITERATURE REVIEW**

### **Information Behavior**

Information behavior, according to Wilson (2022), is defined as the way human behavior relates to how information users search for and use information. The study of information behavior is focused on how humans both actively and/or passively seek, manage, and utilize any kind of information. This involves all channels, written or oral, as well as different sources of information. The term information behavior, in this study's context, pertains to one's information needs, information source preference, evaluation practices, experienced challenges, and related consumer outcomes.

### **Health Information-Seeking Behavior**

Health information-seeking behavior (HISB) is defined as an active need-fulfillment behavior where an individual tries to obtain information about health, illness, and other health-related topics from different sources (Jung, 2014; Lambert & Loiselle, 2007). An article by Anker et al. (2011) discusses how health information-seeking is not just searching for information, instead it involves several other factors, such as the information seeker's characteristics, the surroundings, the context at play, and the search process itself. Figure 1 below provides a general overview of what happens in the context of health information-seeking. We can see how the preexisting characteristics of an individual can influence how one searches for information, their experiences while searching for the said information, and how the search process may lead to associated health outcomes.

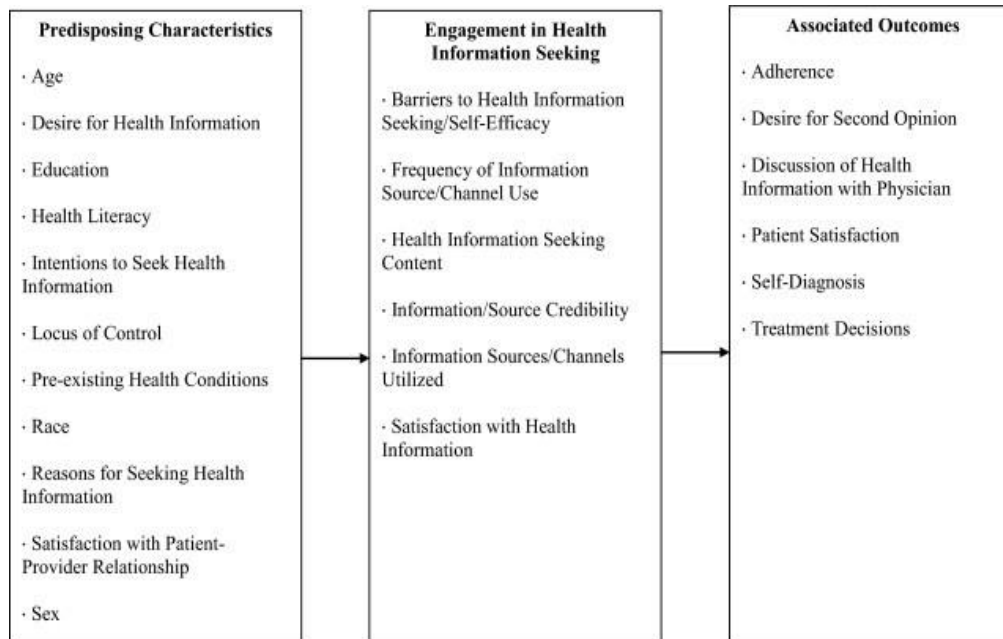


Figure 1. General overview of health information-seeking (Anker et al., 2011)

This can also be applied in the context of a guardian's pet health information-seeking behavior. Learning more about the HISB of pet owners is vital to understand their knowledge and ability to look for health-related information, which is necessary to manage their companion animal's well-being.

Studies also say that a person's behaviors relating to seeking health information may result in positive or negative health-related outcomes (Anker et al., 2011; Lalazaryan & Zare-Farashbandi, 2014). As this process heavily depends on the owner's knowledge and understanding, it must be noted as well that the information pet owners obtained during the process may cause unintentional negative consequences to the pet's health. This is often a result of the individual misinterpreting the animal's needs or behaviors (Roshier & McBride, 2013), or it could also be caused by their reliance on inaccurate information, advice, or related experiences from the past. A research even showed that prior experiences with dogs do not provide significant advantage as compared to inexperienced individuals when it comes to interpreting dog behavior (Salgirli et al., 2016). This only shows the possibility of a person not being able to understand or accurately interpret some behaviors/needs exhibited by pets.

With pets relying heavily on the knowledge and decision-making of their guardians, it is important for us to be able to study and find out more about the practices of owners when seeking pet health-related information so as to avoid such circumstances from occurring. And to do so, identifying first their information needs, practices, and experiences (as done in this study) is the first step to be able to test relationships between variables such as the information seeker's predisposing characteristics, engagement in health information seeking, and other associated outcomes.

## METHODOLOGY

The study employed a descriptive quantitative research design. Participants of the study consist of Filipino pet owners living in the Philippines who have at least one pet at home. Majority of the respondents own pet

dogs, cats, fish, and/or birds, which are the most common pets that can be found not only in Asian households but worldwide (Rakuten Insight, 2021). Legal-aged pet owners who fit the criteria may answer the online survey voluntarily. After the data collection period, 201 people answered the questionnaire. But with the research focused only on pet owners residing in the Greater Manila Area, responses from 13 pet owners living in other regions of the country were removed, leaving the final set of respondents equal to 188 – 127 women and 61 men, aging from 18 to 65 years old.

To collect the needed data for the study, an online questionnaire accessible through Google Forms was used as the main data-gathering tool. The survey questionnaire was based on and edited accordingly from an existing study by Kogan et al. (2019) that studied the online information practices of pet owners in Australia. The questionnaire, which was written in English, aimed to specifically identify Filipino pet owners' most common pet health information needs, information sources, evaluation practices, commonly faced challenges, and associated pet health- related outcomes when seeking pet health information, which are the main objectives of this study.

To reach the needed participants, the researcher posted the survey questionnaire link publicly to various social media platforms (i.e., Facebook, Instagram, and Twitter). For a larger reach, pet owners who have already answered the survey were also encouraged to send the link to other pet owners they know. The researcher also tried to obtain permission to post the survey link from administrators of specific pet owners Facebook groups - specifically, the Pet Lovers Philippines, Dog Lovers Philippines, Cat Lovers Philippines, Fish Keepers Philippines, and Bird Lovers Philippines - where only the request from the last page approved. The online questionnaire was made accessible for one and a half months, starting from February 13, 2023 until March 31, 2023, with the study having no specific quota of respondents that must be reached.

The data gathered from the survey responses were organized, analyzed, and interpreted accordingly with respect to the objectives of the study. With the help of graphs and tables, the researcher used frequency distribution and percentage methods for data organization and analysis.

## FINDINGS

### Profile of the Respondents

**Table 1**

*Distribution of Respondents per Demographical characteristics*

Demographical Characteristics	Frequency (f)	Percentage (%)
Age		
18-30 years old	149	79.3
31-50 years old	35	18.6
Over 50 years old	4	2.1
Total	188	100
Sex		
Female	127	67.6

Male	61	32.4
Total	188	100
Educational Attainment		
Currently a College Undergraduate Student/College Undergraduate	139	73.9
College Graduate/Master's Degree	33	17.6
Senior High School	8	4.3
Postgraduate Studies/Doctorate Degree	4	2.1
Technical/Vocational Program Graduate	2	1.1
Junior High School Graduate	2	1.1
Total	188	100
Employment Status		
Unemployed	102	54.3
Employed	75	39.9
Self-Employed	9	4.8
Freelancer	2	1.1
Total	188	100
Pet/s Owned		
Dog	157	62.55
Cat	62	24.7
Bird	13	5.18
Fish	12	4.78
Others	7	2.79
Total	251	100

## Filipino Pet Owners' Information Needs

**Table 2**

*Pet Owners' Most Common Pet Health Information Needs*

Pet Health Information Need	Frequency ( <i>f</i> )	Percentage (%)
Pet disease or medical problem	138	73.40
Diet, nutrition, vitamins, nutritional supplements	113	60.11
Vaccinations	97	51.60

Medical treatment or procedure	79	42.02
Behavioral issues	50	26.60
Pet's prescription/medicine	43	22.87
Pet wellness/exercise/fitness	38	20.21
Information about a particular veterinarian or vet clinic	5	2.66
Others	1	0.53

The most common pet health information needs of pet owner respondents are: 'pet disease or medical problem'; 'diet, nutrition, vitamins, and nutritional supplements'; 'vaccinations'; 'medical treatment or procedure'; and 'behavioral issues', respectively. The first two were similar to a study by Kogan et al. (2019) asking the same question to Australian pet owner respondents. However, the third most commonly searched pet health-related topic for Australian pet owners are behavioral issues, as compared to the vaccination-related concerns of Filipino pet owners. It is also to note that both Australian and Filipino pet owners have the same fourth most common pet health information need, which is medical treatment-related topics.

Filipino pet owners' tendency to look for vaccination-related matters can be associated with the fact that our country has a relatively new pet healthcare context and awareness as compared to other countries. This can be seen with the lack of animal health-related initiatives aimed to educate Filipino pet owners regarding responsible pet ownership. Which is why in order to learn more about the needs of their companion animals, pet owners tend to research more about their pet's vaccination needs first, which is likely more crucial especially in the early stages of a pet's life, rather than behavioral issues that may be addressed thereafter.

**Table 3**

*Pet Owners' Most Common Sources of Pet Health Information*

Information Source	Frequency (f)	Percentage (%)
Internet websites/web pages/blogs	133	70.74
Veterinarian	115	61.17
Social media (i.e., Facebook groups, online forums, etc.)	86	45.74
Fellow pet owners	62	32.98
Veterinary databases/journals/research articles	58	30.85
Family/friends	44	23.40
Pet breeders	31	16.49
Magazine, journal, newspaper articles	18	9.57
Books and encyclopedias	14	7.45
Television/radio	2	1.06
Past experiences	1	0.53

Filipino pet owners' most common pet health information sources are: 'internet websites/blogs'; 'veterinarian'; 'social media'; 'fellow pet owners'; and 'veterinary journals/articles', respectively. Reasons for pet owners leaning more towards the use of internet websites first than consulting their animal healthcare providers immediately can be related to the easier accessibility and availability of the internet. Furthermore, it also provides access to a wider range of information for free, as compared to animal healthcare providers where their services are mostly available for a fee. Social media and fellow pet owners can also be seen by many Filipino pet owners as an easily accessible source of information for their pet health needs as compared to the more time-consuming process of having to look for trustworthy veterinary journals added to its possibly lengthy content.

Interestingly, results from this particular question found similar results from an older study by Kogan et al. (2018) about pet owners from United Kingdom, where the internet (78.6%), their veterinarian (72%), and social media (56%) were the top three most commonly used source of pet health information. A year after the said study was published, Kogan et al. (2019) conducted another similar study now focused on Australian pet owners where they reported that the most common sources for pet health information are veterinarians (88.2%), the internet (81.1%), and social media (32%), respectively – veterinarians now receiving more number of responses than the internet. The difference in these results, however, can be attributed to geographical and other contextual factors at play in the two locations.

### Filipino Pet Owners' Information Source Preference

Information users prefer and use particular sources over others. In a study by Zhang (2013) that asked respondents to discuss the reasons behind their source preferences, 14 unique criteria were identified and further grouped into two sets, the first pertaining to the *source and source content characteristics*, while the second pertains to *user-related characteristics*. These characteristics are said to be factors associated with an individual's source preference and use. For this study, similar or related criteria were merged together into a single statement, which were then included in the online survey administered. The researcher came up with a total of 11 statements tackling the respondents' reasons for preferring specific information sources than others. The source and source content characteristics include the source's authoritativeness, availability of visuals, understandability, currency, accessibility, usability, cost, and scope. While user-related characteristics are related to a person's familiarity and personal interests, as well as the social norms currently at play.

**Table 4**

*Pet Owners' Agreement to Information Source Preference-Related Statements*

*"I prefer using the information sources [chosen above] because..."*

Information Source Preference-Related Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
It provides trustworthy content.	16	8.51	3	1.60	30	15.96	92	<b>48.94</b>	47	25.00
The content is presented in a visual format.	17	9.04	7	3.72	35	18.62	92	<b>48.94</b>	37	19.68



The content is easy to understand.	15	7.98	3	1.60	16	8.51	92	<b>48.94</b>	62	32.98
It provides updated/ current content.	16	8.51	4	2.13	30	15.96	84	<b>44.68</b>	54	28.72
It is easily available/ accessible.	16	8.51	2	1.06	20	10.64	70	37.23	80	<b>42.55</b>
It is easy to use.	17	9.04	2	1.06	14	7.45	78	<b>41.49</b>	77	40.96
It is free to use.	16	8.51	4	2.13	15	7.98	80	<b>42.55</b>	73	38.83
It provides content relevant to my pet health information needs.	17	9.04	3	1.60	19	10.11	86	<b>45.74</b>	63	33.51
I am familiar with using these information sources.	15	7.98	7	3.72	21	11.17	74	<b>39.36</b>	71	37.77
I like/enjoy using these information sources.	16	8.51	3	1.60	29	15.43	86	<b>45.74</b>	54	28.72
Other people are using it too.	15	7.98	8	4.26	32	17.02	82	<b>43.62</b>	51	27.13

Seven (7) out of the eight (8) source and source content characteristics statements were found to be agreeable by most of the respondents, excluding the accessibility criteria that pet owner respondents found to be strongly agreeable. Seeing these results, we can say that accessibility is one's first consideration, and a factor that greatly influences Filipino pet owners' information source preference. Interestingly, this shows similar results from the study conducted around ten years ago by Zhang (2013) where all respondents were said to consider the source's accessibility, while its authoritativeness – referring to the truthfulness and correctness of information – only comes second, receiving 90% of the total responses. This does not mean, however, that the other characteristics (i.e., availability of visuals, understandability, currency, usability, cost, and scope) are not perceived as important, as can be seen by the large percentage of respondents that 'agreed' with the related statements on the survey (all of which received not lower than 40% of the responses' total).

On the other hand, three (3) out of three (3) user-related characteristic statements have agree as the most common answer. The criteria of familiarity received a similar number of responses between two answers, where agree got around 39% of the total while strongly agree received 38% of the responses from the survey participants. These two values show how important of a consideration familiarity to the source is when it comes to pet owners' information source preference. This can also be related to the fact that being familiar with an information source makes it easier to navigate through the information available, added to the already established trust due to previous experience/s of an individual in using or encountering a particular source of information. To provide a clearer definition of the other terms used, 'personal interests', refer to whether they find the information source and content entertaining or engaging, while 'social norms', in this case, pertain to the tendency to use a specific pet health information source for it is already the generally accepted and used source by the pet owners community. On the other hand, criteria related to the pet owners' personal interests and current social norms were agreed upon by around 46% and 44% of the respondents, respectively.

With these results in mind, it can be said that one's familiarity with an information source contributes greatly to a pet owner's pet health information source preference, and that their personal interests as well as other people's influence, are contributing factors as well.

**Table 5**

*Pet Owners' Perceived Trustworthiness of Various Pet Health Information Sources*

Information Sources	Very Untrustworthy		Untrustworthy		Neutral		Trustworthy		Very Trustworthy	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Books and encyclopedias	7	3.72	3	1.60	38	20.21	89	<b>47.34</b>	51	27.13
Magazines, journals, newspaper articles	5	2.66	6	3.19	59	31.38	92	<b>48.94</b>	26	13.83
Veterinarian	7	3.72	0	0.00	11	5.85	71	37.77	99	<b>52.66</b>
Veterinary databases, journals, research articles	6	3.19	2	1.06	14	7.45	73	38.83	93	<b>49.47</b>
Internet websites, web pages, blogs	7	3.72	5	2.66	96	<b>51.06</b>	62	32.98	18	9.57
Pet breeders	6	3.19	10	5.32	87	<b>46.28</b>	69	36.70	16	8.51
Social media (i.e., Facebook groups, online forums, etc.)	7	3.72	17	9.04	103	<b>54.79</b>	50	26.60	11	5.85
Family/friends	5	2.66	13	6.91	94	<b>50.00</b>	61	32.45	15	7.98
Television/radio	7	3.72	11	5.85	91	<b>48.40</b>	69	36.70	10	5.32
Fellow pet owners	5	2.66	3	1.60	52	27.66	107	<b>56.91</b>	21	11.17

## Filipino Pet Owners' Information Evaluation Practices

The respondents were also asked how frequent they check various aspects of an information source in order to evaluate it. To find out more about the information evaluation practices of Filipino pet owners, the researcher used the CRAAP Test, designed by Meriam Library California State University, Chico. CRAAP is an acronym that stands for Currency, Relevance, Authority, Accuracy, and Purpose – the different aspects of an information source that one should look out for when evaluating it. With the help of this evaluation method, an information seeker will be able to inspect each of these aspects accordingly, which can then aid with the proper evaluation of the information source and content that one is able to find.

**Table 6**

*Pet Owners' Information Evaluation Practices*

*“When looking for pet health information...”*

Information Evaluation Practices	Never		Rarely		Sometimes		Often		Always	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
How often do you check the credibility of the author of the information you found?	6	3.19	17	9.04	74	<b>39.36</b>	54	28.72	37	19.68
How often do you check the quality and accuracy of the information?	2	1.06	11	5.85	49	26.06	55	29.26	71	<b>37.77</b>
How often do you check the purpose and objectivity of the information you found?	3	1.60	12	6.38	63	<b>33.51</b>	58	30.85	52	27.66
How often do you check the currency of the information?	3	1.60	12	6.38	54	<b>28.72</b>	64	34.04	55	29.26
How often do you check the relevance and coverage of the information you found to your question?	2	1.06	8	4.26	53	<b>28.19</b>	56	29.79	69	36.70

As seen from the results, responses of the pet owners from this section showed distributed responses for each question. Responses scattered this way goes to show inconsistent information evaluation practices of Filipino pet owners, a concern that must be addressed accordingly. Iranian pet owners were also found to have high willingness to look for and use pet health information online, but it was reported that only half of them are concerned with the information's quality (Solhjoo, 2018). There are signs showing the low health literacy of pet owners, and this is the very reason why pet owners are unable to find, comprehend, and use reliable information that they need (Solhjoo et al., 2018).

It is also important to emphasize that while not all evaluation aspects or criteria can be applied equally to an information source at once, information evaluation practices is also a skill that can only be furthered when one is exposed repeatedly to the information-seeking process itself, and when one applies critical thinking when looking for and using any kind of information. With pet health information sources varying in quality and completeness, evaluation practices is a very important skill towards informed pet health decision-making. Moreover, these findings remind us of the importance of further learning about the matter, and that there is a need to educate not only Filipino pet owners, but the public in general, about evaluating information they find in different kinds of sources. Information intervention initiatives (e.g., providing information prescriptions) is also important to ensure that pet owners only obtain reliable health information on print and online, for what they find can greatly affect their companion animal's overall wellbeing (Naghshineh et al., 2018).

### Challenges Encountered by Filipino Pet Owners

The survey participants were also asked about the top three (3) challenges they commonly encounter when looking for pet health information.

**Table 7**

*Pet Owners' Commonly Encountered Challenges When Seeking Pet Health Information*

Challenges Encountered	Frequency (f)	Percentage (%)
The source does not contain enough pet health information to answer my question.	95	50.53
I am overwhelmed by the amount of pet health information I found.	86	45.74
I cannot find the pet health information I am looking for.	65	34.57
I do not have enough time to look for the pet health information I need.	55	29.26
I do not know how to evaluate the source of the pet health information I found.	53	28.19
I do not have enough money to pay for the information source I need to answer my question.	45	23.94
I do not know who to ask for help to answer my pet health information needs.	45	23.94
I do not know where or how to look for the pet health information I need.	39	20.74
I experience no further challenges.	35	18.62
I cannot understand the pet health information I found.	21	11.17
I do not have Internet access to look for the pet health information I need online.	7	3.72

I do not have an electronic device (e.g., smartphone, computer) I can use to look for the pet health information I need.	7	3.72
I do not know how to use the needed device (e.g., smartphone, computer) to look for pet health information.	6	3.19
I experience no challenges at all.	1	0.53

The top five (5) answers said by the pet owner respondents were related to the ‘insufficient amount of information found from a particular source’, the ‘overwhelming amount of information found’, ‘unsuccessful information-seeking’, having ‘insufficient time to look for the information’, and the ‘lack of knowledge in evaluating the information’ they find.

As seen from the results above, despite the wide range of information made available from both offline and online information resources, pet owners still face challenges when seeking for pet health information. In this case, we can see concerns related to the information source itself (i.e., insufficient amount of information), as well as those related to the information seeker or the pet owner themselves (i.e., overwhelmed with the information found, lack of knowledge in evaluating the info, etc.)

These encountered challenges are not new as similar problems were reported to be faced by Nigerian university students when seeking health information (Onwe & Okocha, 2019). The lack of time, insufficient amount of information, their lack of knowledge where to look for it, and the lengthy information available, are some of the several identified. Information seeker-related problems, such as those pertaining to one's information evaluation and comprehension skills, may be addressed accordingly with proper information literacy awareness and education. With the appropriate skills and knowledge, pet owners (or people in general) would be able to prevent feeling overwhelmed, confused, or frustrated with handling the information at hand.

### Filipino Pet Owners & Pet Health-Related Outcomes

The last section of the survey asked for pet owners' agreement to various statements regarding pet health-related outcomes. All statements started with “*Searching for pet health information on various information sources...*”

**Table 8**

*Pet Owners' Agreement to Pet Health-Related Outcome Statements*

Pet Health-Related Outcome Statements	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Affected my decision(s) about how to treat my pet's illness or condition.	10	5.32	3	1.60	39	20.74	86	45.74	50	26.60

Changed my overall approach to maintaining my pet's health.	7	3.72	4	2.13	47	25.00	78	<b>41.49</b>	52	27.66
Changed the way I cope(d) with my pet's condition or behavior.	10	5.32	2	1.06	43	22.87	89	<b>47.34</b>	44	23.40
Affected my decision about whether to take my pet to the veterinarian.	10	5.32	14	7.45	45	23.94	81	<b>43.09</b>	38	20.21
Led me to ask my veterinarian/ friends/ family/ fellow pet owners new questions.	11	5.85	6	3.19	39	20.74	78	<b>41.49</b>	54	28.72
Led me to get a second opinion from another veterinarian/ friend/ family/ fellow pet owner.	9	4.79	6	3.19	50	26.60	83	<b>44.15</b>	40	21.28
Helped me better understand my pet's health issues.	10	5.32	1	0.53	30	15.96	75	<b>39.89</b>	72	38.30
Made me better able to communicate my concerns with my veterinarian/ friend/ family/ fellow pet owner about my pet's health.	9	4.79	4	2.13	41	21.81	73	<b>38.83</b>	61	32.45
Helped me make better choices about my pet's health.	10	5.32	0	0.00	25	13.30	79	<b>42.02</b>	74	39.36

As can be seen from the table above, the most common answer of the pet owners was 'agree' to all the pet health-related outcome statements given in the survey questionnaire. Similar to the results from a study by Kogan et al. (2019), Australian pet owners found searching for pet health information to be influential in the way they manage, cope, address, and communicate their pet's health needs. Indeed, searching for pet health information on various information sources is the best way to be able to know more and address one's health concerns regarding their pet's wellbeing. Doing so, in a responsible and critical manner, can help one make informed health decisions towards the betterment of their companion animals.

## **Filipino Pet Owners' Thoughts**

At the end of the online survey form, respondents were also given an opportunity (optional) to share their thoughts in a text box before submitting the form. Several pet owner respondents answered, which revolved in the following themes: *loving and caring for their pets*; *being critical in making pet health-related decisions*; and *the need for the government's initiatives to cater the needs of Filipino pet owners and their companion animals*.

Several pet owners shared their thoughts on treating pets with utmost care and love – as one would treat a family member. On the other hand, other respondents emphasized the need to seek for a professional's help as much as possible, when it comes to concerns relating to the health of their pets. Doing a thorough research about a pet health-related concern is needed, and that a veterinarian's instructions and prescriptions must be followed accordingly. Lastly, some pet owners also shared their thoughts about the more expensive veterinary clinics here in the Philippines, as compared to those in other countries. The pet owners said that initiatives addressing the need for free or more affordable pet clinics in the country are needed, so as to cater as well the needs of poor pet owners, who cannot afford animal healthcare services due to financial constraints.

## **Limitations of the Study**

As the respondents of this study are respondents of Greater Manila Area, it is possible that pet owners from provinces, cities, or municipalities outside this area may have different experiences and practices that needs further examination. A quantitative method using an online survey was employed in the study, which may have also limited how the participants presented their views regarding the matter. And lastly, as this is aimed mainly to give an initial overview regarding the subject, the relationship between the information seeker's predisposing characteristics, engagement in health and information seeking, and its associated outcomes (Anker et al., 2011), as well as between each aspect explored in the survey (i.e., information needs and sources, evaluation practices, and challenges experienced) were not studied in-depth.

## **CONCLUSION**

With the increasing pet ownership rate in the Philippines, more in-depth studies about the subject matter should be conducted. To ensure that pet owners are able to fulfill their responsibilities to their companion animals, it is necessary to know more about their information seeking-behavior, which is a crucial aspect when it comes to ensuring a pet's overall wellbeing. The information that the pet owner finds and how they make use of it contribute to their pet health decision-making, which is a big part of responsible pet ownership. To know more about this, Filipino pet owners were asked about their pet information needs and sources, evaluation practices, commonly experienced challenges, and pet health-related outcomes.

The researcher found out that veterinarians and veterinary databases/journals are perceived by pet owners as very trustworthy information sources. Despite this fact, animal healthcare providers only rank second among the top three (3) common pet health information sources of Filipino pet owners. On the other hand, despite internet websites and social media being seen as less trustworthy information sources, these still belong to the three (3) most commonly used pet health information sources of pet owners. These findings raise several concerns considering the fact that the information evaluation practices of Filipino pet owners were found to be inconsistent. Pet owners should be made aware of the probable dangers (regarding information quality, accuracy, etc.) posed by the irresponsible or incompetent information practices, as well as the heavy reliance on websites and social media as sources of pet health information. Again, this can be related to the study's findings related to the information source preference of Filipino pet owners.

Accessibility, as compared to the information's authoritativeness and other factors, is seen to be the most influential factor that drives pet owners to utilize specific information sources over others. Internet and social media's accessibility influences Filipino pet owners to prefer and use these information sources, as compared to the less accessible, lengthy, and possibly for-a-fee features of the more trusted sources, such as animal healthcare providers and veterinary journals.

The incompetencies and challenges experienced by Filipino pet owners regarding information seeking, evaluation, handling, and comprehension need to be emphasized so that we can plan initiatives that can equip them with the proper skills and competencies regarding proper location, evaluation, and usage of pet health information. Similar to the recommendations from other studies abroad (Kogan et al., 2012; Kogan et al., 2014; Solhjoo et al., 2019), veterinarians, information professionals, and other involved institutions should also work hand in hand to educate and address the needs of Filipino pet owners. Establishing a better veterinarian-pet owner and/or information professional-pet owner relationship can also promote a better communication of pet health information needs. Promoting the practice of veterinarians providing information prescriptions to pet owners can also be helpful, as this can direct them to reliable and accurate pet health information. Moreover, projects that aim to provide more affordable animal health services to pets should also be started to encourage more Filipino pet owners to seek for a professional's help when the need arises. Doing these can enhance not only their competencies, but it can also significantly improve the overall health and wellbeing of companion animals in the Philippines.

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# **Sexual Beliefs of Librarians and its Impact on the Satisfaction and Healthcare Practice of Users of Philippine Health Sciences Libraries: A Mixed Method Study**

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## **ABSTRACT**

*Background.* Sexual health is defined by the World Health Organization as the holistic state of well-being in terms of human sexuality. The achievement of this state of sexual health requires the participation and education of not only patients, but also of their healthcare providers. It has been established that library and information services satisfy, and have an impact on the practice of health professionals and their patient care. However, there is currently no literature that specifically examines the impact of sexual health information in libraries on the practice of healthcare professionals and students.

*Objectives.* This study aims to contribute to the field of health sciences librarianship research by 1) measuring the sexual beliefs of librarians via a psychometrician validated tool, 2) examining, if any, the effects of librarians' sexual beliefs in the offered sexual health information in their libraries and 3) determining the satisfaction, and impact on practice of libraries' sexual health information on the users of health sciences libraries.

*Methods.* This is a mixed methods study that utilizes the Brief Sexual Attitudes Scale (BSAS), an information services user survey, and open-ended questionnaires based on the aforementioned surveys to quantitatively and qualitatively analyze the satisfaction and impact of sexual health information on healthcare professionals. An examination of the collection development of the two study sites are also included to complete the analysis. The two study sites are the UERMMMC and Philippine Heart Center Health Sciences Libraries.

*Results.* The sexual beliefs of librarians does not appear to affect the satisfaction and impact of sexual health information on users of the library. When the quantitative and qualitative data is corroborated alongside the collection development of the library, it appears that health sciences librarians do not build library collections based on biases or preferences, but on the demands of their users, and standards when applicable (in the case of academic institutions). User satisfaction, therefore, appears to be based on the collection serving their needs, regardless of what their health sciences librarian believes in terms of sexuality. In terms of impact on practice, there is an effect on the specialized fields of obstetrics and gynecology, urology, and research, especially on sexually transmitted infections.

*Contributions.* This study demonstrates the real world impact of health science libraries and their services on the practice of healthcare workers and students, specifically on the important dimension of sexual health. The results of this study expands Philippine and international literature on the impact of librarianship in other professions that are serviced by librarians, and identifies the relevant areas in which healthcare professionals use sexual health information. This assists librarians to strengthen those services and address identified points of dissatisfaction with the service.

## INTRODUCTION

Sexual health is defined by the World Health Organization (2019) as the holistic state of well-being in terms of human sexuality; this includes empowerment in terms of the physical, emotional, social, educational, and other dimensions of sexuality. A person is said to have achieved sexual health when they can positively express their sexuality without shame, restriction or repression from internal or external factors. The achievement of this state of sexual health requires the participation of not only patients, but also of their healthcare providers

Healthcare professionals, and healthcare students on their way to become professionals, require education in sexual health, so that they may apply it in their practice to address the questions and needs of patients regarding their sexuality. These needs encompass a multitude of topics, including but not limited to contraception, sexual identity, and sexually transmitted infections (Verrastro et al., 2020). Despite this need for education however, a study by Cesnik et al. (2017) shows that current sexuality education at various levels of training is inadequate to meet the needs of patients. This is despite the various avenues for medical training, including formal schooling, residency and fellowship programs, seminars, guidelines, and the various information services of health sciences libraries.

As early as the 1980s, it has been acknowledged by Van Vuren et al. (1987) that health sciences libraries have a role in the continuing education of health professionals. A study by Marshall et al. (2013) has established the satisfaction of healthcare professionals with library and information services, as well as its impact on the practice of health professionals and their patient care. These findings however, are for general healthcare practice; there is currently no literature that specifically examines the impact of sexual health information in libraries on the practice of healthcare professionals and students.

Given these facts and the gap in the literature, this study aims to contribute to the field of health sciences librarianship research by:

- 1) Measuring the sexual beliefs of librarians via a psychometrician validated tool
- 2) Examining, if any, the effects of librarians' sexual beliefs in the offered sexual health information in their libraries
- 3) Determining the satisfaction, and impact on practice of libraries' sexual health information on the users of health sciences libraries.literature review

## LITERATURE REVIEW

### **Health Sciences Libraries**

Shedlock (2014) defines health sciences libraries as institutions providing specialized information services to medical professionals, students, and other populations with a particular interest in health and biomedical information. Such services may include building a collection catering to specific institutional needs, expert searching on specialized research questions, and generally providing support that enables medical processes to flourish.

#### *Evidence-Based Librarianship*

Due to the scientific context of health sciences libraries, a key feature of the information provided in such libraries is its ever changing nature; what may be seen as current information can be easily superseded by new evidence (Shen, 2005). The concept of evidence-based practice, therefore, is of paramount importance in health sciences libraries, in keeping up with the general paradigm shift in the medical field.

Evidence-based librarianship is a specific application of the wider concept of evidence-based practice. A proposed definition by Eldredge (2000) is that it is a framework that aims to improve the practice of librarianship (that is, the provision of information services) by using the best available evidence to address a particular concern, instead of the traditional modality of standards and “expert opinion”. A specific application of this involves appraising current scientific literature as the primary basis in updating a library’s collection, reference and other services, so that library users can make decisions based on what is currently considered best practice as supported by evidence (Gathoni, 2021).

#### *Health Sciences Libraries in the Philippines*

In the Philippine context, health sciences libraries exist as a formal entity, represented in the wider library profession by the Medical and Health Librarians Association of the Philippines (MAHLAP). A study by Masalinto et al. (2015) sheds light on the demographics of Philippine health sciences libraries, with a majority being academic health sciences libraries (75%), and the others being special government libraries (16%), research libraries (3%) and corporate libraries (6%). These library types may overlap, as many schools also have hospitals, and others may be run by corporations while also conducting research activity.

### **Sexual Health and Sexual Health Information**

The World Health Organization (2019) defines sexual health as a state of well-being that is not merely the absence of sexual disease, but an empowered and positive experience that considers physical, mental, and social experiences. Sexual health is well-explored in literature, such as in the work of Abdurahman et al. (2022) which defines sexual and reproductive health as physical and emotional wellbeing, enabling freedom from unwanted pregnancies, sexually transmitted infections, and sexual violence. The Minnesota Department of Health (2022) provides a chronological exploration of the various definitions of sexual health.

Sexual health information, in contrast, is not a term as well-defined in literature. In the context of this study, it is defined as information and information services that lead to the realization of sexual health. Scholars McKellar and Sillence (2020) however, define it as information resources (these days mostly online) that concern the sex and sexuality, not necessarily reliable or enabling sexual health.

## **User Satisfaction and Assessment of Attitudes**

### *User Satisfaction in Libraries*

Zeithman and Bitmar (2000) defined user satisfaction as the means of determining if a product or service meets the required needs and expectations. If the products or services do not meet the user's needs or expectations, it is assumed that they are dissatisfied with the product or services. Similarly, Iwhiwhu and Okorodudu (2012) stated that users satisfaction of library information resources and services is a way in which users judge the adequacy of the library information resources and services given, and also their if expectations are met. Library user satisfaction implies how users feel after using the information resources and services, and their willingness to return to the library when they need information again (Ikenwe and Adegbihero-Iwari, 2014). According to Ijiekhuamhen et al. (2015) the level of using the library depends on users' satisfaction with the available information resources and services rendered to them. In a nutshell, users' satisfaction could be considered as the satisfaction users derive from the library by using the various types of information resources and services to fulfil their information needs for their various daily activities. Thus, the availability of quality information resources and services in libraries do have a significant influence on users' satisfaction. When users are satisfied with library information resources they not only come back, but speak well of the library to other users. (Tiemo & Ateboh, 2016)

### *Assessment of Sexual Attitudes*

The study of attitudes is enormously complex and varied, and it has spanned all domains of human social activity and personal behavior. This is no less true for the field of human sexuality. A review by Schiavi et al. (1979) shows that there are many questionnaires, inventories, and scales that are currently available to describe various aspects of people's attitudes, beliefs, and values concerning sexual behavior and its regulation.

Surprisingly, however, there does not appear to be a currently available, well-standardized measure of the extent to which individuals adhere to a liberal or conservative orientation concerning human sexual expression. Although complex, attitudes concerning human sexual expression can be described in terms of a liberal or conservative orientation which is conceived as a single bipolar continuum. At the liberal end of this continuum are those who feel that the expression of human sexuality should be open, free, and unrestrained. At the other end of the same continuum are those who feel that sexual expression should be considerably constrained and closely regulated. Although many people do adhere to extreme forms of a liberal or conservative orientation concerning human sexual expression, most fall somewhere in between the truly extreme positions. This means that when a person is described as being a "liberal" or a "conservative" in this regard, it is very important to recognize that such a characterization is strictly a relative matter. Thus, one might be quite liberal in relation to another person or some specific reference group while appearing somewhat conservative in relation to others. If individuals can be accurately described in terms of a liberal or conservative orientation toward human sexual expression, such characterizations may be useful to the social and behavioral scientist in a number of ways (Hudson et al., 1983, 258-259). Notably, a more modern existing tool, the Brief Sexual Attitudes Scale by Hendrick et al. (2006) as used in this study, does not explicitly state liberal or conservative beliefs, only positive or negative attitudes towards aspects of human sexuality (permissiveness, birth control, communion and instrumentality).

## **METHODOLOGY**

This study used a mixed method approach to analyze the impact of sexual health information. A consent form adapted from the UERMMC Ethics Review Committee (2018) is given to all participants to ensure understanding and agreement with the study and its scope. The study sites are the health sciences

libraries of the University of the East Ramon Magsaysay Memorial Medical Center, and the Philippine Heart Center, being a mix of health sciences library types, as well as being from the public and private sectors. The UERMMMC Library is an academic and research health sciences library, and the Philippine Heart Center, a specialty hospital and government-controlled corporation, is a research, special government, and corporate health sciences library.

The analysis of this study is on three levels. For the quantitative aspect of this study, descriptive statistics were collected for the BSAS and Library User Satisfaction surveys per institute. Qualitative analysis is drawn from data gathered by open-ended questions integrated within the surveys, and follow-up interviews; this data was processed with thematic analysis. Finally, the collection development policy of the institutions were requested and reviewed by the researchers for consideration as a possible factor in the provision of sexual health information in the libraries.

To assess the sexual beliefs of the librarians, the researchers adopted the Brief Sexual Attitude Scale (BSAS), a concise and validated scale designed to gauge attitudes toward human sexual expression ranging from liberal to conservative. The BSAS consists of 23 5-point Likert-type items, two of which are worded negatively to mitigate response bias. Each item is scored based on its relative frequency, as indicated in the scoring key of the instrument. Scores on the BSAS range from 0 to 115, with higher scores indicating more conservative attitudes and lower scores indicating more liberal attitudes. A threshold score of 50 is used, where scores below this value suggest an increasingly positive (arguably liberal) attitude towards aspects of human sexual expression, while scores above indicate a progressively negative (arguably conservative) orientation. (Hendrick et al., 2006). The validity of the tool was assessed by a psychometrician onboard with the study.

Meanwhile, assessment of user satisfaction was done by a tool derived from Mizra and Mahmood (2012), originally a survey measuring electronic resources and services. The tool was modified by the researchers to inquire specifically on sexual health information resources and services, and to include traditional resources such as print materials and traditional reference service. The questionnaire is a Likert-type survey rating various library services in the context of sexual health information, ranging from 1 (very dissatisfied) to 5 (very satisfied). The overall Cronbach's alpha value for the satisfaction survey is .800 (11 items), which indicates that there is internal consistency for the instrument.

## **FINDINGS**

### **Quantitative Analysis**

This study involved the participation of librarians and library patrons within two distinct institutions: the University of the East - Ramon Magsaysay Memorial Medical Center (UERMMMC) and the Philippine Heart Center (PHC). Within the population of  $N_1$  unique library users from UERMMMC and  $N_2$  unique library users from PHC, where  $N_1 = 150$  individuals who frequent the library on a weekly basis and  $N_2 = 15$  individuals who frequent the library on a daily basis, a systematic sample of  $n_1 = 123$  and  $n_2 = 15$  library users were drawn to contribute their responses to the Library Satisfaction Surveys. Additionally, the cohort of respondents encompassed all four (4) librarians from UERMMMC and a sole librarian from PHC, who provided responses to the Brief Sexual Attitudes Scale.

In order to assess the characteristics of the responses, the means and standard deviations were calculated for each survey item per survey, grouped per institution. Should the librarians obtain a BSAS score on the more conservative side while the library patrons indicate diminished library satisfaction scores, this may suggest that librarians are prioritizing personal sexual belief systems over the information needs of users, raising concerns about potential ethical implications as they may act as barriers to the information-seeking process.

**Table 1**

*Library User Satisfaction Scores for UERMMMC*

Library Service/Material	Satisfaction Rating	
	Mean	Std. Dev.
<i>Online Public Access Catalogue (OPAC)</i>	4.73	0.54
<i>Online Databases (e.g. UpToDate, Clinical Key)</i>	5.00	0.00
<i>E-Books</i>	4.92	0.30
<i>Internet Service</i>	4.66	0.62
<i>Virtual/Electronic Reference Service/Article Retrieval</i>	4.96	0.24
<i>Expert Searching (e.g. retrieving and appraising resources to answer complex questions)</i>	4.96	0.27
<i>Research Assistance/Counseling (e.g. consulting a librarian for guidance for a research paper)</i>	4.96	0.28
<i>Selective Dissemination of Information (SDI)</i>	4.82	0.45
<i>Current Awareness Service (e.g. updates latest acquired books)</i>	4.78	0.52
<i>Traditional Reference Service (e.g. asking the librarian directly)</i>	4.98	0.20
<i>Print Materials (e.g. textbooks)</i>	4.93	0.29

With mean scores not falling below 4.66 and standard deviations not exceeding 0.52, the findings show that the library patrons of UERMMMC collectively report a consistent and elevated degree of satisfaction as regards the library services and materials. Satisfaction for online databases exhibit an exceptionally high satisfaction rating of 5.00 which is unanimously agreed upon by the respondents.

**Table 2**

*BSAS scores for UERMMMC librarians*

Question	Rating	
	Mean	Std. Dev.

<i>Permissiveness</i>	<i>I do not need to be committed to a person to have sex with him/her.</i>	<i>4.25</i>	<i>1.50</i>
	<i>Casual sex is acceptable.</i>	<i>3.75</i>	<i>1.50</i>
	<i>I would like to have sex with many partners</i>	<i>4.50</i>	<i>1.00</i>
	<i>One-night stands are sometimes very enjoyable.</i>	<i>3.50</i>	<i>1.73</i>
	<i>It is okay to have ongoing sexual relationships with more than one person at a time.</i>	<i>3.00</i>	<i>1.41</i>
	<i>Sex as a simple exchange of favors is okay if both people agree to it.</i>	<i>3.75</i>	<i>1.50</i>
	<i>The best sex is with no strings attached.</i>	<i>3.50</i>	<i>1.73</i>
	<i>Life would have fewer problems if people could have sex more freely.</i>	<i>4.50</i>	<i>1.00</i>
	<i>It is possible to enjoy sex with a person and not like that person very much.</i>	<i>3.25</i>	<i>1.26</i>
	<i>It is okay for sex to be just a good physical release.</i>	<i>3.50</i>	<i>1.73</i>
<i>Birth control</i>	<i>Birth control is part of responsible sexuality.</i>	<i>5.00</i>	<i>0.00</i>
	<i>A woman should share responsibility for birth control.</i>	<i>4.25</i>	<i>1.50</i>
	<i>A man should share responsibility for birth control.</i>	<i>4.25</i>	<i>1.50</i>
<i>Communion</i>	<i>Sex is the closest form of communication between two people.</i>	<i>3.75</i>	<i>1.50</i>
	<i>A sexual encounter between two people deeply in love is the ultimate human interaction.</i>	<i>3.75</i>	<i>1.50</i>
	<i>At its best, sex seems to be the merging of two souls.</i>	<i>4.25</i>	<i>1.50</i>
	<i>Sex is a very important part of life.</i>	<i>5.00</i>	<i>0.00</i>
	<i>Sex is usually an intensive, almost overwhelming experience.</i>	<i>5.00</i>	<i>0.00</i>
<i>Instrumentality</i>	<i>Sex is best when you let yourself go and focus on your own pleasure.</i>	<i>4.00</i>	<i>1.15</i>
	<i>Sex is primarily the taking of pleasure from another person.</i>	<i>3.50</i>	<i>1.00</i>
	<i>The main purpose of sex is to enjoy oneself.</i>	<i>3.00</i>	<i>1.41</i>



	<i>Sex is primarily physical.</i>	3.75	1.50
	<i>Sex is primarily a bodily function, like eating.</i>	3.75	1.50
<b>TOTAL OF MEANS</b>		90.75	

The mean ratings for the questions on Permissiveness range from 3.00 to 4.50, which indicates moderate disagreement with the statements. However, standard deviations vary from 1.00 to 1.73, suggesting variability in responses.

The mean ratings for the questions for Birth Control show relatively high disagreement, ranging from 4.25 to 5.00. Two of the items have standard deviations of 1.50, indicating some level of variability. It should be noted that one of the items has a standard deviation of zero, indicating unanimous disagreement.

The mean ratings for the questions on Communion from 3.75 to 5.00, which indicates moderate to high levels of disagreement. There is variability in three of the responses under this construct as evidenced by the standard deviation of 1.50 for both. It should be noted that two items have zero standard deviation, indicating unanimous disagreement.

The mean ratings for Instrumentality vary from 3.00 to 4.00, which indicates moderate levels of disagreement. Standard deviations range from 1.00 to 1.50, indicating variability in responses.

The sum of the means for each question totalled to 90.75, indicating that the librarians of UERMMM are more conservative in their sexual attitudes.

### *Philippine Heart Center*

**Table 3**

*Library User Satisfaction Scores for PHC*

<b>Library Service/Material</b>	<b>Satisfaction Rating</b>	
	<b>Mean</b>	<b>Std. Dev.</b>
<i>Online Public Access Catalogue (OPAC)</i>	4.93	0.26
<i>Online Databases (e.g. UpToDate, Clinical Key)</i>	5.00	0.00
<i>E-Books</i>	5.00	0.00
<i>Internet Service</i>	5.00	0.00
<i>Virtual/Electronic Reference Service/Article Retrieval</i>	5.00	0.00
<i>Expert Searching (e.g. retrieving and appraising resources to answer complex</i>	5.00	0.00

<i>questions)</i>		
<i>Research Assistance/Counseling (e.g. consulting a librarian for guidance for a research paper)</i>	5.00	0.00
Selective Dissemination of Information (SDI)	5.00	0.00
Current Awareness Service (e.g. updates latest acquired books)	5.00	0.00
Traditional Reference Service (e.g. asking the librarian directly)	5.00	0.00
Print Materials (e.g. textbooks)	4.87	0.35
To what extent are you overall satisfied with the electronic resources & services in your library?	5.00	0.00

With 15 respondent library patrons of the Philippine Heart Center, the findings indicate high mean scores with a near-perfect consensus with only two services having standard deviations of 0.26 and 0.35. This implies that library patrons consistently report high satisfaction towards the library services and materials.

**Table 4**

*BSAS Scores for the PHC Librarian*

Question		Rating
Permissiveness	<i>I do not need to be committed to a person to have sex with him/her.</i>	5
	<i>Casual sex is acceptable.</i>	5
	<i>I would like to have sex with many partners</i>	5
	<i>One-night stands are sometimes very enjoyable.</i>	5
	<i>It is okay to have ongoing sexual relationships with more than one person at a time.</i>	5
	<i>Sex as a simple exchange of favors is okay if both people agree to it.</i>	3
	<i>The best sex is with no strings attached.</i>	5
	<i>Life would have fewer problems if people could have sex more freely.</i>	5

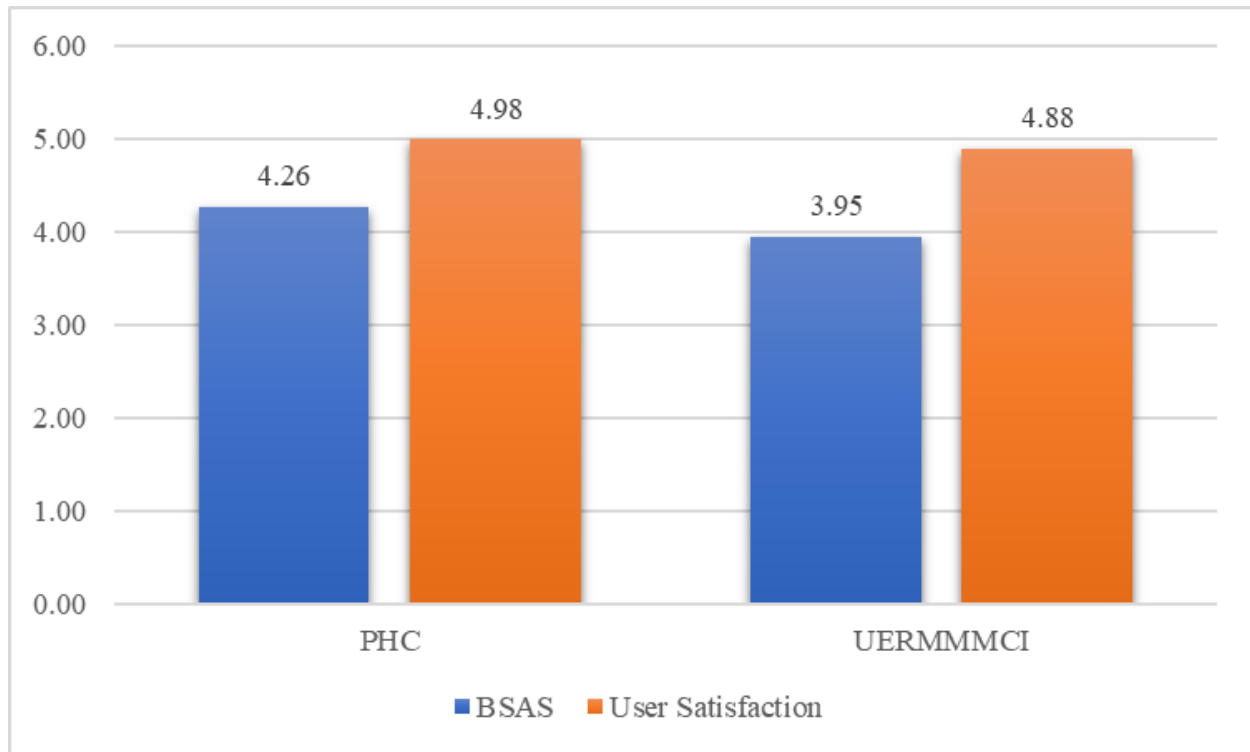
	<i>It is possible to enjoy sex with a person and not like that person very much.</i>	5
	<i>It is okay for sex to be just a good physical release.</i>	5
Birth control	<i>Birth control is part of responsible sexuality.</i>	5
	<i>A woman should share responsibility for birth control.</i>	5
	<i>A man should share responsibility for birth control.</i>	5
Communion	<i>Sex is the closest form of communication between two people.</i>	3
	<i>A sexual encounter between two people deeply in love is the ultimate human interaction.</i>	5
	<i>At its best, sex seems to be the merging of two souls.</i>	5
	<i>Sex is a very important part of life.</i>	5
	<i>Sex is usually an intensive, almost overwhelming experience.</i>	5
Instrumentality	<i>Sex is best when you let yourself go and focus on your own pleasure.</i>	2
	<i>Sex is primarily the taking of pleasure from another person.</i>	2
	<i>The main purpose of sex is to enjoy oneself.</i>	2
	<i>Sex is primarily physical.</i>	3
	<i>Sex is primarily a bodily function, like eating.</i>	3
<i>TOTAL</i>		98

The questions on Permissiveness are almost consistently rated with high disagreement from the statements, with only one rated with a neutral sentiment. The questions for Birth Control are consistently rated with strong disagreement. The questions on Communion are almost consistently rated with strong disagreement from the statements, with only one rated with a neutral sentiment. Deviating from the other constructs, moderate to low ratings were given to questions on Instrumentality, indicating moderate agreement with the statements

The total rating for the BSAS of the PHC librarian is 98, indicating a strongly conservative sexual attitude.

**Figure 1**

*Column chart on the mean BSAS and Library User Satisfaction scores per institution*



It can be observed that the user satisfaction and BSAS scores of UERMMMC ranks minimally lower than PHC. While it can be implied that it follows a certain trend, i.e., the satisfaction score decreases as the sexual attitude becomes more positive (BSAS score decreasing), additional data points may be required to properly test this observation for correlation. The researchers note that, in the case that a low satisfaction score was recorded, this lends an opportunity to expand the research, with the aim to substantiate whether conservative beliefs are linked to lower satisfaction levels or if there are other factors that may influence the satisfaction scores of the library patrons.

### **Qualitative Analysis**

*Library Users of UERMMMC*

**Table 5**

*Matrix for the Responses of UERMMMC Library Users on the Question “Given your overall satisfaction or dissatisfaction with the library’s sexual health information, please explain the reasoning behind your answer.”*

Theme	Supporting Narrative/Quote
Use of Library references for Research purposes (	“Helpful for our thesis on sexual behavior,

internal research or extension researches)	databases have complete information”
Making informed decisions for cases of patients (clinical decision making) especially for OB-Gyn and Urology rotations	“When I face patients, UpToDate and online sources really save me, especially if it's a new condition. This applies to sexual health information too in rotations like OB-Gyne”
Public Health Education regarding sexual health (references for lay fora and seminars)	“Resources are very helpful for example when we do lay fora and we need a quick source for the content we will discuss with our patients, however sometimes we don't know that a reference exists”
Using library references regarding sexual health in academic settings for teaching medical students	“Obstetrics and Gynecology, like any medical field, always has new information. The library's resources keep me updated for the classes that I teach for the department.”

Most library users in UERMMMC are medical students, doctors in the academe, clinical clerks and post-graduate interns. As a teaching hospital, their satisfaction with regards to sexual health information focuses on 4 themes: use of library for research reference purposes, making informed decisions for cases of patients, public health education regarding sexual health and for teaching sexual health in academic settings. Some medical students delve into topics in their thesis regarding sexual health and behavior and students in UERMMMC are satisfied with the pool of sexual health information available in their library.

Clinical clerks and post-graduate interns learn the art and science of diagnosing diseases and their treatment and management. Resources available in the library like UpToDate help them in reviewing important clinical information with regards to diseases which helps them in identifying the proper diagnosis and management especially in their OB-GYN and Urology rotations.

One of the major tasks of medical students, clinical clerks and post-graduate interns is to conduct patient education through lay fora or seminars. Available information in the library aids them in crafting sexual health information education and communication (IEC) paraphernalia with scientific bases. This information in turn is laymanized so that the general public during consultations understands certain sexual health diseases in a level they can grasp.

The faculty in the department utilize the library for sexual health information in making their modules for the courses they teach in medical school. Some faculty from Obstetrics and Gynecology, Urology and Community Medicine use UpToDate and other materials in the library to help them explain concepts in sexual health to medical students.

**Table 6**

*Matrix for the Responses of UERMMM library Users on the Question “What changes should the library implement to increase your satisfaction regarding accessing sexual health information?”*

Theme	Supporting Narrative/Quote
Highlight the need for streamlining sexual health information services and making it known to constituents	<p>“Advertise services and information on sexual health more”</p> <p>“Inform students better of all the resources in the library”</p>

Majority of library users of UERMMM agree that the information available in the library regarding sexual health is enough for their academic and clinical needs. They would however like to point out that the availability of these information needs to be publicized and marketed more to the UERMMM constituency as a number of students are not aware that there is certain information regarding sexual health available in the library. Another point of concern would be strengthening the signal of Wi-Fi in the campus so that students could access these information about sexual health wherever they are in the campus. They would also like more e-copies of sexual health information literature so that they can access these whenever they want, even outside the campus.

#### *Library Users of Philippine Heart Center*

**Table 7**

*Matrix for the Responses of PHC Library Users on the Question “Given your overall satisfaction or dissatisfaction with the library’s sexual health information, please explain the reasoning behind your answer.”*

Themes	Supporting Narratives/Quotes
Use of Library references for Research purposes ( internal research or extension researches)	<p>“As head of clinical research, the library goes hand in hand with our department. It has provided generous support in the face of budget cuts, and satisfies the sexual health information research needs of our doctors, whenever the topic is explored in a study.”</p>
Policymaking and Guidelines for Cardiologists in the Philippines	<p>“I use the library for research when I participate in consensus statements and guideline/policy making for the cardiologists of the Philippines. It has provided enough information on cardiology, including some niche topics such as STIs and cardiology, which I guess would qualify as</p>

	satisfying my sexual health information needs.”
Patient Education regarding Sexually Transmitted Infections	“Patient education is important and it also involves sexual health, and so the library has these databases and books which support this function. I am satisfied with that”
Making informed clinical decisions especially with rare cases	“The library helps us access guidelines and articles especially for rare cases without well-defined management. Sexual health comes up in cardiology despite being seemingly tangential (vs. Ob-Gyne or other specializations), and the library is enough in providing journals and guidelines when we need it.”

PHC Library users lean towards the demographic of health professionals. 4 themes emerged with regards to their satisfaction on their library’s sexual health information: Use of library for research purposes, policy making and guidelines for Cardiologists in the Philippines, Patient Education regarding Sexually Transmitted Diseases, and making informed clinical decisions especially with rare cases. PHC health professionals conduct research regarding cardiology and there are some researches published that touch the topic of sexual health. One concern is that the sexual health information in their institution is not ample.

Some healthcare professionals in PHC are involved in policy making and guidelines for cardiologists in the Philippines. While it is only seldom that cardiologists are involved in managing diseases for sexual health, they obtain some information regarding sexual health in their library.

Patient education is an important aspect in cardiology practitioners. PHC cardiologists use the library whenever there is a need to research sexual health in relation to heart diseases. There are some sexually transmitted infections with cardiovascular complications and their references in the library help them explain these complications to their patients.

While the relationship with sexual health and cardiovascular diseases are rare, whenever there is a need to review these whenever a rare disease comes up, cardiologists in PHC use available information in their library to look up for diagnostics and management of these diseases.

**Table 8**

*Matrix for the Responses of UERMMM library Users on the Question “What changes should the library implement to increase your satisfaction regarding accessing sexual health information?”*

Themes	Supporting Narratives/Quotes
Clamor for more budget for library services and with this comes expanding sexual health catalogue	<p>“The library needs its own space and a bigger budget for more databases”</p> <p>“Perhaps we should support a higher budget for the library”</p>

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Philippine Heart Center is a government institution and they regularly face budget cuts. This in turn affects the available references in the library with regards to sexual health. Health professionals in PHC would want more budget for library services to be able to expand their catalogue and services with their needs on clinical information and with this comes information regarding sexual health.

### *Librarians*

There were only 5 participants in the research that were librarians therefore the researchers combined the thematic analysis for all librarians.

**Table 9**

*Matrix for the Results in the Question “Based on your answers on permissiveness, birth control, communion and instrumentality, do you think that these beliefs could have influenced the sexual health information in your library?”*

Theme	Supporting Narrative/Quote
Librarians just follow guidelines given by institution or higher policy making body	<p>“No, we just follow the collection development policy, which is made by the faculty with the librarian”</p> <p>“I am not sure, but probably it could.”</p>

While librarians in this research were found to have liberal views with regards to sexual beliefs, all of them agreed that they just follow the collection development policy set by their institution or higher policy making bodies like the Commission on Higher Education with regards to available sexual information in libraries. Though 1 respondent pointed out not being sure and the probability that this could influence sexual health information being given to library users wanting to seek information regarding sexual health.

**Table 10**

*Matrix for the Results in the Question “Do you believe that a librarian’s sexual beliefs should influence collection development and the provision of information services concerning sexual health information to users?”*

Theme	Supporting Narrative/Quote
Librarians agree that every library user should be given equal access to sexual health information and that their personal bias should not affect their mandate in providing information	<p>“No, a librarian should provide equal access to information”</p>



All the librarians agree that library users should be given equal access to sexual health information. Whatever personal bias they have regarding their sexual beliefs should not affect their mandate in providing these information to library users.

### **Collection Development Analysis**

#### *University of the East - Ramon Magsaysay Memorial Medical Center*

The UERMMMC Library provided a copy of their collection development policy for analysis in this study. The collection development policy of the institution is comprehensive, tackling various aspects of the collection development process. This covers actions such as:

1. Setting the standards for the collection in compliance with regulatory bodies like the Commission on Higher Education (CHED) and various medical societies,
2. Stating a hierarchy for the approval of acquired materials which involves a faculty library committee, student suggestions, administrators, and the librarians themselves
3. Detailing, step-by-step, the actual selection criteria for various forms (print and non-print) of library resources, as well as standards for weeding the collection.
4. Discussing the conservation, preservation, and restoration of materials perceived as valuable by the librarian and users of the library

Overall, the collection development policy provides a strict guideline that must be followed before the library's collection is modified, leaving little room for personal preferences and biases to get into the collection due to standards and multiple levels of approval. This seems to have served the library well, as despite the quantitative data showing a large standard deviation (difference) in terms of librarian's beliefs, the collection shows satisfaction across the board with the library's services in terms of user responses, except for some aspects like signal for internet access (a location, not collection, problem).

Qualitatively, the librarians have stated unanimously that bias and belief should not affect the collection development of an institution, which is reflected in this library's collection. This is in line with the collection development policy of the institution which follows standards instead of personal preference.

#### *Philippine Heart Center*

The Philippine Heart Center does not have a formal collection development policy, but the librarian states that the library consistently holds consultations with the doctors, nurses, administrators and researchers of the hospital in order to guide their collection development. In particular, the library focuses on journals, online databases, and resources as requested by the hospital staff, only suggesting resources that are still subject for approval of the hospital administrators.

Unlike academic health sciences libraries, the PHC library does not have regulatory institutions like the Commission on Higher Education to regulate the contents of their collection in compliance with a set standard or curriculum. The responses of the hospital library's users, however, show the adequacy of the collection, as there is both quantitative satisfaction in terms

The only issue on collection development shared by the librarian is the lack of budget and support, mostly from administrators who are not library users. Return of investment is a constant question thrown at the library during budget meetings, which the librarian justifies with non-financial returns such as better patient care and faster service when relevant information reaches healthcare practitioners on

time. Nonetheless, the qualitative data from the library users show that they support the library's push for more resources, and see the value of the sexual health information services given by the library.

## CONCLUSION

The sexual beliefs of librarians does not appear to affect user satisfaction and the impact of sexual health information on users of the library. When the quantitative and qualitative data are corroborated alongside the collection development of the library, it appears that health sciences librarians do not build library collections based on biases or preferences, but on the demands of their users, and standards when applicable (in the case of academic institutions). User satisfaction, therefore, appears to be based on the collection serving their needs, regardless of what their health sciences librarian believes in terms of sexuality.

The results reveal the impact of library services on the professional practice of healthcare professionals engaged in sexual healthcare, as there are definite answers as to which aspects of practice are affected by the sexual health information of a library. Specifically, in the specialized fields of obstetrics and gynecology, urology, and research on sexually transmitted infections, health sciences libraries have a concrete impact, as the information they provide users guide decision making in patient care and the interpretation of medical data. This should be seen as both a responsibility, and as an opportunity by health sciences librarians, as they can innovate services specifically catered to these demographics given their clearly defined special information needs.

Beyond the practical dimension, the study has professional and ethical implications for the profession of health sciences librarianship. The very real impact of information services provided should entail a sense of pride, and responsibility in health sciences librarians and information professionals when they provide sexual health information to library users, as the information they provide have very real consequences in terms of patient care and education. This should also spur the greater health sciences librarian community (and its attached professional organizations) to strengthen their support for initiatives such as training in the provision of sexual health information, and reinforce the concept of evidence-based librarianship, not just as capacity building, but as a responsibility to our partners in the medical field and society as a whole.

The inclusion of more study sites can improve this research, as it strengthens both the quantitative (especially in terms of enabling correlational and inferential analysis) and qualitative analysis with a higher sample size, granting more integrity to the finding of this study.

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## Session 3: Information literacy, Digital literacy, Data literacy, Media literacy

ALIEP 3-1 The Level of Awareness on Plagiarism and Impact of Anti-Plagiarism Tools of Senior High School Students Taking the Academic Track

(Francis Kim Tanay and Rhea Rowena Apolinario)

ALIEP 3-2 The Question of Reading: A Documentational Perspective

(Yichen Yao and Kyo Kageura)

# **The Level of Awareness on Plagiarism and Impact of Anti-Plagiarism Tools of Senior High School Students Taking the Academic Track**

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## **ABSTRACT**

*Background.* In the past years, plagiarism has become rampant due to the increasing volumes of information that can be accessed through the internet.

*Objectives.* This study was conducted to know the level of awareness regarding plagiarism of senior high school students of Naga City, Philippines who are currently taking academic track. This study also explored students' plagiarism awareness and the impact of anti-plagiarism tools awareness and its relation towards their actions in preventing plagiarism.

*Methods.* A total of 416 students from 7 public senior high schools in Naga City were asked to answer a survey questionnaire. Non-parametric Mann-Whitney (M-W) and Kruskal-Wallis (K-W) tests were used for analyzing the significant relationship of students' demographics to the following: plagiarism awareness, impact of anti-plagiarism tools awareness, and actions towards preventing plagiarism. Structural equation model (SEM) was used to determine the relationship between student's plagiarism awareness, impact of anti-plagiarism tools awareness, and actions in preventing plagiarism.

*Results.* Results show that senior high school students of Naga City are highly aware of the concepts of plagiarism and its facets. It also shows that the Internet and teachers are the most common resources for students to learn about plagiarism. Further analysis found that there were significant differences among students' demographics towards plagiarism awareness, specifically sex, grade level, school, and strand. Lastly, it was found out that plagiarism awareness and impact of anti-plagiarism tools significantly affect the actions in preventing plagiarism. Thus, students' perceptions regarding awareness of plagiarism and anti-plagiarism tools have a positive impact towards preventing plagiarism.

*Contributions.* There are no existing studies on plagiarism awareness that focuses on senior high school students here in the Philippines. This study will help to understand the awareness level of students and can help strengthen existing policies of schools regarding plagiarism.

## **INTRODUCTION**

Plagiarism has become a serious issue for several universities across the world (Selemani et al., 2018). A recent analysis by Copyleaks shows that the average rate of copying in students' work rose from 35 to 45 percent during the pandemic (Schaffhauser, 2021). This analysis indicates that there is a gradual increase of plagiarism during the shifting of classes to online learning. In our current situation, when most classes are conducted virtually, students' main source of information is the internet.

As the internet expands, students have more tendency to commit plagiarism. Researchers explain that one contributing factor to plagiarism is the internet. According to Del Rosario and Sareno (2019), the widespread accessibility of information on the internet has led to an increase in copying and disseminating individuals' intellectual property. Thus, various anti-plagiarism tools have been developed, like Turnitin and Grammarly, which help students in assessing scholarly works (Dong & Shi, 2021). Most of these tools provide a breakdown of the similarity percentage between a student's work and existing online content. Despite these existing tools, some students still commit plagiarism.

In the Philippines, CHED and DepEd both emphasize the importance of combating plagiarism. CHED Memorandum Order No. 52 (2016) amplifies the role of research in university programs to drive economic progress, urging universities to foster an environment for research with integrity. DepEd Memorandum 2021-395 affirms a zero-tolerance policy for academic dishonesty, including plagiarism. However, in July 2022, a valedictorian in Camarines Sur faced public criticism for delivering a plagiarized speech, revealing a lack of awareness in plagiarism. This then raises questions on the degree of awareness of students regarding plagiarism. Thus, this study explores the level of awareness of senior high school students of Naga City regarding plagiarism and its facets.

## **LITERATURE REVIEW**

### **Plagiarism**

There are already countless definitions of plagiarism coined by researchers. According to the University of Oxford (2022), plagiarism is "presenting someone else's work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgment." The same definition was expressed in the study of Del Rosario and Sareno (2019) stating that plagiarism is "the deed of taking another person's ideas and passing them off as their own". In general, plagiarism is wrong and detrimental to the proliferation of knowledge.

In a qualitative study by Devlin & Gray (2007), students' primary reasons for plagiarism included inadequate admission criteria, poor understanding of plagiarism, weak academic skills, teaching and learning issues, laziness, pride in plagiarizing, pressure, and education costs. Other researchers like Franklin-Stokes and Newstead (1995) identified factors such as time pressure, peer pressure, fear of failure, grade improvement, and trend-following. Common themes across these studies include a lack of awareness, laziness, and education system issues.

### **Trends in Plagiarism Awareness**

Numerous studies have explored plagiarism awareness across various academic levels and fields. Some focus on undergraduates (Jereb et al., 2017; Macatangay, 2015; Shang, 2019; Mahmud et al., 2021), postgraduates (Idiegbeyan-Ose et al., 2016; Kavita, 2018; Ramzan et al., 2011), educators (Bautista & Pentang, 2022), and researchers (Mostofa et al.). Other research investigates the reasons for plagiarism (Kavita, 2018; Namira et al., 2021) and proposes solutions (Cabahug et al., 2015; Shang, 2018), policies (Ramzan et al., 2011), or programs (Chu et al., 2021) for addressing plagiarism. Chu et al. (2021) emphasizes the importance of early-stage comprehensive anti-plagiarism interventions, which justifies conducting the study at the secondary school level.

Students' demographics and their relation to plagiarism awareness has already been explored in previous studies, such as the works of Jereb et al. (2018), Mostofa et al. (2020), and Ahmad et al. (2022), which investigate sex differences. Additionally, Dujua (2014) examines differences in year levels and schools regarding students' plagiarism awareness, and Amper (2012) focuses on the awareness of students from various courses. Nevertheless, some of these studies yield conflicting results, which requires a more comprehensive examination towards students' demographics, more specifically school, grade level, strand, and gender and their relation to plagiarism awareness.

Numerous studies have explored student awareness in the context of a rising case of plagiarism in the country. However, these studies focus mostly on the tertiary level, leaving a gap in the secondary level. Moreover, there are no existing studies on plagiarism awareness that focus on senior high school students, with limited geographic diversity, including areas like Naga City.

### **Plagiarism in Naga City**

Naga City, located in the province of Camarines Sur, Philippines, has a population of 201,170, which is the highest among all cities and municipalities in the province, and one of the highest population densities in the entire Bicol Region (PSA, 2020). Naga is often referred to as the "Heart of Bicol" due to its pivotal role in trade, commerce, culture, and religion. Additionally, it is home to some of the highest-rated universities and educational institutions in the Bicol Region (City of Government Naga, 2022). Its demographic characteristics make it an ideal location in exploring plagiarism awareness of students.

Thus, this study focuses on plagiarism and the impact of anti-plagiarism tools awareness of senior high school students of Naga City. More specifically, it aims to achieve the following: (1) To determine the levels of plagiarism awareness and impact of anti-plagiarism tools awareness of public senior high school students taking academic track in Naga City; (2) To identify if there are significant differences among the students' demographics towards plagiarism awareness, impact of anti-plagiarism tools awareness and actions in preventing plagiarism; and (3) To determine the relationship between plagiarism awareness, impact of anti-plagiarism tools awareness, and actions in preventing plagiarism. More specifically the following:

- To identify the significant relation of plagiarism awareness and actions in preventing plagiarism.
- To identify the significant relation of impact of anti-plagiarism tools awareness and actions in preventing plagiarism.
- To identify if plagiarism awareness and impact of anti-plagiarism tools awareness jointly affect the actions preventing plagiarism.

### **METHODOLOGY**

Naga City has 8 public senior high schools offering various academic strands: Accountancy, Business, and Management (ABM), Humanities and Social Sciences (HUMSS), Science, Technology, Engineering, and Mathematics (STEM), and General Academic Strand (GAS). The total senior high school student population for the 2022-2023 school year is 4,617. Using Slovin's formula with a 95% confidence level and a 5% margin of error, the study's desired sample size is 355 students. Multistage-Stratified random sampling with proportional allocation based on students' grade level, strand, and sex was used in choosing the respondents for each participating public school in Naga City.

The main tool used in this study was a survey questionnaire, comprising three parts. The first part gathered demographic information about the students. The second part involved true or false statements related to plagiarism, where students marked their understanding. The third part covered aspects of plagiarism awareness, impact of anti-plagiarism tools awareness, and actions toward preventing plagiarism.

Students rated their responses using a seven-point Likert Scale. Furthermore, under the plagiarism tools awareness and its impact, students were given a checklist of plagiarism tools. Students then identified tools that they were familiar with. Lastly, a list of possible reasons for plagiarism was given in which students rated on a five-point scale. This questionnaire was adapted from the previous studies conducted by Amper (2012) and Mostofa et al. (2020). Prior to its application in data collection, the questionnaire underwent pilot testing to assess its validity and reliability.

The survey exists in both print and online formats. Printed copies were distributed to the involved schools and provided to the students. The online form served as an alternative means for students to complete the survey, particularly when printed surveys were not feasible. The online form was created using Google Forms and disseminated via email to the participating schools. All the materials necessary for the study underwent thorough examination and were accompanied by consent forms in compliance to the ethical standards.

In analyzing the data that was gathered from the survey forms, incomplete data were discarded and did not undergo further analysis. The researchers tabulated the data using Microsoft Excel. Descriptive statistics were utilized in interpreting and analyzing the data.

The table below (Table 1) is a scoring guide for the second part of the survey, adapted from the study of Amper (2012), which was also used by Dujua (2014).

**Table 1**

*Score Key for Plagiarism Awareness Level*

Awareness Level	Scores
Fully aware	16-20
Highly aware	11-15
Moderately aware	6-10
Slightly aware	1-5
Not aware	0

For the data measured by the Likert Scale, measures of central tendency were used. The survey results that were gathered underwent Kolmogorov–Smirnov test and Shapiro–Wilk test. These tests are well known methods to test the normality of the data (Gupta et al., 2019). The study then used non-parametric methods since the assumptions on the population distribution are not satisfied.

Researchers used a non-parametric Wilcoxon test to analyze the awareness levels of senior high school students in Naga City regarding plagiarism awareness, impact of anti-plagiarism tool awareness, and actions in preventing plagiarism. Non-parametric Mann-Whitney (M-W) and Kruskal-Wallis (K-W) tests were utilized to examine the significant relationships between students' demographics towards plagiarism awareness, anti-plagiarism tool awareness, and actions against plagiarism. The M-W test compared students' responses related to plagiarism concerning sex and grade level, while the K-W test assessed variations in students' responses based on factors like strand, grade level, and school. Spearman correlation was applied to determine the relationship between students' plagiarism awareness and anti-plagiarism tool awareness.

To further analyze the data that were gathered, structural equation model (SEM) was used to determine the relationship between student's plagiarism awareness, impact of anti-plagiarism tools



awareness, and actions in preventing plagiarism. Other regression tools may also be used to show if plagiarism awareness and impact of anti-plagiarism tools significantly affect the actions in preventing plagiarism. All analysis of data was done by the following software: R Studio, MS Excel, and IBM SPSS software statistics.

## FINDINGS

### Profile of the Respondents

The calculated minimum sample for the study was 355, while the number of respondents reached a total of 416, which allows possible adjustments through data cleaning and organizing. Table 2 shows the distribution of respondents and average score per demographic characteristics.

**Table 2**

*Distribution of Respondents and Average Scores per Demographic characteristics*

Demographic characteristics	Frequency	Percentage	Average Scores	Awareness Level
<i>School</i>				
Camarines Sur National High School	192	46.15	12.44	Highly Aware
Cararayan National High School	29	6.97	11.52	Highly Aware
Carolina National High School	17	4.09	11.76	Highly Aware
Naga City Science High School	39	9.38	13.67	Highly Aware
Naga City School of Arts and Trades	49	11.78	10.04	Highly Aware
Tinago National High School	72	17.31	9.90	Moderately Aware
Leon Q. Mercado High School	18	4.33	11.50	Highly Aware
<i>Sex</i>				
Male	171	41.11	11.09	Highly Aware
Female	245	58.89	12.13	Highly Aware
<i>Academic Strand</i>				
Science Technology Engineering and Mathematics Strand (STEM)	74	17.79	13.12	Highly Aware
Accountancy Business and Management Strand (ABM)	88	21.15	12.76	Highly Aware
Humanities and Social Science Strand (HUMSS)	71	17.07	11.93	Highly Aware
General Academic Strand (GAS)	183	43.99	10.53	Highly Aware
<i>Grade level</i>				
Grade 12	246	59.13	12.21	Highly Aware
Grade 11	170	40.87	10.96	Highly Aware

## Plagiarism Awareness Assessment

**Table 3**

*Frequency and Percentage of Correct Students per Item*

Item no. (Ix)	Frequency	Percentage
1. Copying and pasting from the internet can be done without citing the source, because it is common knowledge.	299	71.88
2. When summarizing a block of text from another work, citing the source at the end of your paper is sufficient.	61	***14.66
3. Improper use of quotation marks is an act of plagiarism	291	69.95
4. Borrowing someone's idea and using it in a paper without reference is not an act of plagiarism.	279	67.07
5. Using a few phrases from an article and mixing them with your own words is not plagiarism.	219	52.64
6. Plagiarism is not a legal offense unlike Copyright.	122	***29.33
7. Imitating other people's expressions without acknowledgement is not plagiarism.	260	62.50
8. Plagiarism can still occur even if the work has no legal protection.	349	83.89
9. You cannot plagiarize your own work.	172	***41.35
10. If the material is not protected by copyright, then you can copy it without citing the source.	282	67.79
11. Reusing in whole or in part our own previously disseminated ideas, text, data, etc. is not an act of plagiarism.	278	66.83
12. Failure to use footnote properly can be considered as plagiarism.	307	73.80
13. Plagiarism in the Philippines is punishable by law.	54	***12.98
14. Failing to put quotation marks in a quotation is not an act of plagiarism.	295	70.91
15. Providing incomplete information about the sources so one cannot trace the original source is an act of plagiarism.	341	81.97
16. Plagiarism is not punishable by expulsion.	299	71.88
17. Plagiarism is always a copyright violation.	65	***15.63
18. Copying verbatim the words of other people with proper quotation and citation is still an act of plagiarism	210	50.48
19. Use of his or her own work without citation is plagiarism.	321	77.16
20. Providing an incomplete information about the original source can also be considered as plagiarism.	364	87.50

*Note:* \*\*\*indicates percentage < 50.00%

Result shows that 54.81% of student respondents rated themselves as "Fully" aware of plagiarism concepts. Among 416 respondents, 318 (76.44%) are familiar with anti-plagiarism tools. Grammarly is the most known tool, with a frequency of 341 (45.17%) out of 755. When asked about the frequency of using anti-plagiarism tools, 33.65% indicated "sometimes," which is the highest percentage. Only 8.17% among the respondents claimed that they "always" use anti-plagiarism tools, despite the majority responded that they are aware of their existence.

Table 2 shows the average scores for students based on demographic characteristics. Notably, Naga City Science High School attains the highest average score of 13.67, with all schools results to a "Highly Aware" awareness level, except for Tinago National High School, which is "Moderately Aware". Among academic strands, STEM records the highest average (13.12), and Grade 12 students score higher (12.21) than Grade 11 students (10.96). Lastly, females exhibit a higher average score (12.21) compared to males (10.96). All categories within sex, academic strand, and grade level indicate a "Highly Aware" level of awareness.

Overall, Naga City public senior high school students scored an average of 11.7019 out of 20, signifying a "Highly Aware" level of awareness. However, items I2, I6, I9, I13, and I17 received less than 50%, indicating that students have limited understanding of technical (I2 and I9) and legal (I6, I13, and I17) aspects of plagiarism (see Table 3).

### Student's Perception on Different Plagiarism Facets

Plagiarism awareness involves students' understanding about concepts of plagiarism, thus statements defining concepts of plagiarism were used and were measured in a seven-point scale to measure the students' perception of plagiarism awareness. Table 4 shows the mean and standard deviation of students' perception in plagiarism awareness.

**Table 4**

*Mean and Standard Deviation of Responses per Statements Regarding Awareness to Plagiarism*

<b>Plagiarism Awareness</b>	<b>Mean (SD)</b>
Copying text/image from the internet without acknowledging the source may result in plagiarism	5.60 (1.84)
Unpublished works, such as thesis, dissertations, reports, etc. always require citations	5.54 (1.75)
Translating a small part of a paper from a foreign language without citing the source is plagiarism	5.21 (1.71)
Common knowledge (i.e., facts known to most people) require citations	4.68 (1.87)
Recycling of my own work is plagiarism	4.37 (2.12)
Avoiding plagiarism includes citing only published materials	4.14 (1.93)

*Note.* Awareness level statements are in descending order based on its mean.

Based on the survey conducted, most students are familiar with any anti-plagiarism tools or software. Students then indicated their agreement in a seven-point scale from the statements that discuss possible impacts of anti-plagiarism tools. Table 5 shows the mean and standard deviation of awareness level regarding the impact of anti-plagiarism tools.

**Table 5***Mean and Standard Deviation of Actions Taken to Avoid Plagiarism*

<b>Impact of Anti-Plagiarism Tools Awareness</b>	<b>Mean (SD)</b>
I am now more aware of how to avoid plagiarism	5.60 (1.84)
I always make reference to the actual source when using another author's work	5.54 (1.75)
I can check my work easily with the help of anti-plagiarism tool	5.21 (1.71)
I am now aware of maintaining the quality of my paper and my academic integrity	4.68 (1.87)
I am now more conscious while paraphrasing texts	4.37 (2.12)
I keep records of the sources where the ideas are taken from to cite them later	4.14 (1.93)
I feel confident to represent my ideas and observations in my own language	5.35 (1.58)
I know how to quote statements of other researchers appropriately	5.31 (1.55)
I know how to cite works both in-text and in references properly	5.28 (1.55)
I do not try to dodge plagiarism detection software by replacing keywords, terms, etc.	4.92 (1.63)

*Note.* Awareness level statements are in descending order based on its mean.

Students were asked about their actions in preventing plagiarism. The table shows that all the actions listed have mean greater than 5, indicating that students perceived that they have an active role in preventing plagiarism. Mean and standard deviation of students' responses were presented in Table 6.

**Table 6***Mean and Standard Deviation of Actions Taken to Avoid Plagiarism*

<b>Actions in Preventing Plagiarism</b>	<b>Mean (SD)</b>
If I use information from websites or other online databases, I acknowledge the source	5.58 (1.57)
When I directly quote from other sources, I always give credit to original sources	5.49 (1.66)
When I copy and paste something in my work, I acknowledge the source in reference	5.47 (1.58)
I acknowledge the sources, when I summarize the text from other sources and write them using my own words	5.33 (1.52)
I usually seek help from others if I have questions about when and how to cite	5.30 (1.62)
I acknowledge the source both in-text and reference list if I only use a significant amount of text from others	5.22 (1.60)
If I use image, chart, or graph from other sources, I cite the sources	5.21 (1.60)
I use anti-plagiarism software to check the originality of my work before I submit it	5.16 (1.62)
While using a questionnaire based on a previous study, I take written permission to reuse it and acknowledge the source	5.15 (1.54)

*Note.* Actions taken are in descending order based on its mean.

Table 7 shows the mean and standard deviation of reasons that cause plagiarism. Students assessed a set of reasons for plagiarism on a seven-point scale. The data indicates that students tend to unintentionally

commit plagiarism, with a mean score of 5.04. Other reasons include "lack of awareness about plagiarism consequences" and "lack of formal orientation on plagiarism and academic ethics," both with mean scores of 4.97 and 4.96, respectively.

**Table 7**

*Mean and Standard Deviation of Reasons That Cause Plagiarism*

Reasons that cause plagiarism	Mean (SD)
Sometimes students plagiarize unintentionally	5.04 (1.54)
Lack of awareness about the punishment for plagiarism	4.97 (1.71)
Lack of formal orientation on plagiarism and academic ethics	4.96 (1.84)
Lack of interest in and enthusiasm for publishing quality research works	4.81 (1.70)
Difficult to check plagiarism for every piece of work	4.79 (1.71)
Competition among peers to produce more number of publications within shortest possible time	4.78 (1.67)
The issue of plagiarism and its penalties has never been discussed at the university level	4.44 (1.76)
The punishment against plagiarism is too light to be concerned of	4.38 (1.70)
I am good if I am not caught	3.81 (2.10)

*Note.* Reasons are in descending order based on its mean.

### Test for Significant Difference

#### *Rating Difference Between Two Groups*

In each survey section, researchers assessed whether significant differences existed in respondent ratings based on grade level and gender. Mann-Whitney tests were used to analyze these differences, and the results are presented below.

**Table 8**

*Mann-Whitney U Test of Difference Between Grade Levels and Sexes in Terms of Plagiarism Awareness, U (p-value)*

Plagiarism Awareness	Grade Level	Sex
1.Copying text/image from the internet without acknowledging the source may result in plagiarism	15424.000 (0.000***)	23319.000 (0.005**)
2.Translating a small part of a paper from a foreign language without citing the source is plagiarism	15700.000 (0.000***)	21754.000 (0.188)
3.Unpublished works, such as thesis, dissertations, reports, etc. always require citations	17751.000 (0.024*)	21562.000 (0.241)
4. Recycling of my own work is plagiarism	14982.000 (0.000***)	23686.000 (0.003**)
5.Common knowledge (i.e., facts known to most people) require citations	17444.000 (0.014*)	21611.000 (0.238)
6.Avoiding plagiarism includes citing only published materials	21966.000 (0.1477)	18061.000 (0.061)

*Note.* \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Mann-Whitney test results on plagiarism awareness reveal significant grade-level differences in five out of six items (see Table 8), specifically in items I1, I2, I3, I4, I5, and I6. This signifies that Grade 11 and Grade 12 students significantly differ in their responses. In contrast, only items I1 and I5 show significant differences between male and female students. Overall, gender has minimal impact on plagiarism awareness, except in a few cases.

Ratings in all items under the section of impact of anti-plagiarism tools awareness are significantly different between grade levels. That is, the median rating of students for each question is different for Grade 11 students compared to Grade 12 students.

On the other hand, result shows that only a few items had a significantly different rating between the two sexes. This includes being more conscious while paraphrasing texts (M-W  $U = 24038.000$ ,  $p < 0.001$ ), knowing how to cite works both in-text and in references properly (M-W  $U = 22910.000$ ,  $p < 0.05$ ), being aware of maintaining the quality of their paper and their academic integrity (M-W  $U = 22990.000$ ,  $p < 0.05$ ), being more aware of how to avoid plagiarism (M-W  $U = 23501.000$ ,  $p < 0.01$ ), and checking their work easily with the help of anti-plagiarism tool (M-W  $U = 23023.000$ ,  $p < 0.05$ ).

Consistent with prior findings, significant grade-level differences were observed in all action-related variables for preventing plagiarism. In contrast, gender differences were found in only a few specific items. This include acknowledging the source when using information from websites or other online databases (M-W  $U = 15610.000$ ,  $p < 0.001$ ), acknowledging the sources when they summarize the text from other sources and write them using my own words (M-W  $U = 16450.000$ ,  $p < 0.001$ ), citing the sources when they use image, chart or graph from other sources (M-W  $U = 16292.000$ ,  $p < 0.001$ ), using anti-plagiarism software to check the originality of my work before they submit it (M-W  $U = 15882.000$ ,  $p < 0.001$ ), and acknowledging the source in reference when they copy and paste something in their work (M-W  $U = 14190.000$ ,  $p < 0.001$ ). This means that for the other questions, the median rating of male students does not significantly differ from female students.

Looking at these results, it can be observed that there are clear differences between Grade 11 students and Grade 12 students when it comes to their agreement on the different facets of plagiarism that was enumerated in this study. While most of these questions were also different for male and female students, there is a sizable number of items that were found to have no significant difference in terms of ratings of male and female students.

#### *Rating Difference Among More than Two Groups*

Previous results indicated that there is a significant difference between two groups (grade level and sex) in most plagiarism variable items. To further investigate whether there is also significant difference among groups with more than two categories, a nonparametric test - the Kruskal-Wallis (K-W) test was used in this study.

Table 10 displays the K-W test results for plagiarism awareness, comparing various strands and schools. The outcomes reveal significant differences between several pairs of strands and schools for most questions in this section. In the strand group, significant differences were observed in items I1, I2, I3, and I4. Meanwhile, all items showed significant differences when considering the school variable, rejecting the null hypothesis of no significant difference.

**Table 10**

*Kruskal-Wallis Test of Difference Among Strands and Schools in Terms of Plagiarism Awareness, 2 (p-value)*

Plagiarism Awareness	Strand	School
1. Copying text/image from the internet without acknowledging the source may result in plagiarism	41.358 (0.000***)	44.507 (0.000**)
2. Translating a small part of a paper from a foreign language without citing the source is plagiarism	36.561 (0.000***)	33.121 (0.000***)
3. Unpublished works, such as thesis, dissertations, reports, etc. always require citations	35.134 (0.000***)	35.967 (0.000***)
4. Recycling of my own work is plagiarism	44.255 (0.000***)	56.644 (0.000***)
5. Common knowledge (i.e., facts known to most people) require citations	6.854 (0.077)	26.915 (0.000***)
6. Avoiding plagiarism includes citing only published materials	3.619 (0.306)	14.689 (0.023*)

*Note.* \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Ratings in all items under the section of impact of anti-plagiarism awareness significantly differ among strands and schools. That is, there is at least one pair of strands that has statistically different median ratings. These items include making reference to the actual source when using another author's work (2 = 33.307,  $p < 0.001$ ), being more conscious while paraphrasing texts (2 = 38.123,  $p < 0.001$ ), keeping records of the sources where the ideas are taken from to cite them later (2 = 54.859,  $p < 0.001$ ), knowing how to cite works both in-text and in references properly (2 = 39.300,  $p < 0.001$ ), feeling confident to represent their ideas and observations in their own language (2 = 19.335,  $p < 0.001$ ), knowing how to quote statements of other researchers appropriately (2 = 44.439,  $p < 0.001$ ), being aware of maintaining the quality of their paper and their academic integrity (2 = 31.151,  $p < 0.001$ ), being more aware of how to avoid plagiarism (2 = 46.094,  $p < 0.001$ ), checking their work easily with the help of anti-plagiarism tool (2 = 36.751,  $p < 0.001$ ), and not trying to dodge plagiarism detection software by replacing keywords, terms, etc. (2 = 40.956,  $p < 0.001$ ).

Results also show that most items had ratings that are significantly different among all schools except for one item. It was found that the rating of students on their agreement to feeling confident to represent their ideas and observations in their own language is not significantly different among all schools. Meanwhile the following items had a statistically significant results: making reference to the actual source when using another author's work (2 = 29.639,  $p < 0.001$ ), being more conscious while paraphrasing texts (2 = 51.216,  $p < 0.001$ ), keeping records of the sources where the ideas are taken from to cite them later (2 = 64.148,  $p < 0.001$ ), knowing how to cite works both in-text and in references properly (2 = 29.638,  $p < 0.001$ ), knowing how to quote statements of other researchers appropriately (2 = 30.196,  $p < 0.001$ ), being aware of maintaining the quality of their paper and their academic integrity (2 = 32.894,  $p < 0.001$ ), being more aware of how to avoid plagiarism (2 = 40.569,  $p < 0.001$ ), checking their work easily with the help of anti-plagiarism tool (2 = 50.736,  $p < 0.001$ ), and not trying to dodge plagiarism detection software by replacing keywords, terms, etc (2 = 33.498,  $p < 0.001$ ).

Similar to the previous results, it is found that all variables under actions in preventing plagiarism had a significant difference in the ratings among all strands while only one variable was not statistically significant in the K-W test for schools. In terms of school, one item for actions in preventing plagiarism did

not have a significant result, which was acknowledging the source both in-text and reference list if they only use a significant amount of text from others.

In summary, when it comes to strands and schools, students' ratings significantly differ in most of the variables while for two-group comparisons, only grade level was seen to have significantly different ratings in almost all the questions in the survey. However, it must still be noted that a significant number of variables were found to have statistically unequal ratings between male and female students.

### Structural Equation Model (SEM)

A structural equation model (SEM) is analyzed to identify the causal relationship between awareness of different aspects of plagiarism, the impact of anti-plagiarism software and the actions taken to prevent plagiarism.

**Table 11**

*Model Fit Statistics for the Structural Equation Model*

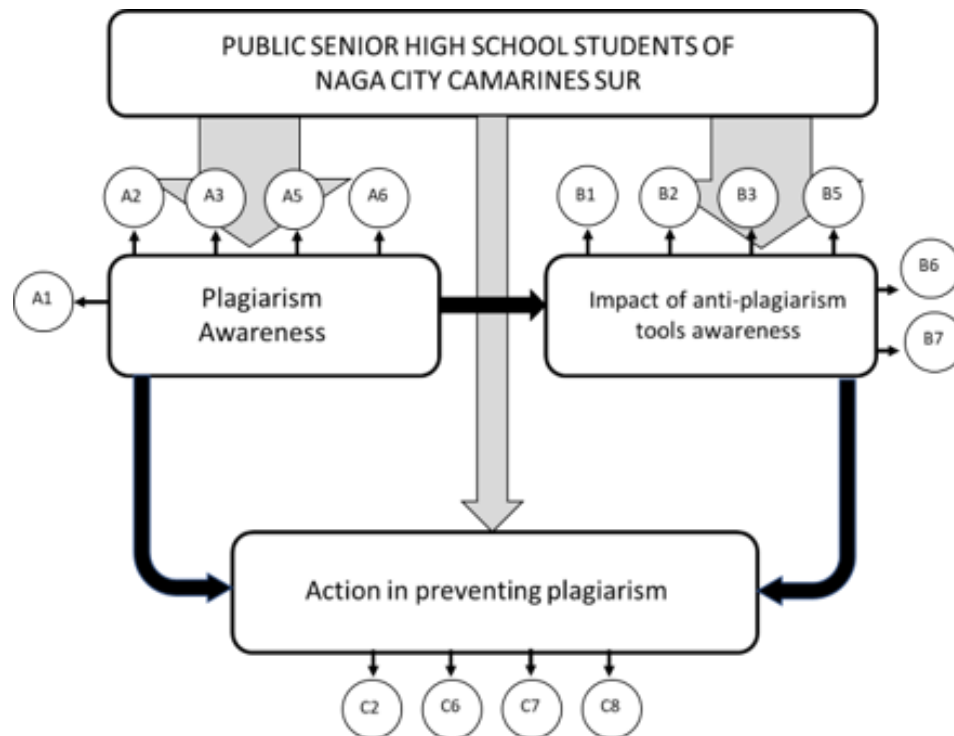
Index	Fit indices
2- value	321.499
Degrees of freedom (df)	87
2/df	3.695
p-value	0.000
Comparative Fit Index (CFI)	0.944
Tucker-Lewis Index (TLI)	0.932
Goodness-of-Fit Index (GFI)	0.904
Adjusted Goodness-of-Fit Index (AGFI)	0.868
Root Mean Squared Error of Approximation (RMSEA)	0.081

Table 11 shows the statistics used to evaluate each model depending on the suggested goodness-of-fit criteria of Mostofa et. al. (2021), such as  $2/df < 3$ , Goodness-of-Fit Index (GFI)  $> 0.9$ , comparative fit index (CFI)  $> 0.9$ , Tucker-Lewis index (TLI)  $> 0.9$ , adjusted goodness of fit index (AGFI)  $> 0.9$  and root mean square error of approximation (RMSEA)  $< 0.08$ . Based on the fit indices shown in Table 11,  $2/df > 3$  and p-value was highly significant ( $p < 0.001$ ) which indicates poor model performance (null hypothesis of perfect fit is rejected). Furthermore, the calculated values of Adjusted Goodness-of-Fit Index (AGFI) and Root Mean Squared Error of Approximation (RMSEA) are less than the threshold, indicating poor fit. However, for some of the indices, more specifically Goodness-of-Fit Index (GFI), comparative fit index (CFI), Tucker-Lewis index (TLI), which are all beyond the set thresholds. The critical ratios of the 15 items included in the models are highly significant indicating that all the items have a relative relationship towards the model.



**Figure 1**

*Structural Equation Model (SEM) for Plagiarism Awareness and its Facets*



*Note.* (A1) Copying text/image from the internet without acknowledging the source may result in plagiarism; (A2) Translating a small part of a paper from a foreign language without citing the source is plagiarism; (A3) Unpublished works, such as thesis, dissertations, reports, etc. always require citations; (A5) Common knowledge (i.e., facts known to most people) require citations; (A6) Avoiding plagiarism includes citing only published materials. For impact of anti-plagiarism tools awareness the following items are included: (B1) I always make reference to the actual source when using another author's work; (B2) I am now more conscious while paraphrasing texts; (B3) I keep records of the sources where the ideas are taken from to cite them later; (B5) I feel confident to represent my ideas and observations in my own language; (B6) I know how to quote statements of other researchers appropriately; (B7) I am now aware of maintaining the quality of my paper and my academic integrity. Lastly for the actions in preventing plagiarism, items included are the following: (C2) If I use information from websites or other online databases, I acknowledge the source; (C6) If I use image, chart or graph from other sources, I cite the sources; (C7) I use anti-plagiarism software to check the originality of my work before I submit it; (C8) While using a questionnaire based on a previous study, I take written permission to reuse it and acknowledge the source.

Further analysis was carried out to show the causal relationship between plagiarism facets, which in effect, tests the alternative hypothesis of this study. Table 12 presents the path analysis of the model, regression estimates, and critical ratios. It shows that at a 5% level of significance, there is sufficient evidence to say that the predictor significantly affects the regressor. Specifically, it shows that the following alternative hypotheses are accepted: Students' awareness of plagiarism has a positive effect on their awareness on the impact of anti-plagiarism tool (Ha1); Awareness of plagiarism has a positive effect on the students' actions in preventing plagiarism (Ha2), and Awareness on the impact of anti-plagiarism tools has a positive effect on the students' actions in preventing plagiarism (Ha3).

**Table 12***Testing Hypothesis with Standard Regression Coefficient and Critical Ratios for the Final Model*

Hypothesis	Path coefficient	Estimate	Critical Ratio	Decision
Ha1	Awareness of Plagiarism → Awareness of Impact of Anti-Plagiarism Tools	64.148 (0.000***)	14.630***	Supported
Ha2	Awareness of Plagiarism → Actions in Preventing Plagiarism	29.638 (0.000***)	2.335*	Supported
Ha3	Awareness of Impact of Anti-Plagiarism Tools → Actions in Preventing Plagiarism	53.988 (0.000***)	12.980***	Supported

*Notes.* \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

The structural equation model established significant causal relationships among the latent variables in the study. Goodness-of-fit indices confirm the model's effectiveness in illustrating the relationships among latent variables, described by individual observed variables (survey items). While the model aligns with Mostofa et al.'s (2021) which suggests that the awareness of plagiarism and impact of anti-plagiarism tools are significant factors for the actions in preventing plagiarism. Nonetheless, the earlier results show that awareness of public senior high school students regarding plagiarism and anti-plagiarism tools directly affect their actions in preventing plagiarism.

## CONCLUSION

Overall, public senior high school students that are currently taking academic track in Naga City school year 2022-2023 are highly aware of the concepts of plagiarism and are also familiar with the use of anti-plagiarism tools. This indicates that public senior high schools in Naga City provide sufficient education for students regarding the topic of plagiarism. However, the study reveals significant variations in plagiarism awareness across student demographics, including gender, grade level, school, and academic strand. This means that students' plagiarism awareness varies from one student to another based on their background and characteristics. Lastly, the study also found out that plagiarism awareness and impact of anti-plagiarism tools significantly affect the actions in preventing plagiarism. Thus, students' perceptions regarding awareness of plagiarism and anti-plagiarism tools have a positive impact on understanding the impact of anti-plagiarism tools and preventing plagiarism. To ensure equal education regarding plagiarism, it is recommended that teachers from all disciplines introduce and integrate anti-plagiarism tools at the early stages of education, making plagiarism detection a natural practice. Additionally, different academic tracks should incorporate specialized subjects to deepen students' understanding of plagiarism. Uniform improvement across all tracks will enable students to excel in their academic pursuits, regardless of their chosen field.

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# The Question of Reading

## A Documentational Perspective

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### ABSTRACT

*Background.* While the concept of literacy is expanding, reading is still one of the essential components of literacy (UNESCO, 2023). The importance of gaining proper reading skill is indeed growing, given that the amount of written knowledge and information is increasing rapidly, and the amount of AI-generated texts is expected to increase.

*Objectives.* This paper aims to clarify core questions about reading, taking into account the point of view of Library and Information Science (LIS). We put special emphasis on clarifying the difference between the status of how “reading” is discussed in psychology and in LIS, as psychology is the main field in which “reading research” is carried out. We contend that this clarification will eventually add value to our understanding of the questioning of “what is reading”, which the existing reading research neglect. We particularly focus on reading at the university level.

*Methods.* Both deductive and inductive approaches are used. In the deductive approach, we examine the word “to read” to clarify features relevant to reading. In the inductive approach, we retrieved studies that involve reading experiments at university-level and analysed how they describe the act “to read” and reading skills.

*Results.* We clarified essential features of reading mainly in two aspects. Firstly, we identified that the target of reading includes documents, not only linguistic units. This implies that (a) targets of reading can be unique expressions or events rather than expression types, and (b) concrete documents constitute an essential part of the context. Secondly, the act “to read” in most existing work is defined in either a circular or goal-oriented way, this requires us to explore the true essence of what constitutes the act of reading. The psychological study of reading does not give adequate insights into skills involved in the act of reading for two reasons. Practically, it is difficult to take into account the documentational contexts in psychological experiments of “reading”. Theoretically, psychological experiments logically require our understanding of what reading is, which is exactly not fully understood because only internal process has been accounted. Consolidating the proper skill sets that can be externally shared, followed and translated into action is urgent.

*Contributions.* We clarified the questions that should be asked about “to read” and about reading skills. While LIS claims to be concerned with literacy, which includes reading skills, LIS researchers has often failed to fulfill its self-proclaimed mission (cf. Kageura, 2021). This work constitutes a stepping stone to further promote research in reading, especially in reading skills, from LIS points of view.

## 1. INTRODUCTION

Literacy is an important topic addressed in Library and Information Science (LIS). While the concept of literacy is expanding and LIS tends to emphasize wider range of literacy under the name of information literacy (Agosto, 2018; Nemoto, 2017), reading remains an essential part of literacy (UNESCO, 2023). Library, Information Science and Technology Abstracts returns 42,804 materials for the keyword “reading” (as of 9 June 2023; incidentally, 188,646 for “school library”, 28,479 for “writing”, 26,057 for “information retrieval”, and 10,873 for “reference services”, for comparison), which corroborates the importance of reading in LIS research. A look at most relevant titles shows that, while much work is devoted to such external aspects as reading advice, book recommendation, media or the effect brought by reading performance, little work is devoted to reading itself. Put differently, most work shares the assumption that we know what constitutes this act called “to read” (we use “to read” and “reading” interchangeably, although we tend to use “to read” when we emphasize the act of reading). This holds for recent discussions on reading (e.g. Korbey, 2023).

Unfortunately, there is ample evidence that this assumption is untenable. A large amount of unscientific discourse produced about the nuclear disaster in Japan and about COVID-19 all over the world revealed that reading for many people amounts to distorting what is written to fit their wishful thinking (see Tanimoto et al., 2022, for a radiation-related issue). Society at large does not seem to have a common understanding of this thing called “to read”. University teachers should be aware of the fact that students – and teachers themselves, for that matter – carry out widely different acts when they are required to read something. Sharing the basic issues about reading itself is an urgent task especially in the face of ongoing and expected growth of AI-generated texts.

Against this backdrop, we examine questions about reading itself. We would like to highlight that the psychological approach of reading is particularly stimulating our current study. Since the cognitivism has largely altered the paradigm of psychological research, reading has been understood as a process that involves elements such as visual recognition, comprehension, memory and background knowledge (for example, Kintsch, 1974; Gough and Tunmer, 1986; Kintsch, 1988 are representative works featuring one or more of these elements) for readers to construct multiple representations of what a text means. Therefore, reading is an internal, individual process. However, if we looked at the educational research to glean insights into “what is reading”, when the researchers and educators invest efforts to understand how student’s reading outcome can be improved, how reading can be “teachable”, we notices that they suggest teachers to teach “strategies” of reading, and the students are expected to “metacognitively” control their reading process, and learn to read by performing the strategies such as “identifying”, “distinguishing”, “inferring” or “evaluating” (Paris et al., 1996 and Manarin et al., 2015 provide good examples of such strategies or rubrics). While the educational research adopts concepts from cognitive science and remains to discuss the reading process on an internal level, we see that there is a shift of interest to the more externalized part of reading: reading skills are expected to be implementable and provide tangible solution to the reading tasks; how to learn to read should be shared to all readers for our education purpose. However, when we are “identifying” or “inferring” etc. for being able “to read”, what exact steps should we take? Education studies do not give answers to this concrete-act level. Therefore, we would like to introduce an internal – external distinction between the questioning of “what is reading”, to show that we do not have adequate understanding of “what is reading” yet, and we believe this will ultimately foster a holistic answer to the question. As a first step to reveal the rather unexplored aspects of reading itself, we will place special emphasis on clarifying the difference between the status of how “reading” is discussed in psychology where reading is specifically “internal”, compared to that in our proposal of reading from a LIS perspective. We assume university-level reading so that the main issues can be made clear, although the observations here should be relevant to reading at all levels.

## 2. THE MEANING OF “TO READ” AND THE OBJECT OF READING

Oxford Advanced Learner’s Dictionary ([https://www.oxfordlearnersdictionaries.com/definition/english/read\\_1?q=read](https://www.oxfordlearnersdictionaries.com/definition/english/read_1?q=read); checked 3 June 2023) provides 14 definitions under the entry “read”, including the act of “reading somebody’s lips” or “taking information from a disk”. From a LIS perspective, what we are interested in is related to the following:

[words/symbols]

1. to look at and understand the meaning of written or printed words or symbols
2. to go through written or printed words, etc. in silence or speaking them to other people

[discover by reading]

3. to discover or find out about somebody/something by reading

Similar definitions are also given in other dictionaries. For instance, we see the following parts of the definitions given in Collins online (<https://www.collinsdictionary.com/dictionary/english/read>; checked 3 June 2023) roughly correspond to the above definitions in Oxford:

1. When you read something such as a book or article, you look at and understand the words that are written there.
3. People who can read have the ability to look at and understand written words.

In this section, we aim to raise attention for the need to re-examine the question of “what is reading”. We immediately notice two points in these definitions. Firstly, the definitions are given in a goal-oriented manner, i.e. “to ... understand the meaning” and “... and understand”. Secondly, the target of reading is “words” (in the case of Oxford “words or symbols”). The definition in Collins is interesting in this respect, as it defines the object of reading as “a book or article” but the object of the target state, i.e. understanding, is “the words”. In other words, the act “to read” itself is not specified, and the target state of “to read” is regarded as understanding linguistic units (“words”).

These points are observed not only in dictionary definitions but also in academic discourse about reading. Descriptions in some recent handbooks of psychology-oriented reading research (Snowling and Hulme, 2005; Pollatsek and Treiman, 2015) provide examples to illustrate “what constitutes the act of reading” seems to be axiomatic (see especially “Preface” of Snowling and Hulme (2005) and Pollatsek and Treiman (2015b)) in the existing approach to understand what is reading. Similarly, an overview of research themes appeared in *Reading Research Quarterly*, which cover wide topics of reading, also indicates that most studies assume that we know this thing called “to read”; most research regards linguistic units as the object of reading (Reutzel and Mohr, 2014). Similarly observed in Israel (2017), reading is assumed to be understood, or defined in a goal-oriented manner. We also note that the term “processing” is often used to break down reading in psychology, in which case “processing” is assumed to be understood (e.g. Gernsbacher and Kaschak, 2013).

As in psychology, LIS also assumes that we understand what constitutes this act called “to read”, as we briefly saw in Introduction. This can be confirmed by scanning titles of books and articles retrieved from Library, Information Science and Technology Abstracts with the keyword “reading”; most work starts from the assumption that the act of reading is understood. LIS researchers may find that regarding the object of reading as linguistic units such as “words” differs from their understanding about “to read”. From the point of view of LIS, the natural object of reading is books or articles. In the field of LIS, this is typically indicated in reading related activities and services provided by libraries, such as recommending reading materials, support of reading for pleasure, reading-together programmes, activities among reading groups, etc. We can use this contrast between reading linguistic expressions and reading books as a point of departure to delve into the issue of clarifying questions about “to read” *per se* and reading skills, which LIS researchers and practitioners also tend to regard as understood and shared.

### 3. DOCUMENTS AS THE OBJECT OF READING

We observed above that general definitions of “to read” and psychological research tend to regard the object of reading as linguistic units, while LIS regards it as documents. Both linguistic units and documents (mostly for documents) consist of language expressions (we use this term in a neutral way). In this section, we make clear the difference between linguistic units and documents. In order to do so, we take in mind the contrast between reading in language teaching/learning and linguistic setup on the one hand (sometimes we simply call this setup “linguistic” for succinctness) and in general setup on the other.

#### 3.1 Documentational vs. Linguistic

Given the issues we revealed about dictionary definition, we first need to confirm that the natural object of “to read” is documents. Suppose that you are asked what you are reading. What are natural answers among the following?

1. I am reading a newspaper article.
2. I am reading a detective novel.
3. I am reading a patent document.
4. I am reading a word.
5. I am reading a sentence.
6. I am reading a paragraph.

Answers 1 to 3, which specify subtypes of documents, are some of the standard answers you would expect, while those 4 to 6 are heavily marked and can only make a valid answer in specific situations – these are subtypes of linguistic units. This simple thought experiment shows that we naturally regard documents, not linguistic units defined in linguistics, as the object of reading. Of course, adopting the concept of reading differently from what is generally understood is perfectly possible, but the result of research based on such concepts will not be about the act of reading as normally understood. In any case, LIS regards the object of reading as documents, which is in line with our ordinary understanding of what we read. Incidentally, acts/concepts that can be put side-by-side with “reading” based on this understanding are, among others: “writing”, “translating”, “editing”, “publishing”, and “archiving”. Interestingly, “listening” and “speaking”, which are frequently juxtaposed with “reading” and “writing” in language teaching/learning, do not belong to the same group.

We can understand, at least partially, characteristics of reading by examining the nature of document. Briet (1951) cites the official definition of documents given by the Union Française des Organismes de Documentation, which states:

“Any materially fixed base of knowledge likely to be used for consultation, research or proving” (Briet, 1951, p. 7, authors’ translation),

and then gave a refined definition:

“Any concrete or symbolic indication, preserved or recorded, for the purpose of presenting, reconstructing or proving a physical or intellectual phenomenon” (Briet, 1951, p. 7, authors’ translation).

Although there are different definition of documents (see, e.g. Buckland, 1997), these definitions serve for our purpose of discussion here as they fit to our common understanding of documents. Three essential features of documents are identified in these definitions. First, documents are a unique existence in history. Second, they are concrete (the term “symbolic” in the second definition is also regarded as concrete, as it is “preserved or recorded”). Third, they contain knowledge (in a rather loose sense). All these



features should be regarded as a matter of course in LIS. Libraries record documents with unique time stamp (and location information); documents are physically or symbolically “tangible”; and they are regarded as containing what is commonly called knowledge.

### 3.2 Documents as Unique Existence

What we read, i.e. documents, are unique existence in history. When we read a document, therefore, we also regard language expressions in documents as unique existence. This contrasts with the treatment of language expressions in language teaching/learning or in linguistics. Dummett (1993) shows this contrast clearly by using the following example (this example is originally from G. E. Moore (1964) *Commonplace Book 1919-1953*. Ed. by C. Lewy.):

“That thing is in the way”.

In a highschool language class, the goal of “understanding” this sentence is to take its meaning, i.e. <something over there is obstructing something>. Here “it would be senseless to ask, “[w]hat thing?”, or “[i]n the way of what?” (Dummett, 1993, p. 55). In other words, “[w]hen the sentence is considered merely as a type, there is no ‘thing in question’” (Dummett, 1993, p. 55). On the other hand, to understand “a particular” – or a unique – “utterance of the sentence – of a serious utterance of it”, we need to specify what is exactly referred to by “that thing” and “in the way” of what. The referents can be unique physical happenings, ideas or concepts generalised from the reality, or imaginary world created by documents.

It is convenient here to distinguish two meanings of “understanding”, as “understanding” is used in the goal-oriented definition of “reading”. First is “that in which someone is said to understand a word, phrase or sentence, considered as a type”, and second is “that in which he [sic] may be said to understand a particular utterance” (Dummett, 1993, p. 56). The relationship between understanding a given sentence as a type and understanding it as a unique utterance is important, namely, “to understand a particular utterance in this sense, it is necessary to understand the type sentence uttered” (Dummett, 1993, pp. 55–56). So linguistic understanding of a sentence as a type is a prerequisite – or a necessary but not sufficient condition – for understanding of what a unique utterance means in a document. Interestingly, a modern framework for translator education adopts the same framework. EMT (2022) explicitly states that “a high level of language competence in at least two working languages (CEFR level C1 and above or an equivalent level in comparable reference systems) should be a prerequisite for access to any EMT master’s degree course in translation” (EMT, 2022, p. 6). Note that the object of “translating” is also documents, although the dictionary definitions we saw above were at best ambiguous in this respect.

Information literacy discussed in LIS is concerned with this second meaning of understanding (e.g. Lim, 2020; Paor and Heravi, 2020). Correspondingly, reading addressed in LIS is concerned with reading documents rather than reading linguistic expressions as addressed in language teaching/learning. Unfortunately, it is sometimes pointed out that, in practice, LIS may not be necessarily fulfilling its self-proclaimed mission (Kageura, 2021).

### 3.3 Documents as Concrete Existence

We started the discussion from limiting the range of reading as reading language expressions. Linguistics arranges language expressions into hierarchical categories of morphemes, words, phrases, clauses or sentences (Lyons, 1981). Sometimes the units are extended to paragraphs and texts, and abstracted to discourse. The range of linguistics has been further extended to cover pragmatic and sociological aspects (Senft, 2014). In any case, linguistics essentially deals language expressions as types.

A document consists of totally different components (Miyata and Miyauchi, 2022). While language expressions are its main components, a document has meta-elements such as authors, year and place of publication, or publisher. It may contain non-language elements such as graphs and images. Language expressions in a document are divided into such units as table of contents, abstracts, chapter or section titles,

enumerations, itemisations, footnotes, indexes, references, etc. These units are totally different from the units adopted in linguistics, although parts that consist of language expressions in a document can also be divided into linguistic units.

When we read a document, we do not only “read” language expressions. Different documentational parts play different roles in portraying the content. Language expressions appearing in different documentational parts are read differently. Table of contents, for instance, shows a macroscopic organisation of arguments contained in the document. Chapter and section titles function as keys that indicate topics, and entries in the index show key terms that represent concepts used in the document. Also, meta-information often plays a crucial role for readers to understand the document as a unique utterance. For instance, the term “the crime of aggression” in a document published in 1995 has a status totally different from “the crime of aggression” in a document published in 2020, because the amendment was made on the Rome Statute of the International Criminal Court at Kampala on 11 June 2010 (UN, 2010). These together provide clues to understanding language expressions in documents as a unique utterances produced in history.

### **3.4 Documents as Units that Represent Knowledge**

We can also shed light on the difference between regarding language expressions as linguistic units and regarding them as documentational units from the point of view of knowledge.

As for the expressions the linguistic units of which are words or phrases, the difference is most typically depicted as the contrast between words and terms. On the one hand, linguists deal with the meaning of words. For instance, the meaning of “dog” or “high” is addressed in lexical semantics (Cruse, 1986). On the other hand, linguists do not deal with the concept that the term “crimes against humanity” represents. Linguists safely leave this issue to specialists in international criminal or humanitarian law. Interestingly, however, when ordinary citizens use the expression “crimes against humanity”, they are indeed addressing the legal concept represented by this term and not the linguistic meaning of this expression. Although the misuses of technical terms are abundant in mass media including so-called quality papers, the very fact that we can sensibly point out these misuses indicates that we regard these expressions as technical terms that represent due concepts rather than linguistic phrases that merely express loose linguistic meanings. This corresponds to the two levels of “understanding” we discussed in 3.2.

As for the expressions the linguistic units of which are sentences or larger, we already distinguished two readings, i.e. reading by regarding them as a type and reading by regarding them as a unique occurrence. Roughly speaking, discussions of meaning of an expression type can be further divided into two. The first is related to the orthodox linguistic semantics, in which consistency among meanings represented by constituent units of the expression type is examined. The second is related to the truth-theoretic semantics mostly addressed in the philosophy of language, which are concerned with conditions upon which the expressions become true (e.g. Davidson, 1984). Reading a document goes one step further than the truth-theoretic semantics. Rather than being concerned with the conditions upon which a given expression becomes true, reading a language expression in a document involves the judgement about whether a given expression is true or not in a particular situation that the document talks about.

Language expressions in a document thus represent statements about facts or about laws that are to be judged either as true or false, together with inferences that can be judged either as valid or invalid (Benjamin, 1936; Carnap, 1966). We can loosely call them knowledge. This also holds for fictions, in which facts and laws are bound by the world they define, and the validity of language expressions are judged based on the world they describe.

## **4. READING AND READING SKILLS IN PSYCHOLOGICAL RESEARCH**

After clarifying the state of object of reading from our LIS perspective, here we review recent works in psychology that address university-level reading and that involve empirical experiments to address the

theoretical and practical issues of the existing approach to “reading”. We try to answer two questions. Firstly, we examine whether the psychological work of reading is sufficient in addressing the reading of documents or not. Secondly, we examine whether the psychological work clarifies “what is reading” or not to support our overarching claim. Logically, the answer to this question should be negative, because, in experimental psychology, the question of how people read is transformed to the question of how individuals read, and the concept of “to read” needs to be given in order to observe how individuals carry out the act that is identified as reading. Husserl (1911) stated that experimental psychology presupposes the analysis of consciousness, which can never become the target of experiments. We can replace “consciousness” with “reading” and the statement still logically holds.

#### **4.1 Pre-university “reading problems” vs University reading problems**

Psychology gains its prominence in reading research when it provides efficient and quantifiable measures to assess reading since the 1950s (see also Pearson and Cervetti, 2017). At the time the behaviorists’ emphasis was on studying the observable behavior of reading that is an activity to identify “print” (Fox and Alexander, 2010) and “visual signals... sounds into words, phrases, and sentences” (Pearson and Stephens, 1994). Later in the 1960s–1970s when psychologists become curious about human mental structure, reading is viewed as an inherent ability that applies one’s cognitive and linguistic competence (Alexander and Fox, 2004; Pearson and Cervetti, 2017). We hence see that “reading-as-a-mental-activity” is the general setting for psychological reading research. This characterizes how psychological reading research tend to regard the object of reading as linguistic units. However, it is not clear if psychology concerns about “documents” – the natural units that we read, the unique utterances.

This fact that document should not be confused with linguistic units is indeed the reason why we choose to focus on reading research undertaken at the university level, because reading before this level is usually concerned with linguistic issue. For example, when Kirkpatrick (2015) mentions K-12 “struggling readers” in the U.S. (Kirkpatrick, 2015, p. 3), he quotes Vellutino et al. (1996) where the first graders “did poorly on...basic phonological awareness” (Kirkpatrick, 2015, p. 12) When he argues for the necessity to develop intervening methods for tackling reading difficulty, he reviews the Simple View of Reading model (Gough and Tunmer, 1986) that depicts word-reading and linguistic comprehension as the two essential component skills that we need for “to read”. We also see that in National Reading Panel (NRP) Report (2000), while regarding learning to read as an important childhood task, identifies “phonemic awareness, phonics, fluency, vocabulary, and comprehension” as the “five pillars” of how reading needs to be instructed (Fox and Alenxander, 2010, p. 11).

For university students, the case is different. When we claim that students are having reading problems, we no longer feel convinced to blame “linguistic ability” solely for students’ poor academic achievements as we did in the primary or secondary education level. Manarin et al. (2015) explicitly questions and states:

“Can students read? On one level the answer must be...they wouldn’t be in university if they couldn’t...reading instruction...happens when children are young... sets the stage for the decoding processes of early literacy...” (Manarin et al., 2015, p. 29).

The focus of reading here is no longer the word-reading “decoding skills”, student’s behavior of reading is interpreted as a part of “learning” ability (for example, conceptualized to be learning related skills in Weideman, 2003; Bharuthram, 2012; Mehta and Al-Mahrooqi, 2014). But if word-reading ceases to be the focus, what else is? At this level, does psychology regard the object of reading as “document”? These are questions relative to our LIS approach to reading and that we have to explore.

#### **4.2 What is being read?**

We therefore check “what is read” by university students, as depicted in the empirical studies. Generally, we see two ways of practice for the examination of university students’ reading: researchers either measure the outcome of reading, or inspect the participants’ “perceptions” towards their reading.

In the case where reading is “assessed” or “tested” (e.g. Nel et al. (2004)), when the researchers are interested in determining the scope of university students’ reading problem, they identified the components of current reading assessment. They include vocabulary, fluency and eye-movement analysis, and reading comprehension. They stated: “for comprehension to occur, words must be decoded and associated with their ... phrases and sentences must be processed fluently...” (Nel et al., 2004, p. 97). They then employed devices such as the Visagraph II eye-movement recording system and TOEFL Vocabulary and Reading Comprehension (ETS, 1989) section to measure the component reading skills of university students. What is read here is the test material, what is examined is indeed the vocabulary, fluency and reading comprehension – these are the component skills for “processing” the print. Understanding of a unique utterance is not mentioned. Moreover, “text” is another phrase that is frequently identified to be what experiment participants have read. In Pretorius (2002), while literacy test is administered to assess reading, the author specifies that the material “texts” are taken from “textbooks used in undergraduate Psychology courses”. Though a textbook can be a concrete existence, the study does not recognise the difference between “text” and “textbook” as different objects on the document level. A similar case is in Bohlmann and Pretorius (2002) use paragraphs from the book to represent “authentic mathematics textbooks”; students are required to do “reading” by identifying the “anaphoric references”, “text semantic relations” and sequencing.

In the case where the readers’ perception towards reading is observed, what is read by students becomes more ambiguous, because “how students read” is not directly and objectively identifiable. Reading experiences are usually merged as a part of “prescribed tasks”. In Saumell et al. (1999), students are instructed to use reading strategies for “formulating main ideas, identifying details... recognizing author’s tone, evaluating bias, and developing vocabulary” (Saumell et al., 1999, p. 126). Here we do not have any insights to the object that students are reading, when they “make inferences”, “recognize author’s tone”, etc. Similarly in Andrianatos (2019), the researcher claims that the university students are having problems, i.e. “the barriers” to reading. The researcher interviewed the university lecturers’ perception of students’ “reading comprehension”. While the lecturers comment that students are “not engaged in prescribed text”, what students need to do is to “read the textbook”, “go through the content”. The researcher does not take a step forward to ask what is the “prescribed text”, the “textbook” and the “content”. The object of reading is neglected, we assume we know what we are reading, and we do not question whether as a result of “reading comprehension” we are understanding knowledge.

#### **4.3 Is “reading” clarified in psychological reading research?**

In order to address the internal, mental process of reading, researchers have to identify what they observed is signaling reading. This is specifically why we contend that psychological research is addressing the object of “reading” in a goal-oriented way. We look at what is accounted as “reading” in the empirical studies. Generally, three patterns are identified and are briefly summarized in the following.

##### **(1) Reading is understanding the meaning**

Some researchers regard reading comprehension as a process to extract meaning, and this is expected to be the evidence of “having reading skills”. Pretorius (2002) notes that whether students can “effectively access information from print-based learning materials and construct a mental representation” is the reading skill she aims to assess, and how students can “go beyond the sum of the sentences... linking information across textual units” (Pretorius, 2002, p. 176) is referred to as the “inferencing” skill that represents “reading comprehension”. Taraban (2000) indicates that comprehending the text is not only “able to identify main idea, but also to extend and elaborate the meaning of a text” (Taraban, 2000, p. 284).

##### **(2) Reading is being able to use reading skill or strategy**

In Pretorius (2005), “reading strategies” are thought to be able to enhance “reading comprehension”. The study expect to “anaphoric resolution; previewing strategies; awareness of the elements of the text”

(Pretorius, 2005, p. 792). In Perry (2013), the “comprehension strategies” are, for example, “literal translation”, “paraphrasing and summarizing”, “re-reading, reading more slowly or with greater attention” (Perry, 2013, p. 80). The use of these strategies are thought to be signaling “to read”.

(3) Reading is being able to perform a reading task

The third case is observed when reading is assessed in academic tests. In Dreyer and Nel (2013), scores of TOEFL reading test are expected to show the students’ level of “relating information, generalising, noting similarities, differences and contradictions, paraphrasing...” (Dreyer and Nel, 2013, p. 356). Nel (2004) is likewise a case where reading is represented by sitting for reading comprehension tests. Mehta and Al-Mahrooqi (2014) think that students are doing “critical reading” when they can identify forms of writing, or are able to write about their “understanding of the author’s intention”, “choice of language”, “nature of publication”, etc.

Back to our question, why do we say that “reading” is not clarified in these psychological reading research? One opposition to our claim could be that the researchers have well developed the objects that they want to observe, and they do examine how the participants are reading; “reading” is clearly defined, otherwise they will not be able to observe “reading” because it is an individual psychological activity. However, this is exactly where psychology fails to clarify the object of reading. For example, as we have briefly mentioned in the introduction, when reading/reading skill is “linking sentences”, “identifying the main idea” or “elaborating”, what concrete acts are taken “to read”, what to do to be able to “link” or “identify”? Thus, we argue that psychological approach is goal-oriented, and is unable to address reading as an externalized, universal skill that can be acquired.

## **5. FROM THE QUESTIONS OF READING TO QUESTIONS ABOUT READING SKILLS**

In this section, we consolidate questions about reading skills and methodological issues in addressing them, referring to the discussions made so far.

### **5.1 Theoretical Questions about Reading Skills**

We saw that reading research in psychology is mostly concerned with reading linguistic expressions and not with reading documents. From LIS point of view, therefore, psychology addresses the prerequisites for reading, but not clarifying reading itself. Behind the façade of language expressions lie documents, the reading of which we need to address. Examinations of the nature of documents in Section 3 showed, among others, the following points about reading documents:

- (1) a document as the object of reading consists of unique utterances that makes sense within its unique position in history, and the goal of reading language expressions in a document is to understand what they represent/refer to;
- (2) a document consists of such documentational parts as table of contents, main body, chapter or section titles, footnotes, index, etc. and essential meta-information that provides the document a unique status in history;
- (3) a document represents what is loosely understood as knowledge.

As mentioned previously, we see that beyond the study of reading linguistic units, we have a temptation to shift the focus from reading to acquiring knowledge such in understanding school subjects. Here, however, recent work in science education has shown that a critical issue of reading may be involved in difficulties in learning school subjects (Arai, 2018). This is logically understandable because being able to read documents (textbooks) is a prerequisite for learners to gain new knowledge, which they do not know before reading (though the access to knowledge is not limited to reading, understanding lectures has the same logical structure).

It is thus important to consolidate, in between reading linguistic units and gaining knowledge, the area of reading documents. Here, we need to regard linguistic expressions as unique utterances which constitute a document and components of document should be taken into account. Because reading documents is qualitatively different from reading linguistic units, we can expect that skills of reading in this sense are independent of nativeness. This is related to our daily observations at universities that native speakers do not necessarily read and understand better subject materials in university classrooms.

We also observed above that reading skills are rather internal in psychological research. Skills are only identified by the goal-oriented manner when we already know types of skills. This is efficient in understanding the mental process, however, as we mentioned, we saw that we do not grasp the full range of reading skills involved in reading linguistic units, much less in the case to read documents. To avoid getting into a trap of observing individual process while implicitly assuming that the reading skills involved are known to us, the education's target of making reading "teachable" provides inspiration. We need to explicitly target the skill set for reading, e.g. to externalize and describe the concrete acts of reading documents that we can share, is a natural way to pursue. The question about reading skills can then be articulated as follows: what is the skill set for reading documents?

This question is based on the following understanding, i.e. that some people can read documents does not mean they know what skills they are using and that there is no guarantee as of now that the skills they can identify explicitly exhaustively cover the overall skill set.

## **5.2 Methodological Issues about Clarifying Reading Skills**

Given the status of our knowledge about reading documents, it is essential to start from describing what is involved in reading documents, not as a psychological process but as a set of concrete acts. At the same time, we need to avoid going back to the behaviourist approach. Addressing the following two issues is essential.

Firstly, establishing scales or measures to describe elements involved in the act of reading is necessary. These scales or measures are inevitably qualitative, so the task amounts to developing and refining languages to talk about the act of reading. This amounts to developing a metalanguage, following the expression adopted in Kageura et al. (2022), to dissect and describe the act of reading. To describe the act of reading, we need to be able to refer to different types of source document elements at different layers (cf. Miyata and Miyauchi, 2022), concrete acts involved in "reading" each document element (e.g. "when you find a word you do not know, first guess the meaning and then look up dictionaries"), resultant status of the acts, and success and failure of acts in reading, among others. We can take terminologies used in existing research as a point of departure, as it partially refers to some of these. We can also refer to subject-specific work that is devoted to reading (e.g. Takeyama, 2022).

Secondly, designing experiments that contribute to revealing the act of reading is essential. Different from what we saw in section 4, the experiments here should first target "reading document", and should contribute to descriptive exploration of the types of acts involved in reading can be clarified, to which skills are to be attributed. Unlike reading a sentence or other linguistic expressions in a language classroom, reading a document is not a one off task but part of a cumulative act. In order to read a particular document, for instance, you are supposed to have read some other documents. Indeed, the task of relevant experiments is not to observe whether some known skills are deployed (as in Section 4.3) or not, but to observe and describe the concrete acts involved in reading. Note that the acts to be revealed are different from the acts that can be captured by eye-tracking. Eye-tracking itself only reveals the individual process involved in reading and does not reveal the skill set for reading.

## **6. CONCLUSIONS**

In this paper, we examined the act "to read" from the point of view of LIS. We first made clarified that the object of reading has an aspect of being "documents", briefly examined the status of documents in

contrast with linguistic expressions. We looked at recent work on reading in the field of psychology that targets university-level reading, and observed that research in psychology mostly deals with reading linguistic expressions, understand reading in a goal-oriented manner and deals with individual processes of reading. Based on these observations, we defined the research question and directions that should be pursued in the field of LIS to fully clarify necessary reading skills, which is essential as long as LIS is concerned with information literacy. Finally, we showed two necessary directions to go to reveal the act of reading and the skills of reading involved in it. We are currently working on designing a feasible experiment that enables us to clarify concrete acts, together with their goals, involved in reading documents, and the skills necessary to carry out these acts and to fulfill the goals.

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# Session 5: Leadership Development and Strategic Management in Libraries

ALIEP 5-1 Service Failures in Public Libraries: Exploring Online Negative Word of Mouth in Google Map Reviews of the Taoyuan Public Library

(Chen Su-may Sheih and Hsin-Tzu Hu)

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(Saowapha Limwichitr)

# **Service Failures in Public Libraries**

## **Exploring Online Negative Word of Mouth in Google Map Reviews of the Taoyuan Public Library**

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### **ABSTRACT**

*Background.* Libraries are service-oriented institutions that cannot entirely avoid failures in the process of delivering services. Service failures often lead to reader complaints, which manifest through negative online word of mouth, or electronic word of mouth (e-WOM), among other forms. Therefore, libraries consider the analysis of negative e-WOM related to service failures an essential means of self-assessment.

*Objectives.* This study aims to deduce the types of service failures frequently cited in public libraries from negative e-WOM. It also seeks to explore service failure attributions and further examine variations in reader satisfaction concerning different types of service failures and attributions.

*Methods.* This study adopts a rational-reader perspective and takes the Google Maps reviews of the Taoyuan Public Library as its research sample. It performs content analysis to examine 1,199 incidents of service failures from 2,709 negative e-WOM comments about the library.

*Results.* This study classifies the service failures at the Taoyuan Public Library into four major groups with 16 categories: “service delivery system failures,” “reader needs response failures,” “employee personal behavior failures,” and “problem patrons.” Service failure attributions were also categorized into three: “library,” “readers,” and “third-party.” Results revealed that the most frequent type of service failure was “service delivery system failures,” and the most common attribution for service failures was “library.” Moreover, reader satisfaction level was significantly lower for incidents under “problem patrons” compared to other types of service failures.

*Contributions.* This study found that most of the service failures in the library were still attributed to the library itself, with core service failures occurring most frequently. Among these service failures, those caused by poor interpersonal communication were the most dissatisfying for readers.

## INTRODUCTION

Since the nineteenth century, the library profession has been classified as a career primarily oriented toward providing services (Rubin, 2000). Many studies have applied customer-oriented market theories, techniques, and management models for evaluating and exploring libraries (Cronin, 1984; Doherty et al., 1995; Gómez, 2001; White, 1997). Besides using indicators to assess service quality, Su (2012) suggested that libraries can use reader complaints as an evaluation measure. Understanding the content and aspects of reader complaints can provide libraries with directions for improving service deficiencies. However, Robinson (1984) argued that addressing reader complaints involves criticism of the library, making it a less favorable topic of research. Su (2012) also highlighted the limited exploration in the library and information science field with regard to research or monographs on service failures and user complaints.

Studies on user complaints have found that the recent emergence of the Internet-based society has led to an increase in people's reliance on online information for various decisions. Social media platforms have also become a channel for individuals to express their opinions and provide feedback on services and products. This phenomenon of sharing positive or negative comments about products or companies through online social platforms is known as electronic word of mouth (e-WOM) (Kiecker & Cowles, 2002; Hennig-Thurau et al., 2004). Consumers' expression of negative sentiments about a company or product on online platforms is referred to as negative e-WOM (Bougie et al., 2003). Recently, scholars have also used e-WOM, particularly those posted on Google Maps, when conducting library-related research (Asari et al., 2022; Borrego & Comalat Navarra, 2021).

This study aims to investigate negative e-WOM on public libraries focusing on reviews of the Taoyuan Public Library on Google Maps. It seeks to understand the types of service failures that library users frequently cite on online public platforms. Furthermore, this research explores the attributions behind these failures and examines how different types of service failures and attributions affect reader satisfaction.

Ultimately, this study will synthesize its findings and offer suggestions for public libraries to use as references for minimizing service failures.

## **LITERATURE REVIEW**

### **Service Failure**

Research has shown that when customers perceive that a service experience provided by a service provider is below their initial expectations or when they are subjected to unsatisfactory service, they experience a “service failure” (Fisk et al., 1993; Goodwin & Ross, 1992; Kelley et al., 1993; Zeithaml et al., 1990). Bitner, Booms, and Tetreault's (1990) investigation of service failure from the customer's perspective categorized it into three major types: (1) employee response to service delivery system failures, (2) employee response to customer needs and requests, and (3) unprompted and unsolicited employee actions. Related studies have also adopted this classification framework to analyze service failure categories (Hoffman et al., 1995; Kelley et al., 1993). Later, Bitner, Booms, and Mohr (1994) further examined service failure types and their causes from an employee perspective. In addition to Bitner et al.'s (1990) service failure typology, they introduced a fourth category, “problem customer,” indicating that the improper behavior of certain customers could also cause service failures.

Only a few scholars have directly applied the concept of service failure to library service research. This study referred to Sheih's empirical study (2011), which categorized the causes of readers' negative emotions into seven types, listed from most to least frequent as follows: (1) rules and regulations/management, (2) other readers, (3) equipment, (4) environment/space planning, (5) library staff, (6) collection, and (7) information technology/software. In relation to Bitner et al. (1990; 1994), categories 1, 3, 4, 6, and 7 can correspond with “employee response to service delivery system failures,” category 2 can be associated with “employee response to customer needs and requests,” and category 5 can be related to “unprompted and unsolicited employee actions.”

Furthermore, readers who violate library rules, laws, and social norms or engage in behavior that disrupts library operations are classified as “problem patrons” (Blessinger, 2002; Shuman, 1984; Sheih, 2016). Service failures attributed to problem patrons can be categorized according to Bitner et al.'s (1994) “problem customer.” Conversely, readers' expression of dissatisfaction with problems due to other problem patrons can fall under “employee response to customer needs and requests” in Bitner's framework (1990). Incorporating the above literature, this study adopts Bitner et al.'s (1990; 1994) service failure typology framework and cites the relevant concepts presented by Sheih (2011; 2016) as the basis for further exploration of the library service failure framework.

## Service Failure Attributions

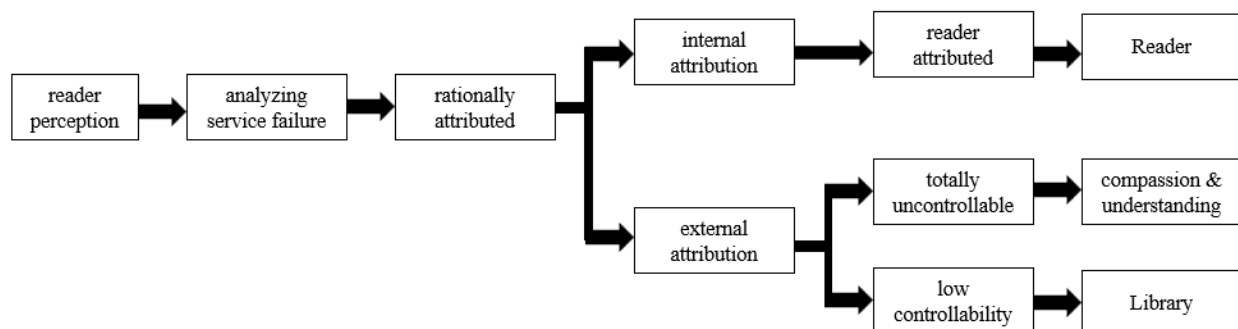
A review of relevant studies on service failure in the general service industry (Armistead et al., 1995; Johnston, 1994; Su, 2012) generally categorizes service failure attributions as “organizational failures,” “problem customers,” and “other institutions.” In library and information science studies, Su (2012) classified the causes of service failures as “librarian service failures,” “reader-related factors,” and “factors from external institutions.” External institution–related factors include mistakes or errors caused by other libraries, book vendors, database providers, and similar organizations.

Different biases can emerge in the process of behavior attribution and interpretation (Schneider & Bowen, 1984). The “self-serving bias” explains that when individuals interpret their own or others' behaviors, they tend to attribute success to internal factors and failure to external factors (Miller & Ross, 1975; Ross, 1977). Zhang (2007) proposed a three-dimensional attribution model for library service failures based on Kelley's (1967) three-dimensional attribution model. Zhang defined three models for service failure attributions from the “general reader,” “library,” and “rational-reader” perspectives. The “general reader” perspective states that, because of the influence of attribution biases, service failures are typically ascribed to the library. In the “library” attribution model, the library tends to attribute failures to internal factors within its management. Lastly, the rational-reader perspective assumes that readers can self-reflect and make internal attributions, showing empathy and understanding for situations beyond the library's control (i.e., attributing some failures to third-party factors) rather than solely blaming the library.

As the researchers are neither readers nor library representatives themselves and to reduce attribution biases, the subsequent analysis in this study will adopt the rational-reader perspective.

**Figure 1**

*Rational-Reader Attribution Model*



*Note.* Cited from Zhang, Wen-Hui. (2007). Attribution model and remedial strategies of library service mistakes. *Journal of Modern Information*, 3, 149.

## Negative e-WOM

Hennig-Thurau et al. (2004) defined “electronic WOM” as any positive or negative statement about a product or company posted by potential, actual, or previous customers on online channels. Amblee and Tung (2008) stated that online word of mouth commonly takes the form of online reviews and ratings. Reviews are textual assessments of products, not limited to a specific format, while ratings involve the assignment of numerical scores to rate products. According to Davis and Khazanchi (2008), ratings or stars that consumers provide for products or services through online platforms can be considered manifestations of positive or negative e-WOM. Research has also demonstrated that negative e-WOM tends to have a greater impact than positive e-WOM (Park & Lee, 2009).

A review of relevant studies that apply negative e-WOM for analysis shows a primary focus on the service industry and product shopping. Within the service industry, a major area of interest has been the hospitality sector, particularly accommodation services. Additionally, studies have been conducted on products, restaurants, movies, books, and other areas. Content analysis is the most commonly used research method, and data are often gathered through manual or text mining techniques.

However, Sparks (2010) emphasized that in the limited social environment of online complaints, qualitative research can conduct a more in-depth exploration of underlying causes or implications. By employing qualitative research methods, researchers can obtain further insights into customers' complaint behaviors through online grievances (Lee & Hu, 2004). Qualitative research allows for a more nuanced understanding of the context and motivations behind negative e-WOM, helping researchers uncover valuable insights and subtleties that quantitative analysis might miss.

In the field of library and information science, Li and Ke (2020) conducted a content analysis of posts from the anonymous Facebook page “Kao-Bei Library” and found that the most common purpose of these posts was to express complaints. They suggested that libraries must focus on the content of these complaints as a reference for decision-making. Similarly, Borrego and Comalat Navarra (2021) examined reviews of 40 public libraries in Barcelona, Spain, using the Google Maps review system and indicated that the most common complaint categories were associated with noise and the lack of seating. They also observed a link between lower ratings and longer review texts.

These studies highlight the importance of analyzing negative e-WOM in the library context as it offers valuable insights into users' opinions, concerns, and preferences, which libraries can then use to improve services and address potential issues.

## METHODOLOGY

This study was informed by research focusing on negative e-WOM and performed qualitative content analysis, which emphasizes the in-depth exploration of text content. It examined the Taoyuan Public Library as a case study and selected comments posted on Google Maps, which are publicly accessible and free of charge, as its research sample.

Data collected from Google Maps reviews included a total of 34 branches under the Taoyuan Public Library as of July 31, 2022 (excluding reading rooms and branches with no reviews). They were manually transcribed into an Excel file, resulting in a total of 5,199 records, which included reviews with comments and those with ratings only. Because of this study's focus on content analysis, it only selected data with textual reviews, generating 2,709 records. Subsequently, the researchers carefully classified each review based on its context and identified a total of 878 records as negative e-WOM, leading to the analysis of 1,199 service failure cases.

This study constructed a fundamental framework through a literature review, developed and formulated its own category structure, and established a classification framework composed of three dimensions: (1) service failure types, (2) service failure attributions, and (3) reader satisfaction. Based on this framework, the researchers drafted coding guidelines and created coding sheets. They randomly selected 20 data samples and assigned two coders with relevant expertise to conduct a pretest on the coding framework.

After the pretest, both coders agreed on the classification framework with no issues and confirmed the operational definitions of the categories as presented in Tables 1–3. Service failure types were divided into four major groups—“service delivery system failures,” “reader needs response failures,” “employee personal behavior failures,” and “problem patrons”—totaling 16 categories. Service failure attributions were categorized into three: “library,” “reader,” and “third-party.” Reader satisfaction was classified into five levels from “very satisfied” to “very dissatisfied.”

Lastly, the two coders performed a reliability test based on the established operational definitions. Each item achieved reliability scores of above 0.90, confirming a certain level of reliability among the categories set up in this study. As a result, the researchers proceeded with the formal coding process.



**Table 1***Operational Definitions of Service Failure Types*

Group	Definition	Category	Definition
<b>Service delivery system failures</b>	Readers' dissatisfaction arises from experiencing insufficient, erroneous, or slow services, making them perceive that they have not been provided the expected service.	<b>Rules and regulations failures</b>	This refers to service failures related to library rules and regulations, including reading rules, interlibrary cooperation guidelines, and opening hours.
		<b>Management failures</b>	This refers to service failures associated with library operational management, which result in readers not receiving the expected services. It includes administrative management tasks such as announcements, cataloging, cleanliness, and staff.
		<b>Collection failures</b>	This refers to negative experiences due to inadequate or outdated library collection resources, leading to reader dissatisfaction. Collection resources include periodicals, newspapers, books, and nonbook materials.
		<b>Information technology/software failures</b>	This refers to service failures linked to the library's information technology software, including automation systems, official websites, mobile applications, and electronic resource connections.
		<b>Equipment failures</b>	This refers to service failures associated with nonstructural hardware equipment in the library, including tables, chairs, photocopiers, computers, and wired and wireless network devices.
		<b>Environment/space failures</b>	This refers to service failures pertaining to the library's internal and external space and environment, including location selection, building exterior, space size, overall atmosphere, interior decoration, lighting, temperature, and other related aspects.

Group	Definition	Category	Definition
<b>Reader needs response failures</b>	Emphasizing that readers may feel dissatisfied during their interactions with the library services because of issues with policy procedures or when library staff are unable to meet specific requests or individual preferences, resulting in feelings of discomfort and unhappiness.	<b>Failure to respond to readers' special needs</b>	This refers to service failures related to special readers such as people with disabilities, senior citizens, pregnant women, foreigners, and others who may face certain barriers or challenges in using the library because of their physical or mental conditions. The library fails to provide services that meet the needs of these special readers.
		<b>Failure to respond to reader preferences</b>	This refers to service failures where readers feel dissatisfied with the services provided by the library because of their personal preferences even though the services are within the existing service system and guidelines.
		<b>Inappropriate response to reader errors</b>	This refers to service failures in which readers unintentionally violate library rules or encounter unexpected situations, but the library fails to resolve these issues. Moreover, the library may lack flexibility and empathy, and staff members might even ridicule readers, causing embarrassment and dissatisfaction.
		<b>Inappropriate management of other problem patrons</b>	This refers to situations where problem patrons disrupt other library users' experiences, causing reader dissatisfaction. The library fails to proactively manage or respond to such situations.
<b>Employee personal behavior failures</b>	This refers to the lack of individual professional knowledge, hygiene habits, service attitude, service skills, and dedication among library personnel (including librarians, volunteers, security personnel, and cleaning staff), which affects customers' overall perception of the service and leads to feelings of discomfort and dissatisfaction.	<b>Poor service attitude</b>	This refers to issues related to interactions between library staff and readers, including poor attitude, uncomfortable tone of speech, excessive indifference, and other related problems that make readers feel uncomfortable.
		<b>Lack of job skills and knowledge</b>	This refers to situations where library staff lack the necessary expertise and knowledge within the scope of library operations to help resolve reader issues. As a result, they are unable to effectively address the problems raised by readers.

Group	Definition	Category	Definition
		<b>Poor manners</b>	This refers to instances where library staff display unprofessional behavior, engage in tasks outside their job responsibilities, or violate library regulations, leading to readers' negative perception of the library. Staff are unable to set a good example for others because of their actions and behavior.
		<b>Other inappropriate employee behaviors</b>	This refers to situations where library staff exhibit abnormal behavior or violate social and cultural norms, such as discrimination against women or young readers. It also includes instances where readers feel dissatisfied with their interaction with the staff for reasons other than professional knowledge, service attitude, and appearance.
<b>Problem patrons</b>	This refers to instances where readers exhibit problem behavior but express dissatisfaction with the librarian's handling method to such behavior.	<b>Interference with others</b>	This refers to cases where readers engage in disruptive behaviors that interfere with others in the library. Despite being advised or warned, they complain about the library's services.
		<b>Other inappropriate reader behaviors</b>	This refers to cases where readers engage in behaviors that violate library rules, disrupt normal library operations, misuse library resources and equipment, violate laws, or exhibit abnormal psychological or socially deviant behavior. Despite receiving guidance or counseling, they express dissatisfaction with the library's services.

**Table 2**

*Operational Definitions of Service Failure Attributions*

Attributions	Definition
Library	Refers to the people, events, and things within the scope of library management that may lead to reader dissatisfaction with various aspects of services.
Reader	Refers to service failures caused by the readers themselves, where the library advises or handles the situation reasonably and the readers' statements do not show obvious excessive behavior, yet they still complain. For example, being advised by library staff not to eat or drink inside the library leads to the reader's dissatisfaction; however, if the library's advising attitude is perceived as poor or handled improperly, the responsibility for the dissatisfaction still falls on the library.
Third-party	Refers to service failures caused by neither the library nor the readers but by a third-party outside the library.

**Table 3***Operational Definitions of Reader Satisfaction*

Satisfaction Level	Quantitative Scale	Definition
Very Satisfied	5	Google Map rating of 5
Satisfied	4	Google Map rating of 4
Average	3	Google Map rating of 3
Dissatisfied	2	Google Map rating of 2
Very Dissatisfied	1	Google Map rating of 1

**FINDINGS****Analysis of Service Failure Types**

Table 4 presents the classification results for service failure types. Within the main groups, the occurrence frequency from highest to lowest was as follows: group 1 (service delivery system failures) with 753 cases (62.80%), group 2 (reader needs response failures) with 265 cases (22.10%), group 3 (employee personal behavior failures) with 174 cases (14.51%), and group 4 (problem patrons) with seven cases (0.58%).

The analysis of the main groups highlights group 1 (service delivery system failures) as the most frequently occurring type, suggesting that readers are primarily concerned with whether their expectations are met by core library services (such as space environment, hardware equipment, operational management, or collection resources).

In addition, the five most frequent service failure events were “2-4 Inappropriate handling of other problem patrons” with 223 cases (18.60%), “1-6 Environment/space failures” with 215 (17.93%), “1-5 Equipment failures” with 212 (17.68%), “1-2 Management failures” with 172 (14.35%), and “1-3 Collection failures” with 133 (11.09%).

Four of the top five categories belonged to group 1, which is consistent with the analysis of main groups, indicating that service failures are more likely to occur when core services do not meet readers' expectations. However, in the analysis of categories, the most frequently occurring classification was “2-4 Inappropriate handling of other problem patrons,” which belonged to group 2. This reveals that the library's improper treatment of problem patrons can also lead to service failures.

**Table 4***Occurrence Frequency of Service Failure Types*

<b>Group and Category</b>	<b>No.</b>	<b>%</b>	<b>Rank Order</b>
<b>Group 1. Service delivery system failures</b>			
1-1 Rules and regulations failures	14	1.17%	10
1-2 Management failures	172	14.35%	4
1-3 Collection failures	133	11.09%	5
1-4 Information technology/software failures	7	0.58%	13
1-5 Equipment failures	212	17.68%	3
1-6 Environment/space failures	215	17.93%	2
<b>Subtotal, group 1</b>	<b>753</b>	<b>62.80%</b>	
<b>Group 2. Reader needs response failures</b>			
2-1 Failed to respond to readers' special needs	6	0.50%	14
2-2 Failed to respond to reader preferences	22	1.83%	8
2-3 Inappropriate response to reader errors	14	1.17%	10
2-4 Inappropriate handling of other problem patrons	223	18.60%	1
<b>Subtotal, group 2</b>	<b>265</b>	<b>22.10%</b>	
<b>Group 3. Employee personal behavior failures</b>			
3-1 Poor service attitude	112	9.34	6
3-2 Lack of job skills and knowledge	22	1.83%	8
3-3 Poor manners	26	2.17%	7
3-4 Other inappropriate employee behavior	14	1.17%	10
<b>Subtotal, group 3</b>	<b>174</b>	<b>14.51%</b>	
<b>Group 4. Problem patrons</b>			
4-1 Interference with others	5	0.42%	15
4-2 Other inappropriate behavior	2	0.17%	16
<b>Subtotal, group 4</b>	<b>7</b>	<b>0.58%</b>	
<b>Column total</b>	<b>1,199</b>	<b>100%</b>	

### Service Failure Attribution Analysis

Table 5 presents the results of the analysis of service failure attributions. The number of cases for each attribution is as follows: 1,175 for “library” (98.00%), 17 for “third-party” (1.42%), and seven for “reader” (0.58%). Attributions to “library” are overwhelmingly dominant, accounting for the vast majority of service failure events. This indicates that, despite adopting a rational-reader perspective to minimize attribution biases, this study found that the majority of service failures are still ascribed to the library. Therefore, most service failure incidents reported by readers fall within the scope of improvements that the library should review and address.

**Table 5**

#### *Service Failure Attribution Statistics*

Service Failure Attribution	Type of Service Failures				No.	%
	Group 1	Group 2	Group 3	Group 4		
<b>Library</b>	737	264	174	0	1,175	98.00%
<b>Third-party</b>	16	1	0	0	17	1.42%
<b>Reader</b>	0	0	0	7	7	0.58%
<b>Total</b>					1,199	100%

### Reader Satisfaction Analysis

Table 6 shows the results on reader satisfaction for service failure types. The average reader satisfaction scores for each group are 3.08 for group 1 (service delivery system failures), 2.68 for group 2 (reader needs response failures), 1.77 for group 3 (employee personal behavior failures), and 1.00 for group 4 (problem patrons). The results of the average difference analysis were significant (Brown–Forsythe:  $F = 81.736$ ,  $p = .000$ ; Welch:  $F = 727.511$ ,  $p = .000$ ), providing some confidence to conclude that the average reader satisfaction varies across different service failure types. Post hoc tests also revealed significant differences between all group pairs and indicated that reader satisfaction for group 4 was significantly lower than that for the other types. Moreover, reader satisfaction for group 3 was lower than that for groups 2 and 1, in that order, while group 2 had lower satisfaction than group 1.

From these findings, one can observe that the frequency of service failures is not positively correlated with reader satisfaction; that is, increased occurrences of service failures do not necessarily lead

to higher levels of reader dissatisfaction. However, different service failure types do affect reader satisfaction. Those that result in the highest level of reader dissatisfaction are problem patrons (group 4) and employee personal behavior failures (group 3), which both involve mishandling problem patrons and inappropriate interactions between staff and readers. Overall, these types of service failures are often attributed to poor interpersonal communication; simply put, service failures due to poor interpersonal communication tend to lead to lower levels of reader satisfaction.

**Table 6**

*Analysis of Differences in Reader Satisfaction for Service Failure Types*

Type	N	Mean	SD	Levene ( <i>p</i> )	Brown– Forsythe ( <i>p</i> )	Welch ( <i>p</i> )	Games– Howell
Group 1	753	3.08	1.367	13.632	81.736	727.511	(4) < (3)**
Group 2	265	2.68	1.414	(.00**)	(.00**)	(.00**)	(3) < (2)**
Group 3	174	1.77	1.104				(2) < (1)**
Group 4	7	1.00	.005				
Total	1199	2.79	1.419				

*Note.* \*\* $p < .01$ . Service failures are factors that decrease reader satisfaction; therefore, the differences in the post hoc tests are presented in descending order of “less than.”

In addition, Table 7 presents the results of reader satisfaction based on service failure attribution. The average reader satisfaction scores for each category were 2.8 for “library,” 2.41 for “third-party,” and 1.00 for “reader.” Analysis of variance results showed significant differences (Brown–Forsythe:  $F = 14.116$ ,  $p = .000$ ; Welch:  $F = 941.551$ ,  $p = .000$ ), indicating substantial variations in reader satisfaction among service failure attribution categories.

Further post hoc Games–Howell tests revealed that significant differences in reader satisfaction occurred between the “reader and library” and “reader and third-party” categories whereas no significant difference was observed between the “library and third-party” categories. This suggests that service failures ascribed to “reader” lead to lower levels of reader satisfaction, while differences in reader satisfaction between service failures attributed to “library” and “third-party” are not substantial. Indeed, all service

failures ascribed to “reader” fall under “problem patrons,” further emphasizing that if the library can effectively manage problem patrons, it should be able to enhance reader satisfaction.

**Table 7**

*Analysis of Differences in Reader Satisfaction for Service Failure Attributions*

				Brown–			
Service Failure				Levene	Forsythe	Welch	Games–
Attribution	N	Mean	SD	(p)	(p)	(p)	Howell
Library(1)	1175	2.80	1.418	11.815	14.116	941.551	(2) < (3)**
Reader (2)	7	1.00	.005	(.00**)	(.00**)	(.00**)	(2) < (1)**
Third-party (3)	17	2.41	1.326				
Total	1199	2.79	1.419				

*Note.* \*\*p < .01. Service failures are factors that reduce reader satisfaction; therefore, differences in the post hoc tests are presented in descending order of “less than.”

## CONCLUSION

Content analysis results generated four groups and 16 categories of service failures associated with negative e-WOM on Google Maps for the Taoyuan City Public Library. The classification results correspond to Bitner's (1990; 1994) service failure framework and the causes of readers' negative emotions by Sheih (2011). Additionally, this study conducted an analysis based on Sheih's (2016) definition of "problem patrons" and found that certain library service failures are attributed to the complainant's own behavior as problem patrons. This study thus deduced a category of service failure labeled "problem patrons," which corresponds to the classification of "problem customers" in Bitner's (1994) service failure framework.

Analyses of service failure types, service failure attributions, and reader satisfaction indicated that “service delivery system failures” occurred most frequently. However, the most dissatisfying service failures for readers were those attributed to “problem patrons” and “employee personal behavior failures,” which result from interpersonal communication issues. In addition, this study referenced Zhang's (2007) service failure attribution model from a rational-reader perspective to reduce attribution biases. However,



the analysis of service failure attributions reveals that most service failures are still attributed to the library. Hence, it can be inferred that the Taoyuan City Public Library should continue to review and improve most service failures.

Considering these findings, this study suggests that the Taoyuan Public Library perform a comprehensive review of deficiencies within its core services to mitigate the occurrence of service failures. This includes addressing service failures associated with the library's spatial environment, hardware equipment, operational management, collection resources, regulations, and information software. Notably, inadequacies in decisions made during both the preconstruction planning and post-opening operational phases may lead to the abovementioned service failures. Therefore, besides post-remediation efforts, referring to past instances of service failures during the library design and planning stages can serve as a significant preventive measure against their recurrence.

Furthermore, this study suggests that the Taoyuan Public Library enhance its staff's interpersonal communication skills, particularly in managing its interactions with problem patrons. This can be achieved through relevant educational training programs and the establishment of standardized operating procedures. These measures aim to minimize instances of reader dissatisfaction.

This study is based on a case study of negative e-WOM of a specific library, and the findings should not be generalized to all libraries, however according to the analytical findings pertaining to the Taoyuan Public Library, this study still offers valuable insights generally applicable to public libraries when addressing service failures and reader complaints. In this regard, this study suggests that libraries place significant emphasis on negative e-WOM, using it as one of their tools for evaluating service failures. This approach serves as a foundation for service enhancement through timely responses to comments, thus mitigating reader dissatisfaction and transforming resistance to complaints into a catalyst for improved management.

Concurrently, libraries are advised to enhance the professional competence of their staff in interpersonal communication. Establishing standardized operating procedures for problem patrons is also essential. This entails protocols for addressing problem patrons and for handling emergencies. These measures are pivotal in reducing service failures stemming from inadequate interpersonal communication and issues concerning problem patrons, which tend to evoke the highest levels of reader discontent.

Furthermore, this study suggests that libraries collaborate with pertinent entities, which includes the establishment of communication channels with institutions such as social work agencies, health-care facilities, governmental bodies, and relevant private organizations in addition to nearby police stations. This collaborative approach facilitates rapid communication and response during unforeseen circumstances.

In conclusion, the field of library and information science is expected to undertake diverse research endeavors focusing on negative e-WOM. For instance, valuable insights could be obtained from exploring distinct service failure types in various instances of negative e-WOM in different public libraries. Additionally, examining variations in service failure attributions from both library and reader perspectives presents an avenue for inquiry. Moreover, delving deeper into the impact of negative e-WOM on readers' willingness to use library services could strengthen one's understanding of the implications of negative e-WOM for libraries.

In this era of digital connectivity, libraries are anticipated to take advantage of negative e-WOM as a potent tool for operational management. Such a strategic application of negative e-WOM can help enhance library services. Consequently, this collective effort aims to cultivate a more profound understanding of the dynamics surrounding negative e-WOM, ultimately empowering libraries to effectively use it in their pursuit of operational quality improvement.

\* This article was partly adapted from Hsin-Tzu Hu's master thesis, entitled *Analyzing Service Failure and Attribution of Public Libraries by Online Negative Word-of-Mouth: The Case of Google Map Reviews of Taoyuan Public Library*. The thesis was conducted under the guidance and supervision of Dr. Chen Su-may Sheih.

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# **A Change of Pace: The Shifting Roles of Librarians as Scaffold and Support in the Acquisition of Knowledge in the New Normal**

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## **ABSTRACT**

Libraries have played a significant role in education and giving access to information and knowledge to different clientele. Many users of the library see it as a place where books and other materials are kept and made available for use. However, the new normal has forced many libraries to revisit their roles to remain relevant and responsive in addressing the needs of the clients they serve. This qualitative research is aimed at describing the changing role of librarians as scaffold and support in the acquisition of knowledge in the new normal. Data were gathered from 10 selected studies on the roles of libraries from 1975 to 2021 and were organized through Creswell and Plano-Clark's qualitative analysis framework (2018) which is simplified using the DIVE approach composed of four (4) stages: Deduction, Induction, Verification, and Emergence of themes. Data were analyzed in the light of the research objectives using thematic analysis. Findings show that librarians in today's normal evolved into their becoming collaborators, knowledge developers, content curators, trainers, and information managers. In conclusion, the concept of the library remains a steadfast service institution, continuously evolving and innovating as it adapts to the demands of the new normal. The pivotal role that librarians play in shaping the library's functions contributes significantly to its overall value. As the environment and technology transform, the methods and means of knowledge acquisition evolve in tandem, reflecting the timeless importance of libraries in facilitating learning and access to information. These themes underscore the enduring relevance of libraries in an ever-changing world. To ensure librarians remain well-prepared for their evolving roles, it is crucial to conduct a comprehensive skill and competency assessment. Emphasis should be placed on continuous capacity building, focusing on data curation, digital literacy, research support, and collaboration. Additionally, research into emerging skills for librarians in the new normal is recommended to maintain libraries' relevance and value.

Keywords: *Changing roles, librarians, change, knowledge economy, thematic analysis*

## **Introduction**

The library as a center for learning, plays a very crucial role in the acquisition, organization, preservation and sharing of knowledge. Through the information resources it houses, the library is expected to address the instructional, curricular, research and recreational needs of the users visiting it. Quadri (2014) stressed that the goal of a library is to process, acquire, organize, preserve and provide easy access to knowledge and information among its users in the most convenient way. According to Gunasekera (2010, as cited in Quadri, 2014), the future of library will be as a knowledge center that is dynamic where not only the librarian, the "books" (whether real or virtual) and the users engage in an interchange ideas. The satisfaction derived from the use of library is dependent on the quality of its resources and its personnel and their zeal in service provision.

Indeed, libraries remain relevant as service institutions by consistently offering traditional services they are well-known for. As highlighted by Abdulsalami et al. (2013), the primary mission of any library is to bridge the gap between individuals and the information they seek. To accomplish this,

librarians engage in various tasks such as acquiring primary literature, organizing and controlling it, and providing access to these materials. Additionally, librarians play a secondary role by creating catalogs and reading lists, offering up-to-date and comprehensive bibliographic services to help users identify essential information.

However, the advent of Information and Communications Technology (ICT) in libraries presents librarians with challenges that may not be entirely novel. As the roles of librarians evolve to accommodate these technological changes, they also face the challenge of upholding long-standing professional codes of ethics.

The library, with its dedicated librarians and staff, fulfills a dual role as both a scaffold and a support system. It not only aids in the acquisition of knowledge but also plays a crucial role in the creation, curation, distribution, and evaluation of content. As noted by Abdulsalami et al. (2013), libraries are an indispensable component of the educational system and development. They form an inseparable partnership, as one's completeness and effectiveness are intrinsically tied to the other.

Meanwhile, the pandemic has had a big impact on higher education students' practices regarding academic work and life—e.g., the switch to online lectures/tutorials, closed libraries, changed communication channels for teachers' and administrative support, new assessment methods, different workloads and performance levels, etc. (Aristovnik, Keržič, Ravšelj, Tomaževič, & Umek, 2020).

The pandemic has forced librarians to re-evaluate and re-calibrate their roles especially in the new and emerging normal. Academic libraries have been rethinking their strategic directions and services portfolios. Schonfeld (2018) argued that academic libraries face certain essential transformations, as they move beyond print general collections towards a variety of other roles.

Schonfeld proposed nine (9) key service areas to help academic libraries develop diverse services, based on the specific mission of the parent institution. These include the following: 1) Convene Campus Community; 2) Enable Academic Success; 3) Facilitate Information Access; 4) Foster Scholarship and Creation; 5) Include and Support Off-Campus Users; 6) Preserve and Promote Unique Collections; 7) Provide Study Space; 8) Showcase Scholarly Expertise; and 9) Transform Scholarly Publishing.

The library, as a service institution, enables its users to make the most effective use of the resources and services. It acquires materials, processes it and makes it available for use rather than preservation. It is expected to convert potential users to habitual users (Kamau, 2001).

However, in compliance with health and safety protocols and guidelines being implemented by governments, many libraries all around the world have been forced to close. Without a clear date when they will open their doors as scaffold and support to the equitable access to knowledge and information.

It is for this reason that the researcher felt the need to conduct a thorough study on the shifting roles of librarians in the acquisition of knowledge from the old to the new and emerging normal.

## **Method**

The study utilized a qualitative research design particularly Creswell and Plano-Clark's qualitative analysis framework (2018) which is simplified using the DIVE approach. In this particular study, thematic analysis was used to describe the shifting roles of librarians as scaffold and support in the acquisition of knowledge in the new and emerging normal.

For this research, the searching process is limited to journal articles obtained from electronic sources, mainly databases of scientific data. The keywords used are ‘changing roles’ and ‘emerging roles’ of librarians. These articles are the highly searchable articles and have been selected for convenience following a set of inclusion criteria as reflected from Table 1.

This research covered a review of 9 articles, as shown on Table 2, which correspond to the period from 1975 to 2020.

Only the findings, conclusions and recommendations of each article were reviewed.

Out of the 15 journal articles initially reviewed, only nine articles have been selected following a set of criteria for inclusion: a) must be written in English; b) published from 1965-2020; and c) must contain any of the following: findings and discussion, conclusion, and recommendation.

Articles	Language (English)	Findings and Discussion	Conclusion	Recommendation
DuVal (1968)	/	/	/	
Hisle 2005)	/	/	/	
Lapuz (2006)	/	/	/	/
Virgil (2013)	/	/	/	/
Obadare (2014)	/	/	/	
Quadri (2014)	/	/	/	/
James, Shamchuk & Koch (2015)	/	/	/	
Khan & Ali (2016)	/	/	/	
Ducas, Michaud-Oysttryk & Speare (2020)	/	/	/	/

**Table 1.** *Inclusion Criteria for the Reviewed Articles*

Journal Articles	Article No.	Period Covered
DuVal (1968)	1	1975-
Hisle 2005)	2	1998-2004
Lapuz (2006)	3	1988-2000
Virgil (2013)	4	1975-2012
Obadare (2014)	5	2001-2003
Quadri (2014)	6	1971-2013
James, Shamchuk & Koch (2015)	7	2006-2013
Khan & Ali (2016)	8	1976-2014
Ducas, Michaud-Oysttryk & Speare (2020)	9	2000-2018

**Table 2.** *Summary of Journal Articles, and Period Covered*

This study made use of Creswell and Plano-Clark’s qualitative analysis framework which is further simplified using the DIVE approach which is composed of four (4) stages: Deduction, Induction, Verifying groups into themes, and Emergence of themes.

In the deduction stage, as shown on Table 3, the researcher identified key points from the findings, conclusions and recommendations from the selected articles. Each of which has been assigned a particular code.

Journal Article(s)	Key Points derived from the conclusion and recommendations of the selected articles	Initial Codes
Article 1	Information professionals should be well informed on new interventions in ICT.	<i>New interventions in ICT</i>
	The profession parades an array of people from diverse backgrounds such as engineering, communication, computer, electronics and other fields.	<i>People from diverse backgrounds</i>
	The profession parades an array of people from diverse backgrounds such as engineering, communication, computer, electronics and other fields.	<i>Integration of fields</i>
	Librarians can team up with other professionals to develop new technologies.	<i>Development of new technologies</i>
	More than ever before, librarians must make themselves more relevant in this Digital Age.	<i>Librarians' relevance</i>

**Table 3.** *Deduction Stage from a Sample Article (Obadare, 2014)*

During the induction stage, as illustrated on Table 4, the codes were arranged accordingly and similar codes with related subjects are put together.

Codes	Journal Article(s)
Access to information	Articles 2, 5, 6 and 8
Adult learning and lifelong learning	
Capacity building	
Challenges	
Collaborative learning	
Communication	

**Table 4.** *Induction Stage*

In the verification stage, as reflected from Table 5, similar concepts were grouped to come up with themes.

Similar Concepts	Theme(s)
Access to information	Librarian's Traditional Roles
Information provider/disseminator	
Grounded	
Virtual access	
Traditional roles	
Inclusivity	
People from diverse background	
Service provider	
User expectation	
Library significance and librarians status and relevance	
Maintenance	

**Table 5.** *Verification Stage*



Table 6 presents the last stage, the emergence of themes, following the process.

Themes	Descriptions (as Scaffold and Support)
Librarians' Traditional Roles	Traditionally, librarians have served as a vital scaffold for information access, guiding users through extensive collections and ensuring organized retrieval. They have been unwavering support systems for research, learning, and the community, offering assistance in finding resources, enhancing research capabilities, preserving knowledge, fostering community connections, and teaching essential information literacy skills. In their time-honored roles, librarians act as both the scaffold that structures information and the support that empowers individuals in their pursuit of education, knowledge, and personal growth.
Librarians as Trainers (Past and Present)	Librarians have traditionally served as educators, guiding patrons in the effective use of resources. As a scaffold, they help individuals build their information literacy skills, offering support in navigating the ever-expanding information landscape.
Librarians as Collaborators (Present and Ongoing)	In a modern context, librarians increasingly collaborate with various stakeholders, acting as a vital support system. They partner with researchers, faculty, and community members, providing essential support to facilitate knowledge creation and sharing.
Librarians as Knowledge Creators (Contemporary)	Beyond curating existing knowledge, librarians are now actively contributing to knowledge creation. They serve as both scaffold and support, aiding in research endeavors and producing valuable content.
Librarians as Information Managers (Current and Evolving)	Librarians have evolved into expert information managers, organizing vast digital collections and ensuring easy access. They act as scaffolds by structuring information and support systems by offering efficient search and retrieval mechanisms.
Librarians as Lifelong Learners (Ongoing)	Librarians themselves are lifelong learners, staying updated with the dynamic information landscape. As a scaffold, they assist others in their learning journeys, offering guidance and resources for continuous self-improvement.

**Table 6.** *Emergence of Themes*

## Findings and Discussion

This section presents the themes emerged from the selected articles highlighting the shifting roles of librarians as scaffold and support to the acquisition of knowledge.

***Librarians' Traditional Roles.*** Libraries are service institutions. They exist primarily to serve their users. Hence, librarians are expected to keep their traditional role as providers and disseminators of information and knowledge. In doing so, user expectations are to be considered while maintaining the core services which libraries are known for or expected to deliver (Khan & Ali, 2016; Quardri, 2014; Virgil, 2013; Hisle, 2005; DuVal, 1968).

*"The profession parades an array of people from diverse backgrounds such as engineering, communication, computer, electronics and other fields."*

– Article 1 (RLA2)

*"Latest trends in librarianship brings easiness to access the information..."*

– Article 2 (RLB2)

*"Academic libraries will increasingly provide information and services at any time and to any place students and faculty may be."* – Article 9 (RLI6, RLI7, RLI8)

*"The following roles will continue to be valid: collection development role, information consultation role, instruction role, archival role, providing special collections and spaces for group study or digital media creation and viewing."* – RLI9

*"Libraries should provide balanced information resources in (print and nonprint format) relevant to the activities of its funding body."* – Article 6 (RLF8)

*"In this era of information explosion and the increasing virtual access to knowledge, libraries and librarians need to be up-to-date in meeting the information expectation of their users."* – Article 6 (RLF2)

According to Ekpo (2001, as cited in Obadare, 2014), information is highly essential for individuals, households, government, and corporate organizations. Among the basic tasks of [librarians and] information professionals are: (1) provision of information to users; (2) help users find information; and (3) facilitate dialogue among users of their services.

***Librarians as Trainers (Past and Present).*** As a training center, the library is a place where user education and training may take place. User training may be individual or group. Librarians as trainers perform similar roles such as teachers, facilitators, instructional designers, and learning assessors. As trainers, librarians need to be familiar with different learning modalities and educational approaches in the teaching of library, research, and information literacy skills; thus, making learning more engaging and lasting.

*"The Internet and the World Wide Web has transformed the way librarians will teach the bibliographic sessions, team learning, and collaborative learning. Group learning will be the major focus, and online learning will be an excellent way to merge different styles of learning (Behm, 2002)."* – Article 5 (RLE9)

*"Libraries and the universities where they are located, will have to redefine their roles, due to the demands of life-long and adult learners."* – Article 5 (RLE10)

*"The Internet and the World Wide Web have transformed the distance learning and on campus learning."* – Article 5 (RLE11)

*“They invite student and faculty socialization, learning, research, scholarship and instruction.” – Article 9 (RLI4, RLI5)*

*“Educating newcomers to the field of library science with respect to the management of scientific information.” – Article 10 (RLJ2)*

**Librarians as Collaborators (Present and Ongoing).** Collaboration has become a twenty-first-century trend. The need in society to think and work together on issues of critical concern has increased (Austin 2000a; Welch 1998) shifting the emphasis from individual efforts to group work, from independence to community (Leonard and Leonard 2001b).

The need to establish collaborative programs among libraries is crucial. Collaboration is one of the skills needed for librarians to become more effective in the new normal particularly in the acquisition and dissemination of knowledge and information. Collaboration also helps improve library image. As collaborators, librarians perform the roles such as entrepreneurs, negotiators, and partners.

Lance et al. (2010, as cited in Kammer, King, Donahay & Koeberl, 2021), stressed that collaboration between educators has long been established as a practice that can lead to improved learning outcomes, more satisfactory job experiences, and increased student engagement in the school library.

As collaborators, according to John-Steiner, Weber, and Minnis, (1998, as cited in Kammer, King, Donahay & Koeberl, 2021), not only do they plan, decide, and act jointly; they also think together, combining independent conceptual schemes to create original frameworks. Also, in a true collaboration, there is a commitment to shared resources, power, and talent: no individual's point of view dominates, authority for decisions and actions resides in the group, and work products reflect a blending of all participants' contributions.

*“To be more responsive to the changing needs and create opportunities for continued learning and skills development” – Article 8 (RLH6, RLH7)*

*“They invite student and faculty for socialization, learning, research, scholarship and instruction.” – Article 9 (RLI4, RLI5)*

*“Provides opportunities: Research promotion, marketing strategies, improve the image of library, awareness of use of e-resources, researchers' orientation, design of library web page, more demand for competent librarians, better reference service, technological job opportunities, establishing collaborative programme, backup sources.” – Article 2 (RLB3)*

*“Librarianship has no exception. Complex machines, i.e. computer, ICT, networking etc. are strengthening their hold day by day and need to operate them economically for real benefit of the librarianship.” – Article 2 (RLB5)*

As to data curation, it will prove to be useful, according to Virgil (2013), due to the necessary collaboration between university libraries and other schools within a university, or collaborations with other historical organizations, to create reports, make databases, or make other information available, and to maintain and keep all of the historical or unique information accessible electronically to all.

**Librarians as Knowledge Creators (Contemporary).** Librarians are known to be providers of information and knowledge, but knowledge creation should also be part of the librarian's core competencies. According to Witek (2014), knowledge creation should be within the context of doing

research with the goal of disseminating new knowledge through formal scholarly activities such as conference presentations and articles. Librarians as knowledge creators also perform similar roles such as researchers, content creators, writers, authors, developers, and investigators.

*“There is a great need for training for all the topics on skills development enumerated: web page creation, use of electronic resources, computer hardware, computer software, information networks i.e., Internet, library integrated systems, word processing i.e., MS Word, spreadsheets, i.e. MS Excel, presentations i.e. MS PowerPoint, database creation i.e., MS Access, basics of personal computers.”*

– Article 8 (RLH4)

*“The following roles will continue to be valid: collection development role, information consultation role, instruction role, archival role, providing special collections and spaces for group study or digital media creation and viewing.”*

– Article 9 (RLI9)

**Librarians as Information Managers (Current and Evolving).** Information professionals must be able to guide the users in the choice of media to use for their task. As trained managers of information, Obadare (2014) highlighted that librarians must handle information management professionally because it is both delicate and sensitive. Information management could make or mar any administration, hence good information managers constantly collect, filter, package, and disseminate data to the right people. Information professionals, therefore, are the pivot on which all the activities of governance rotate. Information has to be properly streamlined to avoid creating confusion. For instance, any act of misinformation on the stock exchange market could lead to immediate liquidation of several companies. Therefore, information professionals must provide accurate data to put things in the right perspectives.

*“With this in mind and with the technological improvement every day librarians working in our academic libraries need to develop and improve on their information technology skills or competencies into meeting with the growing needs of both existing and potential users.”* – Article 6 (RLF4)

*“While librarians should move with modern trends of information acquisition librarians on the other hand should develop their competencies in meeting the information explosion challenges.”* – Article 6 (RLF5)

**Librarians as Lifelong Learners (Ongoing).** Libraries are a unique resource for lifelong learning. Librarians of academic libraries facilitate access to learning opportunities, enabling a learning culture and working partnership with students and researchers by providing information. By doing this they must understand the principles of lifelong learning (Malan, 2007).

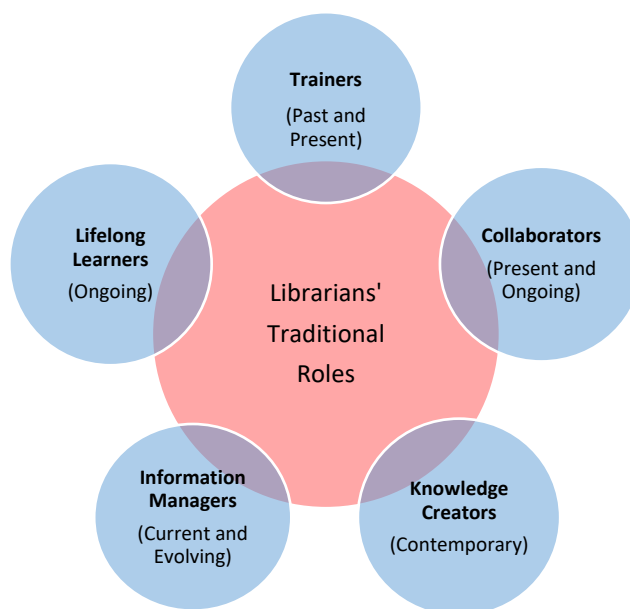
*“There are multiple ways to stay current including, but not limited to, reading research literature, networking, attending annual and mid-conference conferences, online training, webinars, and maintaining memberships in professional organizations, as a whole.”* – Article 5 (RLE6)

*“The field of education is moving to adult learners and life-long learners.”* – Article 5 (RLE8)

*“Libraries and the universities where they are located, will have to redefine their roles, due to the demands of life-long and adult learners.”* – Article 5 (RLE10)

*“A learning organization is an organization that continually provides for innovations and can recreate itself as the needs of its clientele change.” – Article 8 (RLH15)*

Figure 1 presents librarians’ emerging roles in today’s normal which evolved into their becoming collaborators, knowledge creators, trainers, information managers, and lifelong learners. While the primordial role of the library is to provide and disseminate information, remains the same, this may now be done in different manner or approaches in the new normal. In performing the other librarians’ roles, the optimum level of service expected by clients should always be taken into consideration.



**Figure 1.** *The Shifting Roles of Librarians in the Acquisition of Knowledge in the New Normal*

Consequently, as librarians perform their new and emerging roles as scaffold and support in the acquisition of knowledge, similar roles overlap, as it can be gleaned from Figure 2, whether they are aware or not.

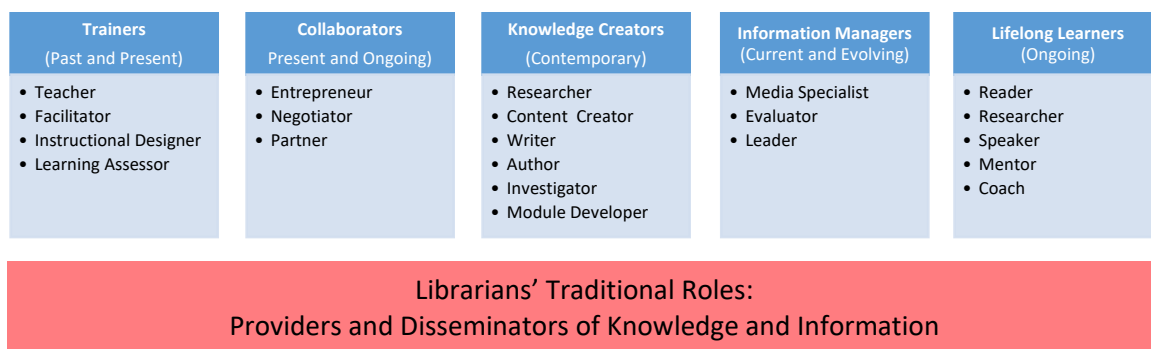
As trainers, librarians perform the roles similar to that of the teachers, facilitators, instructional designers, and learning assessors, among others. As such, librarians should possess the necessary skills and competencies required for such roles.

Consequently, librarians can also become entrepreneurs, negotiators, and partners in knowledge creation and other various sustainable information services.

In the same manner, librarians as information professionals, are good researchers, content creators, writers, authors, investigators, and module developers, because of their formal education, experience and training.

With the wide array of information resources which is now available from various sources, librarians are professionally trained to manage information. Librarians are trained how to access, evaluate and use information responsibly and ethically.

As lifelong learners, librarians' motivation to learn remains constant as anchored on their motto which is, "Continuous and Never-ending Improvement". In fact, lifelong learning is one among the many core competencies, both personal and professional, of librarians as reflected in the National Competency-Based Standards for Filipino Librarians.



**Figure 2.** *Similar Roles that Librarians Perform in the New Normal*

## Conclusion

In conclusion, the concept of the library remains a steadfast service institution, continuously evolving and innovating as it adapts to the demands of the new normal. The pivotal role librarians play in shaping the library's functions contributes significantly to its overall value. As the environment and technology transform, the methods and means of knowledge acquisition evolve in tandem, reflecting the timeless importance of libraries in facilitating learning and access to information. These themes underscore the enduring relevance of libraries in an ever-changing world.

## Recommendation

In light of the conclusion, it is imperative to enhance the recommendations as follows:

*Comprehensive Skill and Competency Assessment.* Recognizing the evolving nature of library roles, it is crucial to thoroughly identify, outline, and validate the skills and competencies essential for librarians in their various functions. This assessment will ensure that librarians are well-prepared for their changing roles.

*Continuous Capacity Building.* The study strongly advocates that librarians should continue to invest in capacity building initiatives. Particular emphasis should be placed on equipping librarians with skills related to data curation, digital literacy, research support, and effective collaboration. These skills are paramount in keeping libraries at the forefront of the evolving information landscape.

*Research on Emerging Skills.* In the context of the new normal, it is recommended to conduct an in-depth study to determine the emerging skills required for librarians in their evolving roles. This research will provide valuable insights into the specific competencies that librarians need to navigate the changing landscape effectively, ensuring their continued relevance and value to the community they serve.

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# Navigating the pandemic:

## How Thai GLAMs adapted their operations and services during the COVID-19 outbreak

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### ABSTRACT

*Background.* Since 2020, Galleries, Libraries, Archives, and Museums (GLAMs) worldwide have faced the unprecedented outbreak of the Coronavirus 2019 (COVID-19) pandemic. The spread of COVID-19 had profoundly impacted GLAMs, necessitating adaptations to the situation from the initial spread in 2019, through the subsequent lockdowns in early 2020, and into the reopening phase as the situation gradually stabilized. During these stages, guidelines and preventive measures were implemented to restrain the spread of COVID-19 and protect employees, users, and visitors. Although the current situation has stabilized and returned to a semblance of normalcy, the author believes that documenting the best practices and lessons learned from how GLAMs embraced new operational approaches during the COVID-19 pandemic—while maintaining their commitment to serving communities and ensuring the well-being of staff and visitors—could assist GLAMs in effectively adapting their practices. This documentation is particularly valuable in preparation for potential future pandemics or other emerging risks.

*Objectives.* The study aims to investigate the responses of Thai GLAMs to the COVID-19 pandemic, with a focus on their adaptations and modifications of policies, practices, and measures implemented to confront the Coronavirus 2019.

*Methods.* A qualitative case study approach was employed, using document analysis and semi-structured interviews as the two main methods for data collection. Fourteen GLAMs in Thailand were selected as cases for in-depth exploration. Relevant documents and interview transcripts were analyzed using thematic analysis to identify key themes, which reflected the situations and responses to the COVID-19 pandemic.

*Results.* The findings were categorized into three main periods: GLAMs under Lockdown, Reopening, and Recovery. The Lockdown period encapsulated the responses following the abrupt closures in early 2020, when the physical buildings of GLAMs were closed to staff and users, rendering their physical spaces and buildings inaccessible. During this period, Thai GLAMs embraced new ways of operating to remain committed to serving their communities while safeguarding the well-being of staff and visitors alike. As the situation improved in June 2020, the GLAMs resumed on-site operations and focused on establishing health and safety protocols in and around their physical buildings to ensure a safe reopening. This entailed significant modifications to policies, procedures, and guidelines. From 2022 onwards, as the outbreak began to ease and society started adapting to the ongoing pandemic situation, the GLAM organizations shifted their focus towards future development, strategizing for the recovery and renewal of the institutions.

*Contributions.* The research findings can serve as a guideline for future planning of preparedness and response to potential pandemics based on the lessons learned from the COVID-19.



## INTRODUCTION

Galleries, Libraries, Archives, and Museums (GLAMs), as information organizations, have a core mission to connect people with information, memories, documents, and cultural heritage. The values of GLAMs have long been justified by their ability to support society with seamless access to information resources, services, and learning spaces, promoting intellectual growth and sustainability (Canadian Museums Association, 2019). In 2020, however, the unprecedented COVID-19 pandemic caused an abrupt disruption to GLAMs worldwide and required adaptation and changes for their survival and the continuity of their services. During the early stages of the pandemic, GLAMs were forced to close their doors, leading to the suspension of physical access to collections, spaces, and activities. As the infectious situation improved, GLAMs initiated a phased reopening, carefully taking steps to resume their activities. They implemented guidelines and preventive measures, prioritizing the safety and well-being of their employees, users, and visitors (Noehrer, Gilmore, Jay, & Yehudi, 2021; Samaroudi, Echavarria, & Perry, 2020).

The author posits that the existence of COVID-19 highlighted the importance of capturing and disseminating best practices and valuable lessons from the situation as these insights could have the potential to assist GLAMs in refining their forthcoming practices within the context of the post-COVID-19 landscape. Thus, a research project titled 'Adaptation of GLAMS: Capturing Lessons Learned and Good Practices from the Coronavirus 2019 (COVID-19) Pandemic' was conducted with the primary aim to investigate how GLAMs responded to the COVID-19 pandemic, using GLAMs in Thailand as a cases study. The focus of this paper was on examining the extent to which Thai GLAMS' policies and practices were modified to address the challenges posed by the Coronavirus. This paper delves into the impact of the pandemic on the Thai GLAM sector, which in turn led the transformation of working lives and the innovations that emerged as a result of this adaptation. The research findings provide valuable insights that can contribute to the development of guidelines for future preparedness and response to emerging pandemics, drawing from the lessons learned from COVID-19.

## LITERATURE REVIEW

Organizations of all types have constantly faced changes over time, either incremental improvements or radical transformational changes. While incremental change involves minor adjustment and improvement responding to the changing environment and seems to be less pervasive, transformational change is disruptive, occurring in response to sudden events and usually forcing organizations to develop new configurations (Dunphy & Stace, 1993; Bryson, 2011).

GLAMs are considered organizations that play a supportive role in society's learning. Although there are differences in their operational focus, they all aim to support the learning process through cultural experiences. Museums and art galleries focus on supporting learning through visual arts, disseminating knowledge and understanding through artworks and artifacts, some of which are cultural heritage. Therefore, these institutions have a role in preservation, conservation, and exhibition to support learning and creative knowledge development, contributing to intellectual advancement. Meanwhile, libraries and archives focus on the collection, management, and provision of information resources in various formats such as print materials, audiovisual media, and electronic media to support research and educational activities. Additionally, they facilitate resource utilization for employability, leisure and recreation. The archival resources are invaluable historical documents that require appropriate processes including evaluation, acquisition, preservation, and conservation to provide educational and research services (Canadian Museums Association, 2019; Warren and Matthews, 2018a; Warren and Matthews, 2018b).

GLAMs have been facing different forces of change, including external political and economic pressures, changes in user behavior, need and expectation, and advancement of technologies. Responding

to changes is vital for GLAMs to remain relevant to their environments and communities. Their roles and responsibilities, staff competencies, services and the collections they maintain need to be continuously reframed. They have transformed their collections and services to digital delivery. (Giannini and Bowen, 2019; Mishra, 2019; Oyelude, 2019) Nonetheless, changes over recent decades seem to have been incremental rather than radical. Adoption of these changes is ongoing, focusing on making continuous improvements and modifications for better work processes or performance without dramatic interruption. In other words, such changes have not disrupted the essence of social structures or organizational practices (Lewis, 2004).

The COVID-19 situation, however, had brought about radical change in the landscape of GLAMs, leading to shifts in their collections, services, spaces, and operations (Cox, 2020). GLAMs around the world responded to the COVID-19 outbreak differently and, in most cases, involved rapid transformations of their core functions. In many countries, restrictions, and specific measures, varying from service limitations to complete space closures, were implemented depending on the number of local infections.

The situations faced by the GLAM sector can be divided into three periods: GLAMs under lockdown, reopening, and recovery (adapted from Feldman, 2020).

### **GLAMs under Lockdown**

The period represents the situation when GLAMs were forced to close in the early 2020. As the physical buildings were shut to both staff and the public, prompting the need to focus on seeking innovative ways to continue serving the public remotely. Programs such as training and workshops were cancelled to prevent people gathering. The use of physical spaces and collections was completely inhibited and replaced by digital resource promotion. Staff were required to work from home with modified schedules and alternative shifts. Promoting staff health and morale became crucial. Communication with all stakeholders was emphasized to strengthen engagement and relationships, and also to reduce stress and anxiety among people during this difficult period (Ali, Naeem, & Bhatti, 2021; Allen, 2020; Creative Industries Policy and Evidence Centre, 2020; Culture24, 2020; Koscijew, 2021; Noehrer, Gilmore, Jay, & Yehudi, 2020; Zuanni, 2020).

### **Reopening**

As the situation improved, GLAMs gradually resumed normal on-site operations, but services and spaces to some extent were subject to restrictions. Preventive measures were implemented in line with the guidance and recommendations from the World Health Organization (WHO) regarding good hygiene practices. GLAMs continued to support their staff and developed reopening plans in accordance with new operational requirements. Clear communication of these plans was emphasized to welcome staff and users back in phases, ensuring a safe return to operations (ICOM, [n.d.]; IFLA, 2020; OCLC, 2022).

### **Recovery**

During this phase, GLAMs resumed their normal operations and began looking forward to the future. They identified and embraced the "new normal" and "next normal" ways of living and working. Strategic plans were revised, and new directions and practices were piloted with the main goal of enhancing the visitor experience (ALA, [n.d.]; Ohler & Pitts, 2021).

The three distinct phases illustrate the adaptability and resilience of GLAMs during the pandemic and was serve as a basis for data collection and analysis.

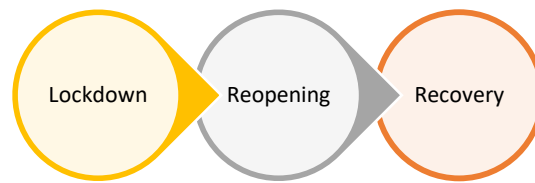


Figure 1 The three periods of COVID-19 outbreak and response

Although the COVID-19 pandemic has been considered as a crisis and thus a source of uncertainty and anxiety, the author posits that opportunities could exist even in this difficult time. Capturing best practices and lessons learned regarding responses to COVID-19 could help GLAMs seize their chance of adapting their practices. Guidelines can be developed for future planning of preparedness and response to potential pandemics or other emerging risks based on the lessons of COVID-19.

## METHODOLOGY

This paper aims to identify the situations the GLAM sector faced during the outbreak of COVID-19, along with the responses adopted by GLAM organizations. The primary focus is on capturing the best practices and lessons learned, highlighting the innovative approaches and measures taken during their responses. To achieve this, a qualitative case study approach was adopted, using document analysis and semi-structured interviews as methods for data collection. According to Yin (2014), this approach is best suited for investigating how and why questions about contemporary phenomena and real-life contexts, making the approach highly applicable to this research project.

Fourteen GLAMs in total, comprising 2 galleries, 4 libraries, 3 archives, and 5 museums, were employed as cases based on predetermined criteria: they are non-profit organizations located in areas significantly affected, specifically Bangkok and its vicinity. Pseudonyms were assigned to the 14 GLAMs, designated as G1-G2, L1-L4, A1-A3, and M1-M5 respectively, to preserve anonymity and confidentiality.

### Data collection methods

Document analysis is a systematic process of searching and analyzing relevant written documents. As this study examines organizational responses to the COVID-19 pandemic, which were not often recorded in official documents, the researcher began by reviewing published information on their websites to understand their policies and practices prior to the COVID-19 outbreak. Key areas of focus included policies and strategies; their resources, spaces, and services; usage guidelines; and relevant reports. The initial information was supplemented with updated information reflecting how these GLAMs adapted their practices and guidelines in response to the evolving outbreak situation.

Given the novelty of the topic during the early stages of the research project, relevant data were not always accessible in official forms or on websites. As a result, the researcher supplemented the analysis with data from official Facebook accounts, as Thai GLAMs actively used Facebook to stay connected with stakeholders, provide prompt assistance and up-to-date information resources, as well as communicate about the current situation, service modifications, and safety and preventive measures.

To gain further insights into the situations, the researcher conducted semi-structured interviews with the directors or executives of the 14 cases to obtain complementary information on topics not covered in available documents, for example their opinions, perspectives, or predictions regarding the COVID-19 outbreak.

### **Phases of study**

The data collection process was conducted in three distinct phases. During the first phase, the focus was on identifying global situations facing GLAMs. Relevant literature and documents were retrieved from electronic databases and related websites, including those of GLAMs, professional associations, governmental, and international organizations. The objective was to investigate the situations and executed measures, as well as the extent to which GLAMs' policies and practices were modified in response to the COVID-19 pandemic.

Moving into the second document analysis phase, the focus shifted to the situations faced by the 14 Thai GLAMs located in Bangkok. Data were collected from their official websites and Facebook pages to obtain information regarding the Thai GLAMs responses to the pandemic, as reflected in the written evidence, comparing the situation prior to and during the emergence of COVID-19.

In the final phase, interviews were conducted with the directors or executives as representatives of the 14 cases to gain their opinions and insights regarding the situations and responses to the COVID-19 outbreak. This phase allowed for a more personalized perspective and added depth to the overall research findings.

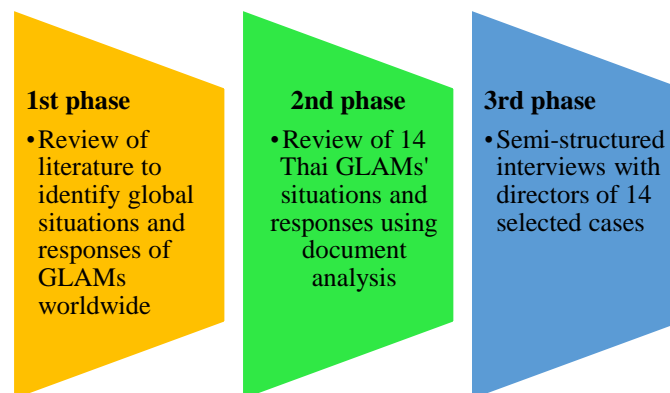


Figure 2 The three phases of study

### **Data analysis**

Thematic analysis was employed throughout the stages of data collection and analysis. The data were analyzed and coded to identify common themes. The research findings were then categorized using the phases of lockdown, reopening, and recovery as the predetermined themes, which were developed from the literature review. Additionally, supplementary themes also emerged during the analysis process.

## RESEARCH FINDINGS

### GLAMs under Lockdown

Following the abrupt closures in early 2020, the physical buildings of GLAMs closed to staff and users, rendering their physical spaces and buildings inaccessible. From the analysis, it was evident that their top priority became revising policies and practices to find new ways forward. Innovative practices emerged and were strengthened during this period, including:

#### *Theme 1: The shift to service approaches: when online was the only possible*

The shift to online services became a necessity when physical access was no longer feasible. All the GLAM sectors mentioned that they were immediately modified and moved online to ensure a continuous supply of information services and prevent the risk of contagion. Libraries particularly mentioned the shift in budget allocation and tremendous efforts made to facilitate access to electronic resources and digital collections. Two libraries mentioned acquiring useful resources such as applications to support English learning, allowing individuals to develop their skills during the lockdown period [L1, L2].

However, for archive organizations, despite the call for archival records to be digitized and made available online, the sector faced more restrictions compared to other sectors due to the sensitivity and confidentiality of the information they contain. Some archival documents may have access restrictions due to legal requirements, rules, regulations, as well as usage agreements, terms, and conditions.

“When compared to libraries, archives seem to face more challenges in undergoing adaptation, as not all resources can be digitized and made available through digital offerings.” [A1]

There was a significant rise in online content production, republishing, and repackaging. All the Thai GLAMs mentioned their efforts to generate digital content based on their information resources and digitized collections, which they delivered through various channels such as websites, Facebook, and other social media platforms. This period witnessed a significant increase in digitization efforts, enabling inclusive access, use, and sharing of information resources. For galleries and museums, collections were snapped or VDO recorded to shared on social media platforms, such as Facebook or Instagram with detailed caption. Prioritization was given to award-winning collections [M2] or collections that had received attention or went viral [G1, M1].

Reference and consulting services, as well as training sessions, were conducted online using applications such as Zoom, Microsoft Teams, or Facebook Live. The transition to virtual formats led to a significant increase in the number of participants, with up to 300-500 people attending online training sessions compared to the limited in-house capacity of 30-50 people before the pandemic. Virtual exhibitions and tours of galleries and museums using AR/VR, 360-degree museum tours, and curatorial talks were provided during the time when the pandemic confined people to their homes. These new ways of delivering online training and virtual experiences broke barriers, allowing people to access galleries and museums worldwide without leaving their homes.

#### *Theme 2: The shift in mindset among staff was critical*

The GLAMs comprise various types of staff including full-time staff, contract staff, and daily labor hired on a day-to-day basis, each performing different functions. During the lockdown, staffing arrangements within the GLAMs were adjusted. In positions where working from home was not possible, such as service staff, public relations officers, and daily labor like security guards and cleaning personnel, individuals were reshuffled to work in different functions and roles. For staff working from home, there

was a shift in the work pattern from an 8-7 pm basis to a new productivity-based schedule. This required staff to modify their mindset regarding work.

A quick response and shift in service mindset were also found to be critical for staff. For libraries and archives, which traditionally adhered to the physical ideology of collecting and preserving materials where "People come to their physical building for reading or researching," adaptation became even more essential to embrace flexible service delivery. For libraries, previously, practices like home delivery service, sending books by post, became nearly impossible. As a result, the pandemic provided an opportunity for GLAMs to pilot and explore various approaches to cater to the society's learning needs. For archives, although they faced service restrictions due to characteristics of archival documents and legal requirements, attempted were paid to allow people access to archival records which are primary resources that could not find elsewhere.

"For some users, archival records were essential; for example, academic success may not have been achievable without these documents. In such cases, staff made every effort to assist, including arranging on-site services during the lockdown period or digitizing non-legal correspondence documents for these specific instances." [A1]

In such cases, users made a special request which was considered and approved by the director. A consent form would be signed online. The archival records would be digitized, or on-site service would be arranged depending on the situation such as travel restriction and the archival record requested.

### *Theme 3: Helping people respond adaptively to stress*

During the lockdown period, social media platforms and websites became primary channels for communication. Innovative applications of social media were observed. In most cases, they mentioned campaigns for food and protective mask donations. Hashtag challenges and quizzes were launched, particularly in archives and museums [A1, M1-M4], to inspire participation and story sharing across platforms like Instagram, TikTok, Facebook, and Twitter. These exemplify the creative strategies employed during the lockdown to heighten community engagement and reduce societal stress and anxiety.

## **Reopening**

As the situation improved in June 2020, GLAMs resumed on-site operations and focused on establishing health and safety protocols in and around their physical buildings. To ensure a safe reopening, they made significant modifications to policies, procedures, and guidelines. Several preventive measures were introduced, including:

### *Theme 1: Accommodating health and safety measures*

Health and safety measures started from the moment visitors entered GLAMs' buildings. A maximum number of users and designated visit times were determined to manage crowd density. Visitors were required to check-in and check-out via Thaichana – a governmental platform used for contact tracing. Active screening was also implemented, and individuals with a body temperature exceeding 37.5 degrees Celsius were not permitted to enter. Floors, elevators, and other facilities were marked to designate spaces for safe distancing. Both users and staff were mandated to use face masks or personal protective equipment (PPE) for added protection. To ensure proper hygiene, hand-washing facilities were provided, and frequent and proper hand washing was promoted. Additional cleaning procedures were implemented before and after the use of shared facilities and in common areas.

Table 1 summarizes key guidelines and preventive measures taken by Thai GLAMs in response to the COVID-19 pandemic, based on the analysis of documentary evidence provided on the GLAMs' websites and Facebook pages. It was evident that all the GLAM sectors shared similar measures, except for the library sector, which differed in terms of information resources and services compared to the other three sectors. Libraries are spaces where people typically spend a significant amount of time reading, with visits ranging from a few hours to a whole day. During the COVID-19 outbreak, this time was limited, and in some cases, reading rooms were closed during severe outbreaks, permitting only brief visits for borrowing books. Self-check services were also suggested as a solution to minimize contact and reduce contagion risk. The lending and shelving process in libraries was revised. Information resources and materials such as books and CDs were suggested to be sanitized and quarantined before returning to shelves.

Table 1: Summary of guidelines and preventive measures

<b>Guidelines and preventive measures</b>	<b>G</b>	<b>L</b>	<b>A</b>	<b>M</b>
<i>GLAMs under lockdown</i>				
Transformed services into digital	●	●	●	●
Promoted access to digital collections or virtual exhibitions	●	●	●	●
Reviewed and instated calendar of programs and events, in-person and virtual	●	●	●	●
Introduced working from home or shifted work policies	●	●	●	●
Promoted the contents through social media platforms or websites	●	●	●	●
Introduced click and collect, or delivery services		●		
Extended loan periods and Waived fines		●		
<i>Reopening the GLAMs</i>				
<b>Access to buildings</b>				
Used Thai Chana application to check-in and check-out before entering and leaving the building	●	●	●	●
Limited number of people	●	●	●	●
Limited period of time in the building		●		
<b>Social distancing measures</b>				
Promoted social distancing and floor marking	●	●	●	●
Rearranged furniture to allow more space for social distancing	●	●	●	●
Installed screens where social distancing measures were less effective	●	●	●	●

Hygiene measures				
Made wipes and sanitizer available for staff and public use	●	●	●	●
Required users and staff to wear masks, face covers, and PPE	●	●	●	●
Introduced cleaning schedules focusing on furniture, and shared devices	●	●	●	●
Services				
Reintroduced cash transactions	●	●	●	●
Limited opening hours	●	●	●	●
Limited use of spaces (meeting rooms, café, toilets)	●	●	●	●
Limited numbers for face-to-face activities	●	●	●	●
Quarantined and/or sanitized returned item		●		
Promoted use of self-check stations		●		

### *Theme 2: Workplace arrangements during the time of uncertainty*

The layout of workspaces and service areas was modified to avoid close contact. Clear protective screens were installed at service touchpoints to minimize direct contact. Staff working hours were staggered to reduce the number of people present at the same time.

"During the time of uncertainty, even though Bangkok allowed reopening, we had to prepare internal staff to correspond to the situation, dividing 3-5 staff into Team A and Team B. One came in for two weeks, and then they worked from home for the next two weeks. If a team member got infected, then the entire team had to isolate while the other team could come in." [G1]

These measures reflected the adoption of new operational requirements, with a strong focus on health and safety to prevent the spread of COVID-19. Additionally, GLAMs introduced innovative practices such as developing applications or systems for ticketing, booking seats, or conducting self-screening to assess the risks of COVID-19 transmission before entering the premises. Knowledge sharing and collaboration between institutions were also highlighted as critical success factors during the reopening phase, allowing GLAMs to learn from each other's experiences and best practices.

### *Theme 3: Dealing with people: Communication was the key*

During this period, the situation was uncertain and there could be new waves and the need for another closure occurring over time. As observed from the end of 2020 to 2021, there were recurring waves of outbreaks. Thus, close monitoring of the situation was essential. Accurate information and communication was mentioned as a critical factor.

"Personally, I think one critical thing was accurate information and there should be clear communication. If we had accurate information and clear communication, it would reduce concerns and anxiety. So, when there were new measures or new instructions,



people within the organization would understand and accept them quickly. But if the information and communication was unclear, people could probably resist the new measures.” [M4]

In 2021, it was evident that different organizations began to gain experience in dealing with the spreading situation and were capable of adjusting their operational strategies accordingly. For instance, if a new severe wave of infections emerged, high-level measures would be implemented, and the consideration of closing operations might arise. On the other hand, if the situation improved, measures could be eased and operations resumed. These experiences and practices have been valuable lessons from the challenges faced throughout the past year.

## **Recovery**

From 2022 onwards, although the COVID-19 may not have completely disappeared, the outbreak was starting to ease as people had received vaccinations to prevent severe symptoms from the infection. The entire society was learning and adapting to the ongoing pandemic situation. As individuals adjusted to the pandemic situation, organizations shifted their focus towards future development and strategized for the recovery and renewal of the institution.

*Theme1: An emphasis on cautious living persisted.*

The GLAMs seemed to agree that there continued to be an emphasis on cautious living as people, both staff and users, tended to safeguard more of their health and safety.

“The behavior of Thai people has changed. Previously, I didn't care much about how severe the PM2.5 was. But with the spread of COVID and until now everyone is ready and willing to wear masks or use hand sanitizers to protect themselves.” [G1]

As the trend of prioritizing safety continued and people became more familiar with online platforms, the delivery of online services and activities was maintained. The future trend of service delivery is moving towards a blend of online and onsite services, with consideration given to providing these activities in parallel, or based on the outbreak situation. In the event of a pandemic reemergence, services would shift online, and once the outbreak situation subsided, onsite activities would be resumed.

*Theme 2: Looking forward to the future.*

The Thai GLAMs started looking forward to the new normal and next normal, for example reconsidering and justifying new roles and values; moving from GLAMs as a space to a safe place or virtual space beyond the walls; or implementing new directions and practices to enhance user experiences.

During the outbreak, online services and activities not only helped reduce the risk of contact contagion but also enhanced access for people outside Bangkok, reducing boundaries and expanding participation from different provinces and regions. There was also a shift in social media usage, from merely informing about events before the pandemic to playing a more engaging role during the outbreak. This, in turn, increased understanding of GLAM's mission and fostered user engagement. Given the societal benefits of online services, it was expected that these online initiatives would continue, supplemented with more proactive onsite services and activities aimed at extending GLAM's outreach to better integrate with communities and society.

With a growing familiarity with online service usage, there was a development of online systems and platforms to provide users with an enhanced experience. Nevertheless, one noteworthy observation was that a significant number of individuals still preferred to physically visit and engage with cultural venues. For the libraries, this also included addressing the challenges faced by elderly and impoverished individuals who had difficulties using technology or online services [L2, L3]. Balancing the importance of both online and in-person services thus became an essential consideration that should not have been overlooked.

Asking whether online platform would replace on-site service delivery, the galleries and museums stressed that online channels might not be able to replace physical spaces.

“if it's in a physical space, you can see it. For example, for a painting, you can see the lines and the details. But for online, sometimes you might not see or immerse yourself in the art just like seeing it in person onsite.” [G2]

With regard to staff in the GLAM sectors, what they had learned from the COVID-19 pandemic was adapting themselves.

“They have adapted and accepted new technologies and new work patterns more. It's about making them aware that uncertainty can happen anytime. And if you are not prepared, you might be the first one to leave the organization. This is quite straightforward. Work from Home (WFH) can prove that if a person doesn't come to work and the organization can still operate quite well. So, they might need to improve themselves.” [G1]

## CONCLUSION

GLAMs organizations share a fundamental role in promoting knowledge and culture as well as fostering learning and social cohesion. However, there appears to be a nuanced difference in focus among the four sectors. Libraries, for instance, prioritize their mission on providing access to reliable and up-to-date information to support learning and cultivate information literacy. Archives, on the other hand, play a pivotal role in preserving and granting access to primary sources that document the past. Meanwhile, museums and galleries, with their extensive collections of artifacts, offer unique characteristics that render them invaluable sources for learning and inspiration. These in turn facilitate learning and inspiration through the observation of art, scientific specimens, and historical objects.

During the spread of COVID-19, the main challenge for Thai GLAMs was to quickly adapt their policies and practices to the changing circumstances. Adapted from Feldman (2020), the adaptability and resilience of GLAMs was navigated and illustrated in this study through the three distinct phases of the pandemic: lockdown, reopening, and recovery. From the early 2020 onwards, the Thai GLAMs had adapted themselves in response to the lock down policy from the emergence of COVID-19 outbreak. Their primary duty was to keep the doors of learning open, and the focus was on finding innovative ways to continue supplying information services and resources despite temporary closures. The lockdown period forced the Thai GLAMs to accelerate their digital transformation, shifting from physical services to seamless and ubiquitous digital offerings. Best practices identified include the enhanced digital presence. Furthermore, the pandemic led to new roles for Thai GLAMs in supporting society, including promoting human connection, supporting social well-being and resilience through campaigns tackling fear and negative emotions. As the situation improved, GLAMs prepared to resume operations, placing significant emphasis on developing reopening plans that adhered to predetermined health and safety protocols. Several practices and measures introduced during the lockdown and reopening period had become integral to the new normal approach. After settling into the modifications to existing services, GLAMs started looking forward to the new normal and next normal. Implementing new directions and practices aimed at enhancing user experiences became a priority.

The digital transformation that occurred during the COVID-19 enabled GLAM services to transition online without disruption. The adoption of digital technology and innovative practices, in turn, enhanced universal access to services (Noehrer, Gilmore, Jay, & Yehudi, 2021). However, the success of this digital transformation depended on the organizational readiness of the GLAMs, particularly in terms of technology, budget, and staff. In Thailand, digital transformation has been a part of governmental policy since 2017. It was evident that the GLAMs with a high level of readiness had invested in developing online platforms, applications, or virtual exhibitions. In this context, the pandemic was perceived as an opportunity to launch and intensively utilize the technologies they had invested in. On the other hand, the GLAMs with a low level of readiness might have perceived the outbreak negatively.

The COVID-19 pandemic was considered a crisis or disruption as in the early stages it forced GLAMs around the world to close and make abrupt changes to their services. This, in turn, caused uncertainty, stress, and concern among staff. However, this study posits that every crisis contains the seeds of opportunity. The pandemic can be turned into an opportunity if best practices and lessons learned from it are captured and applied to create new or more effective ways of working. There are two main aspects to be considered: the people and the work. The pandemic required the Thai GLAMs to reconsider and revise their work processes so that service delivery could continue. In the revision process, they needed to listen to the voices of users, and as a result, this was a time when they truly understood user needs and behaviors, leading to adjustments in services and processes accordingly. Although the future trend may shift towards online services, designing services for all and striking a balance between online and offline becomes crucial. GLAMs could ensure that they do not leave behind the elderly and impoverished individuals. This, in turn, reconnects with the issue of Sustainable Development Goals (SDGs) for their sustainable futures.

The impact of the pandemic on staff roles, collaboration, and staff morale was also observed. In terms of staff, the GLAMs comprise full-time staff, contract staff, and daily labor hired on a day-to-day basis. During the pandemic, all the GLAMs attempted to ensure that all types of staff remained employed and did not break their contracts. They were reshuffled to work in different functions or allowed to work from home, if possible. For some positions that required working onsite, the GLAMs used the situation as an opportunity for staff to develop themselves, attend training and development sessions, pilot new ideas at work, or perform different roles. Staff morale could then be improved as a result of this situation. It was also found that prior to the pandemic, staff might work in silos, focusing on their immediate tasks with less communication and collaboration across functions. The lockdown period necessitated a situation where they were required to brainstorm, collaborate, and work across teams to seek solutions to continue working without disruption. This, in turn, enhanced teamwork, trust, leadership, and the overall working environment. This aspect then provides a forward-looking perspective on applying the learned management approaches to the future operations of GLAM organizations.

The roles they had played in providing global access to reliable information, promoting knowledge and culture, and fostering social cohesion would remain a major focus in the future of GLAMs as well. On top of that the innovations developed during the pandemic will serve as a strong foundation for future developments ahead. GLAMs had embraced change and had shown resilience in navigating through the challenges, ensuring they continue to serve their communities effectively in the post-COVID era. It can be concluded that the best practices and lessons learned by the Thai GLAMs during the pandemic had played a significant role in promoting adaptation, serving as a strong foundation for future developments in the GLAM sector in the post-pandemic world or the upcoming year and beyond.

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# Session 6: Digital Humanities, AI, and Big Data

ALIEP 6-1 Inspecting the usage of Term Pairs in Chinese/Japanese Web Texts: Towards the Enhancement of Multilingual Term Extraction  
(Chaoming Fang)

ALIEP 6-2 Bridging the Gap: UPSLIS as a Catalysts for Reproducible Research and Data Literacy  
(Dan Anthony Dorado)

ALIEP 6-3 An Exploratory Study on the Application of Transformer Models in Library and Information Science Based on Literature Review  
(Huei-Yu Wang and Hao-Ren Ke)

# Inspecting the usage of Chinese-English/Japanese-English Term Pairs in Chinese/Japanese Web Texts

## Towards the Enhancement of Multilingual Term Extraction

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### ABSTRACT

*Background.* State-of-the-art multilingual automatic term extraction (ATE) methodologies predominantly depend on multilingual corpora. These corpora, however, are restricted by their volume and the extensive manpower they require, hindering their ability to address current information management needs. Web content, on the other hand, is an ever-expanding source of text, offers a potential solution but presents complications due to its inconsistent formatting and diverse characteristics stemming from language and context.

*Objectives.* Recognizing that terms accompanied by their translations, termed as “term pairs”, can function as pre-aligned terminologies and can appear even within monolingual content, this study seeks to elucidate the interplay between term pairs and web content, focusing on Chinese-English and Japanese-English. The insights derived aim to establish a theoretical basis for web content-driven multilingual ATE.

*Methods.* “QRpotato” is a system adept at comprehensively harvesting bilingual term pairs from arbitrary web content based on provided seed term pairs. We obtained and analyzed seed term pairs and web content by using seed term pairs related to 12 selected topics from three distinct courses.

*Results.* The analysis revealed that distinct topics are predominantly discussed by unique social groups. Relationships between the expertise of the seed term pairs and the nature of the retrieved pages was also identified. This investigation accentuates the potential of sourcing web content containing term pairs for multilingual ATE.

*Contributions.* The examination of the data showed correlations between terms with specific characteristics and the content and types of the web. These findings show not only the viability of utilizing web content for multilingual ATE but also its potential for enhancing traditional ATE, especially since a portion of the gathered data consists of parallel texts. Moreover, the unique properties of web content can be leveraged for novel word detection, paving the way for heightened automation in ATE.

### INTRODUCTION

Multilingual information exchanges have become increasingly common in recent decades, with frequent discussions on external language/culture-dependent topics. However, orthographic variations in terms, resulting from disparities between information resources and translators, have emerged as a consequence of these developments. These variations present challenges in information management, a major concern in the field of multilingual language resource management. Traditional methods of term collection and

management have often relied on the creation of multilingual terminologies, a process typically executed manually. Manual terminology editing offers the benefits of high reliability and verified sources. Nevertheless, manual editing has notable drawbacks. Firstly, it may introduce ad-hoc elements into the terminology. Secondly, manual editing struggles to meet the growing demand efficiently. Thirdly, managing multilingual terminology requires both professional knowledge and language skills, creating barriers for individual editors.

One promising approach to address these issues is Automatic Term Extraction (ATE), which has shown significant improvements in extraction accuracy, especially for well-structured, pre-processed corpora. ATE plays a crucial role in various fields. However, there are still challenges in developing methods that can handle the vast amount of web content directly. In this study, our aim is to construct a framework to tackle the challenges of multilingual terminology management by elucidating the conventions of usage and positioning of bilingual term pairs. We will achieve this by re-implementing QRpotato (Abekawa & Kageura, 2009), a system designed to exhaustively collect bilingual term pairs from the web.

## **LITERATURE REVIEW**

### **Bilingual Automatic Term Extraction**

#### *Corpora*

State-of-the-art methods of automatic term extraction are mostly based on bilingual corpora, especially parallel corpora and comparable corpora (Yu & Huang, 2011). Parallel corpora are texts that are translations of each other, providing not only validation of candidate term pairs but also equivalents in the target language. Extractions based on parallel corpora can be expected to have higher accuracy as the translation of a candidate term is guaranteed (Melamed, 1997). However, obtaining parallel corpora can be difficult (Vintar, 2010). Comparable corpora are a solution that fills part of this gap, as they are easier to obtain, but pre-processing such as POS-tagging, lemmatization, and morphological analysis is required before performing automatic term extraction on comparable corpora (Van de Kauter et al., 2013).

#### *Approaches*

Another approach to bilingual term extraction is performed by aligning results from multiple monolingual term extractions. Previously, there were two approaches for monolingual automatic term extraction. One approach is to generate term candidates using linguistic rules such as part-of-speech, grammars, and multi-words (Bourigault, 1992). Another approach achieves the goal by using statistics, such as co-occurrence frequency (Zhang et al., 2006). The combination of these two methods was recognized as the third approach (Frantzi et al., 2000), which showed high effectiveness in the task. Recently, deep learning and machine learning have also been adopted for the monolingual ATE task (Merley et al., 2013).

### **QRpotato**

QRpotato is a specialized system meticulously engineered to harvest bilingual term pairs from unprocessed web content, through following steps:

1. Input. Existing bilingual term pairs are required as input, which will be referred to as "seed term pairs" in the subsequent discussions.
2. Retrieve. QRpotato collects web content by sourcing data from search engines using seed term pairs as queries. However, it's important to clarify that the collection process may not be entirely random, as it is guided by the provided seed term pairs and may vary based on the specific search engines used.



3. Page processing. Within the retrieved web pages, QRpotato diligently scrutinizes the spatial interrelation between the constituent elements of the seed term pairs, discerning the nuanced associations between source language and target language terms.

4. Candidate term pair extraction. QRpotato further advances its proficiency by applying a comprehensive full-text search approach to the collected web pages. Lexical elements that exhibit a similar positional relationship to the seed term pairs are isolated, thus constituting the body of candidate term pairs.

In this way, QRpotato is able to identify candidate term pairs from web contents rather than from a given corpus, which can cover the existing gaps in ATE methods.

### **Lifecycle of Research Data**

Terms are not isolated external words; they possess at least three sublayers: professional terms that do not merge into common words, terms that may become common but are not widely accepted, and terms that are already widely used (Zhang et al., 1997). Research data, as outlined by RCOS (2023), follows a lifecycle that facilitates the transmission of empirical and academic knowledge across research institutions, industrial entities, and individuals. A similar framework was proposed in a Chinese study (Li, 1983). At each stage of this lifecycle, terms and their translations may be generated, modified, or abandoned due to internal or external factors. Modifications are more likely when introducing new terms, and they tend to stabilize over time. Building on this research, an approach focused on term dynamics can effectively manage bilingual terminology based on their properties (Liu, 2008).

### **METHODOLOGY**

In the research data lifecycle, terms are introduced and explained as they traverse different stages. The speaker and intended audience vary throughout this lifecycle, leading to varying levels of expertise. Hence, it is not always necessary to use term pairs that include the source language term in different stages. Additionally, academic subjects and fields contribute to differences in expertise levels. To address these factors, we created an experimental model capable of handling web content based on academic fields and expertise levels, following a top-down approach.

First, the source academic subjects or fields that seed term pairs were chosen from should be defined. Three fields (natural science, engineering, social science) were chosen according to the Nippon Decimal Classification (NDC), as this research focuses on texts. When natural science explores the natural world, social science seeks the inside of human being, which make them highly comparable. On the other hand, engineering transform the natural science findings into productivity. This close relationship provides a clear view towards the lifecycle of research data, and potentially the web contents.

Second, topics that belong to the fields from the first step were selected. To spectate the variation from high expertise topics and low expertise topics, two sets of topics would be selected from each field. A-sets, containing two topics that are most likely to occur between specialists, and B-sets with two topics that are more likely to occur in daily situations would be collected as contrast. Impact Factor was used as a selection criterion for A-sets, as it reflects the relative importance of a given journal article.

Third, five seed term pairs were selected as seeds from the same document/page for each topic, and would be completed in the form of Chinese-English-Japanese manually. Using the seed term pairs as queries through QRpotato, the top 10 results for each query would be collected and analyzed.

However, in the context of this research, our approach diverged from the direct use of QRpotato. Instead, we undertook the task of reimagining and re-implementing QRpotato to ensure alignment with the objectives and methodology of our study. This reimplementation process encompassed the following steps:

1. Transcompiling to Python: We opted to transcompile QRpotato from Perl to Python. Python was chosen because it offers a wide range of libraries and frameworks, enhancing flexibility and facilitating future research activities.

2. Adding language support: The existing version of QRpotato did not fully support Chinese, as a part of Chinese or Japanese text resources were generated using unique codes, identified as BIG-5, GB-2312 and SHIFT-JIS, which would be retrieved in the form of garbled characters. To address this limitation, we reimplemented QRpotato and incorporated converters to handle both Traditional Chinese and Simplified Chinese contents effectively.

3. Deploying search engine switching: Substantial amount of Chinese text resources are generated and stored within mainland China. However, due to the presence of the Great Firewall (GFW) system, external access to these resources is severely restricted, including requests from Google. While Google remained the best choice for retrieving Japanese web content, we implemented new modules to support search engine switching for this research and future applications. In this study, we continued to use Google Custom Search for Japanese texts but utilized Bing to collect Chinese resources, both within and outside the GFW effectively.

Two stages of annotation were designed to achieve the goal of this research. Stage 1, which could be considered as an external annotation, mainly focus on the properties of collected pages. Stage 2, which could be relatively called as internal annotation, focus on how seed term pairs appears in the pages in order to inspect their usage and positioning. 1,200 pages were collected for analysis on June 2023, 1,157 of these pages are validate during stage 1 annotation, and only 1,137 of these pages is still validate during stage 2 annotation.

### **Stage 1: External Annotation**

For each collected pages, four types of tags would be assigned according to their specific property:

1. Property of the author: We divide the property of the author into “research institutions”, “individuals/informal organizations”, “enterprises”, “government organizations”, and “others”. This tagging contributes to understanding the relationship between terms and the lifecycle of web contents.

2. Property of the page: “dictionaries/terminologies”, “with clearly marked references”, “without clearly marked references”, “government documents”, “Wiki”, and “academic articles”. Different types of documents assume different groups of audiences, and this tagging contributes to the inspection of “introducing concepts that only exist in a certain source language or cannot be adequately explained using terms of the target language”.

3. Form of pair: “whole word”, “part of a multiword”, “parallel text”. Identifying whether a certain term is part of a multiword or not could possibly improve further terminology management. Additionally, we tag parallel texts, which can contribute to traditional ATE methods, for the same reason.

4. Presence of commercial element: As an external property of a page, commercial elements are important parts of the lifecycle of web contents that transmit academic finding to productivity. As the intended audience varies during the transmission process, the tendency shown by this tag potentially reflects the relation between web contents and terminology.

### **Stage 2: Internal Annotation**

All seed term pairs would be analyzed based on their location and properties on each page, and three types of tags would be assigned separately.

1. Location of seed term pair: Seed term pairs may occur in various contexts and may even appear separately. Depending on the existence of context, “same context” would be assigned to term pairs that completely appear in a context, “different context” for those that appear in context but are separated by language. “No content” stands for seed term pairs used separately, such as in categories, titles, or URLs.

2. Distance between elements: Inside a seed term pair, the source language (SL) word may not be adjacent to the target language (TL) word. While context is necessary to reveal the positioning and usage of a term pair, term pairs that have the SL word and TL word in different text may be inappropriate to share the same frame of analysis with term pairs that are close to each other. According to the above, “word level”, “sentence level”, and “parallel text” would be assigned to each seed term pair.

3. Number of occurrences: When a concept that exists only in a certain source language is introduced, term pairs could be predicted to appear once. Using the same term pair more than once in the same context may possibly violate the maxim of quantity (Grice, 1974). However, unlike traditional texts, one term pair could appear in the same web content multiple times but within completely different contexts. According to this, seed term pairs that appear only once in web content would be labeled as “once”, those that appear multiple times but in completely different contexts would be labeled as “multiple”. The rest would be analyzed case by case, labeled as “annotated multiple” with manual annotations.

Additionally, if a term pair was labeled as “annotated multiple” and extra occurrences triggered more than one label on 1 or 2, the labels on 1 and 2 would be changed to “multiple”, along with their details.

## **FINDINGS**

### **Results of Annotation**

Both Stage 1 and Stage 2 annotations have been completed.

#### *Property of the author*

Pages created by research institutions are notably higher than other authors in the case of the natural science field and A-sets. This number decreases narrowly with a lower requirement for expertise, as they started being discussed by enterprises and individuals/informal organizations. Additionally, while government organizations occur more frequently in Japanese than in Chinese, their overall ratio are still below 10%.

#### *Property of the page*

The ratio of natural science pages that are tagged as academic articles is 42% and 33.16% for Chinese and Japanese, respectively, while it is 14.14% and 17.88% in the case of engineering. 60.73% of Chinese engineering pages are “without clearly marked references”, which is 5.4% higher than Japanese engineering pages. Referring to the expertise, more than one-third of A-sets pages are “academic articles” in both Chinese and Japanese, being also the vast majority in their groups. “Without clearly marked references” pages tend to appear more in B-sets, with a 59.66% ratio in Chinese and 48.45% in Japanese. In addition, the number of “dictionaries/terminologies” in Japanese is remarkably higher than in collected Chinese Pages.

#### *Form of pair*

When the occurrence of parallel texts in A-sets is minorly higher than B-sets for Chinese pages, Japanese tend to have more parallel texts on B-sets. Also, in Chinese context, the occurrence of parallel texts in natural science fields is 6.44% higher than in engineering fields, while the number is 2.85% in the case of Japanese. In 17.03% of collected pages, seed term pairs appeared as part of a multiword, which could potentially be applied to terminology management.

### *Presence of commercial element*

There is no significant difference about the presence of a commercial element among the comparison between natural science and engineering. However, B-sets are having overall twice more samples that contain commercial elements compared with A-sets, in both Japanese and Chinese contexts.

### *Location of seed term pair*

There are minor differences between Chinese and Japanese pages in general. However, in natural science topics, Chinese pages had 25% labeled as “multiple” while Japanese pages had 13.92%. “Multiple” pages were mainly from academic articles that mentioned the seed term pair in the title, keyword, abstract, or the body, reflecting differences in conventions on academic websites. Meanwhile, Japanese pages that discuss social science had 21.16% labeled as “multiple”, while the number was 15.18% for Chinese pages.

### *Distance between elements*

Statistics were generally similar between the two languages. However, “multiple” and “parallel text” labels were significantly higher in natural science pages than in engineering pages, while social science pages had the least. This difference could be considered subject-relative, as similar differences could not be found in the comparison between A-sets and B-sets.

### *Number of occurrences*

Japanese pages tend to use seed term pairs only once, as the label “once” for Japanese pages is 8.83% higher than Chinese pages, along with a 6.55% lower label “multiple”. On the other hand, Chinese pages tend to have more “annotated multiple” than Japanese pages, with a difference of 12.58% on natural science pages.

## **Observations**

In recent decades, search engines often employ fuzzy search as default settings, and our examination of pages aggregated by QRpotato indicated that some pages did not present seed term pairs precisely as input in the search query. While fuzzy search proves valuable for detecting new words—potentially garnering related term pairs and term candidates—of the 1,200 results, only 1,157 were authenticated. We identified three principal factors contributing to this discrepancy:

1. The seed term pair refers to a limited concept. For example, we used “ultracold atom” as one of the natural science A-set term pairs. Searches with this seed term pair as a query returned 16 validated results out of 20. One reason for this outcome is that “ultracold atom” is strongly related to a specific subject, and most discussions on this topic occur in certain languages.

2. The seed term pair was not frequently used on the internet. “Primary member” is a seed term pair from the engineering A-set term pairs, with 14 out of 20 results validated, while 9 of them were dictionaries or thesauruses. Though there are academic thesauruses and governmental files that confirm the existence of this term, the lack of results implies that web-based search is not suitable for this term pair or subject.

3. A widely accepted target language (TL) word already exists. In the case of the social science B-set seed term pair “deportation”, 40% of the collected results were invalidated. This is because the TL word in this term pair (驱逐出境/遣返) had already been widely accepted and used at the everyday level, making mentions of the source language (SL) word less necessary. In two-thirds of the remaining results, the seed term pair was used to distinguish similar concepts that could be referred to by the same TL term.

Given our reliance on web content fetched by search engines, it's expected that some contents or pages will evolve over time. Between the completion of stage 1 annotation in July and the end of stage 2

annotation in October, 20 pages displayed significant modifications, comprising 11 in Chinese and 9 in Japanese. These alterations stem from two main sources:

The first reason is related to inaccessible sites, such as encountering “HTTP 404” errors or “HTTP2 protocol errors”. In some cases, access to certain pages was limited due to insufficient permissions, as target pages may have been archived over time.

The second reason is associated with pages that are regularly updated or changed by their administrators. This situation is often observed on the top pages of organizations like news publishers and enterprises.

Additionally, when comparing Chinese and Japanese pages and their tendencies for changed pages, it appears that pages discussing natural science topics tend to be more stable. None of the Chinese pages had notable changes, and only 2 Japanese pages changed in the natural science category.

## CONCLUSIONS

This study has elucidated the relationship between terminologies and the evolution of web content queries, shedding light on term detection based on web content. The hypothesis that terminology management can be enhanced by understanding the lifecycles of research data has been validated through empirical findings. The characteristics of retrievable pages are influenced by specific queries and can be modulated by varying seed term pairs. This offers a promising avenue to address challenges faced in current multilingual resource management. The research intends to further explore various academic domains to refine its conclusions and ultimately delineate a comprehensive lifecycle for terminologies that can optimize informational exchanges.

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# Bridging the Gap

## UPSLIS as a Catalyst for Reproducible Research and Data Literacy

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### ABSTRACT

*Background.* The reproducibility crisis in scientific research underscores the need for enhanced data literacy and robust research practices. Libraries and librarians are uniquely positioned to address these challenges, especially in academic settings. This article examines the initiatives of the UP School of Library and Information Studies (UPSLIS) in fostering a culture of reproducible research and advancing data literacy.

*Objectives.* The primary objectives are to explore the role of UPSLIS in promoting reproducible research and data literacy, to implement and assess innovative initiatives in these areas, and to demonstrate the strategic importance of libraries in shaping the future of research, education, and society.

*Methods.* Employing an action research methodology, the study includes a series of interconnected initiatives: a census of Filipino librarians to promote open data, publishing a preprint of the census report using Quarto Markdown and Citepub on GitHub, developing Open Educational Resources (OER) through student video projects on digital scholarship, and enhancing librarian data literacy through a partnership with DataCamp. These initiatives are evaluated through qualitative and quantitative methods, including surveys, interviews, and analysis of usage data.

*Results.* The initiatives led to significant outcomes, including creating a comprehensive, open-access dataset of librarians in the Philippines, increased engagement with reproducible research practices, enhanced public understanding of digital scholarship through OER, and improved data literacy among librarians. The establishment of the Data Librarians Special Interest Group further exemplifies the sustained impact of these efforts.

*Contributions.* This article contributes to the discourse on the role of library and information schools in addressing the reproducibility crisis and enhancing data literacy. Detailing the implementation and outcomes of these initiatives provides a model for other libraries and institutions. The study underscores the evolving role of librarians in navigating the complexities of contemporary research. It highlights the strategic necessity of libraries in fostering a culture of integrity, transparency, and collaboration in research.

### INTRODUCTION

The reproducibility crisis in scientific research has raised concerns about the reliability and validity of research findings. In computational science, where complex algorithms and indirect computation are prevalent, reproducibility becomes even more challenging (Mesirov, 2010). Academic libraries have recognized the importance of addressing this crisis and have started to take proactive measures to support reproducible research (Sayre & Riegelman, 2019).

One key aspect of supporting reproducible research is developing data literacy skills among librarians. Data literacy is understanding, analyzing, and interpreting data effectively (Koltay, 2016). A specific skill set and knowledge base empowers individuals to transform data into information and actionable knowledge. Data literacy involves accessing, interpreting, critically assessing, managing, and ethically using data. It is an essential competency for the 21st century, enabling individuals to collect, manage, evaluate, and apply data in a critical manner (Hoffmann et al., 2022). Librarians with data literacy skills can assist researchers in managing and analyzing data, ensuring its quality, and facilitating reproducibility. The UP School of Library and Information Studies has recognized the significance of data literacy and incorporated it into its curriculum for future librarians. The curriculum includes data management, data analysis, and data visualization courses, providing students with the necessary skills to support reproducible research.

In addition to data literacy, the UP School of Library and Information Studies also emphasizes the importance of specific strategies for data literacy education for librarians. These strategies include hands-on training in data manipulation and analysis tools, such as R and Python, as well as workshops on data management best practices and data sharing protocols. By equipping librarians with these skills and knowledge, the school aims to ensure that they can effectively assist researchers in creating reproducible research.

## **REVIEW OF RELATED LITERATURE**

### **Reproducibility**

The reproducibility crisis has raised concerns about the reliability and validity of scientific research findings. Scholars, funders, and publishers have recognized the need to address this issue and developed guidelines and standards to promote reproducibility and replicability in research. The NSF's definitions of reproducibility and replicability provide a clear framework for understanding these concepts and serve as a foundation for efforts to improve research practices (Leonelli, 2018).

As critical stakeholders in the research process, academic libraries have a unique role in supporting reproducibility and replicability. They have a long-standing tradition of providing resources, services, and expertise to support research and scholarly communication (Sayre & Riegelman, 2018). In recent years, academic libraries have recognized the importance of addressing the reproducibility crisis and have started to develop initiatives to support reproducible research (Sayre & Riegelman, 2018, 2019).

One important aspect of the role of academic libraries in supporting reproducibility is providing access to research data and promoting data sharing. Libraries can serve as repositories for research data, ensuring its long-term preservation and accessibility. By facilitating data sharing, libraries contribute to the transparency and openness of research, allowing others to verify and reproduce research findings (Sayre & Riegelman, 2018).

In addition to data management and sharing, academic libraries can also provide training and support for researchers in adopting reproducible research practices. This includes educating researchers about best practices in data management, documentation, and version control. Libraries can offer workshops, training sessions, and consultations to help researchers implement these practices in their research workflows (Sayre & Riegelman, 2019).

### **Data Literacy and Reproducibility Upskilling**

The importance of enhancing data literacy and reproducibility in research has gained significant attention in recent years. Several initiatives, such as The Carpentries, Docker, and Snake Make, have been established to address this issue (Teal et al., 2015). Inadequate emphasis has been placed on recording research



decisions and ensuring the reproducibility of research, highlighting the necessity for upskilling in data literacy and reproducibility (Ioannidis et al., 2014). Libraries have been identified as potential promoters of research reproducibility through community engagement, emphasizing the importance of open science literacy and the role of libraries in improving data access and reproducibility (Hettne et al., 2020). The current debate around research reproducibility has underscored the need for novel approaches to enhance data literacy and statistical thinking among students and professionals (Alston-Knox et al., 2019). Furthermore, data literacy has been recognized as a crucial competence for individuals to succeed in a data-intensive society, emphasizing the importance of integrating data literacy into educational curricula (Gebre, 2022). Educators have been shown to develop data literacy during intensive data use interventions, indicating the potential for targeted interventions to enhance data literacy skills among educators (Kippers et al., 2018). Additionally, initiatives such as Data Carpentry have focused on increasing data literacy among researchers, aiming to equip them with the skills necessary to handle and analyze data in an open and reproducible manner (Teal et al., 2015). Finally, data literacy has been linked to research data management and governance, highlighting the interconnectedness of data literacy with broader data management practices (Koltay, 2016).

### **Academic Libraries as Catalysts for Reproducibility**

Academic libraries have long supported scholarly communication and research (Hart & Kleinveldt, 2011; Revez, 2018). In the context of the reproducibility crisis, they emerge as vital catalysts for enhancing the credibility and transparency of scientific studies. Their alignment with reproducibility guidelines coincides with core areas of academic librarianship, providing specific recommendations for services and expertise (Sayre & Riegelman, 2019).

One of the key areas where libraries can contribute is in methods support. Libraries can support data-intensive research methodologies, data processing, and analysis automation using standard computational tools like R and Python (LaPolla et al., 2022). By offering workshops, tutorials, and one-on-one consultations, libraries can equip researchers with the skills and knowledge to conduct reproducible research. This support extends to using best practices in data management, ensuring that data is stored, curated, and shared in ways that facilitate replication and verification. Systematic reviews are another area where libraries can extend support. By assisting researchers in conducting systematic reviews across the scientific process, libraries ensure methodological rigor and adherence to established protocols. This involves guiding researchers in defining research questions, developing search strategies, selecting databases, screening studies, extracting data, and synthesizing findings. Libraries' expertise in information retrieval and synthesis positions them as valuable partners in this critical aspect of research (Eichmann-Kalwara et al., 2021).

Libraries can also act as connectors to statistical and methodological support units, facilitating interdisciplinary collaboration. By building relationships with statistical consultants, methodologists, and other experts, libraries can bridge gaps between disciplines and foster a collaborative environment that enhances research quality (Bedi & Walde, 2017; Swygart-Hobaugh et al., 2022). This role as a connector amplifies the impact of libraries in supporting reproducible research, extending their reach beyond traditional boundaries.

Repositories and reporting are another dimension where libraries can make a significant contribution. Libraries can provide repositories for preregistrations, helping researchers find and use reporting guidelines, and promoting transparency in research dissemination (Bradley, 2018). By hosting and curating repositories for research data, code, and other materials, libraries ensure these resources are accessible, discoverable, and preserved for future use. This aligns with the growing emphasis on open science and the need for transparent reporting of research methods and findings.

Furthermore, libraries can organize measures into themes such as Methods, Reporting and Dissemination, Reproducibility, Evaluation, and Incentives (Eichmann-Kalwara et al., 2021; Kubas et al., 2018; LaPolla et al., 2022). By categorizing interventions and types of support, libraries can develop targeted services that address specific challenges in reproducibility. This thematic approach allows for a more nuanced understanding of the multifaceted nature of reproducibility and how libraries can contribute.

### **The Role of LIS Schools in Promoting Data Literacy and Research Reproducibility**

The role of library schools in promoting data literacy and research reproducibility is crucial in enhancing STEM education and information literacy. Subramaniam et al. (2012) emphasize the potential of school libraries in enhancing STEM learning, indicating the evolving roles of libraries in education. Brown & Krumholz (2002) highlight the importance of integrating information literacy programs into the general curriculum, underscoring the collaborative role of academic librarians with faculty members. Additionally, Wakimoto et al. (2016) stress the significance of information literacy learning and assessment, presenting librarians with leadership and collaboration opportunities. These references underscore library schools' evolving and collaborative role in promoting data literacy and research reproducibility, emphasizing the need for integration into educational curricula and the broader educational environment.

## **METHODOLOGY**

This study adopts an Action Research methodology to improve UPSLIS's contribution to data literacy and reproducible research in the Philippines. Action Research is particularly suited for this context due to its collaborative, pragmatic, and cyclical nature, which allows for ongoing refinement and real-world application. The methodology is delineated into four iterative phases: Planning, Acting, Observing, and Reflecting. In the Planning phase, challenges and opportunities at UPSLIS are identified through collaborative discussions with librarians, faculty, and students. Specific areas for improvement and strategic actions are determined, such as organizing data literacy workshops and introducing tools for reproducible research like R and Python. The Acting phase involves the implementation of these strategies, including the development of data management protocols. During the Observing phase, data is gathered to assess the impact of these interventions. This includes qualitative data from interviews and focus groups with program participants and quantitative data like workshop attendance and research output analysis. Thematic analysis is used to interpret qualitative data, identifying patterns and insights, while statistical methods are employed to analyze quantitative data for trends and efficacy measures. The Reflecting phase is crucial for evaluating the outcomes with all stakeholders, understanding the effectiveness of the strategies, and identifying areas for further improvement. Ethical considerations are paramount throughout this process, ensuring informed consent, participant understanding, and data confidentiality. The cyclical nature of Action Research allows for multiple iterations of these phases, enabling continuous improvement based on reflective feedback and evolving needs.

### **Ethical Considerations**

Given the collaborative nature of Action Research, it is crucial to ensure that all participants understand the purpose of the study and consent to participate. Confidentiality and data privacy are maintained throughout the research process.

## **FINDINGS**

### **Initiative: Census of Librarians in the Philippines**

As a crucial component of our action research project, UPSLIS embarked on an innovative initiative to promote open data by conducting a comprehensive census of librarians across the Philippines. This census

was designed not only as a means to gather essential data but also as a practical demonstration of the principles of open data and reproducible research that we advocate.

The primary objective of this census was to create an open, accessible dataset that provides a detailed overview of the librarian workforce in the Philippines, including demographics, educational background, areas of expertise, and current professional challenges. This dataset serves as a valuable resource for policy-making, educational program development, and library service improvements.

Utilizing a quantitative approach through a survey questionnaire. The survey, distributed electronically across various library networks and conferences, captured essential demographic and professional data. It also provided insights into the challenges faced by the profession and potential areas for growth and development.

The data collected was rigorously analyzed to ensure accuracy and comprehensiveness. Quantitative data from the surveys underwent statistical analysis, revealing trends and patterns in the professional landscape of librarians in the Philippines. Qualitative data from the survey were thematically analyzed to add depth to these findings, highlighting key issues and opportunities.

In line with our commitment to open data and transparency, the results of the census were made publicly available in an anonymized format. This decision to share the data openly aligns with the ethos of reproducible research and demonstrates UPSLIS's leadership in promoting these practices. The dataset has been made available through Zenodo (Obille & Dorado, 2022), accompanied by comprehensive documentation, including methodology, data collection tools, and analysis techniques, ensuring that the research is reproducible and verifiable.

The census has significantly impacted the library community in the Philippines. It has provided valuable insights for library and information science stakeholders, helped identify areas that require attention and resources, and fostered a culture of data-driven decision-making. Reflecting on this initiative, we observed heightened awareness and interest in open data practices among the librarian community, indicating a positive shift towards more transparent and reproducible research practices. The iterative nature of our Action Research methodology allows for continual refinement of such initiatives based on feedback and evolving needs, thereby ensuring their sustained relevance and impact.

### **Initiative: Publishing a Preprint of the Census Report**

A pivotal part of our action research at UPSLIS involved enhancing the reproducibility of research through innovative publishing practices. To this end, we initiated the publication of a preprint version of the Librarians Census Report on GitHub <https://github.com/upslis/2019LibrarianCensusPh> (Dorado et al., 2022), employing Quarto Markdown and Citepub. This initiative was not only about disseminating findings but also about demonstrating and promoting the practice of reproducible research.

The key objective of this initiative was to provide an accessible, transparent, and reproducible version of the census report, showcasing cutting-edge tools and practices in scholarly communication. By using GitHub, Quarto Markdown, and Citepub, we aimed to demonstrate how these tools can enhance the transparency, accessibility, and reproducibility of research outputs.

The report was prepared using Quarto Markdown, an authoring tool that seamlessly integrates data analysis and document creation. This tool allowed us to embed code, data, and narrative in a single document, ensuring our study could be quickly reviewed and replicated. Citepub was used to manage citations, ensuring that all references were accurately and consistently cited and linked to their sources.

Choosing GitHub as the platform for publishing the preprint enabled us to leverage its features for version control, collaboration, and open access. The GitHub repository contains the report document and the underlying datasets and code, making the entire research process transparent and reproducible. We also

utilized GitHub's issue tracking and discussion features to engage with the community, receive feedback, and make continuous improvements.

This initiative has significantly contributed to promoting reproducible research practices within and beyond the UPSLIS community. The publication of the census report in this manner has been instrumental in demonstrating the practical application of open science tools and principles. The use of GitHub, Quarto Markdown, and Citepub has set a precedent for making academic reports more accessible and reproducible, encouraging others in the field to adopt similar practices. Reflecting on this process, we observed an increase in engagement from the academic community, with valuable feedback and contributions that enhanced the quality and impact of the report. This initiative has also served as a practical example in workshops and seminars conducted by UPSLIS on reproducible research and open science.

### **Initiative: Open Educational Resources on Digital Scholarship**

Another component of our research at UPSLIS was developing and disseminating Open Educational Resources (OER) through student-created video projects on digital scholarship [Abad2021]. These projects, hosted on YouTube and licensed under Creative Commons, were designed to provide accessible, engaging educational content while also exemplifying the principles of open access and digital literacy.

The main aim of this initiative was to create and distribute high-quality educational content on digital scholarship, thereby enhancing public understanding and engagement with this important field. Creative Commons licensing ensured these resources were freely accessible and reusable, aligning with the open access ethos.

Students at UPSLIS were tasked with creating video projects that explored various aspects of digital scholarship. These projects covered topics ranging from data visualization to digital archiving, and each project was designed to be informative, engaging, and suitable for a wide audience. Once completed, these videos were published on the school's YouTube channel, making them widely accessible to the public, educators, and researchers.

By licensing these videos under Creative Commons, we ensured that they could be freely accessed, shared, and adapted, thus maximizing their educational impact. This approach also served as a practical demonstration of how Creative Commons licenses can be effectively utilized in educational contexts.

This OER initiative gained significant recognition, notably being acknowledged by the IFLA Section on Education and Training for its contribution to open education and digital scholarship. The initiative enhanced the visibility and reputation of UPSLIS and served as a model for other educational institutions looking to incorporate OER and digital scholarship into their curricula.

The success of this initiative is reflected in the positive feedback from users and the number of views and shares the videos received. It highlighted the potential of OER to democratize education and provide valuable resources in emerging fields like digital scholarship. UPSLIS plans to expand this initiative by including more diverse topics and collaborating with other institutions to create a broader range of OER content.

### **Initiative: Data Literacy Upskilling for Librarians in Partnership with DataCamp**

Lastly, UPSLIS was involved in a strategic partnership with DataCamp, a leading online platform for learning data skills, to provide data literacy upskilling for librarians. This initiative was pivotal in addressing the growing need for data competencies in the library profession and culminated in the formation of the Data Librarians Special Interest Group (DLSIG).

This initiative's primary goal was to enhance librarians' data literacy skills, equipping them with the knowledge and tools necessary to support data-intensive research and promote reproducible research

practices. By collaborating with DataCamp, we aimed to provide librarians access to high-quality, interactive learning resources in data science, including courses in programming languages like Python and R, data analysis, and data visualization.

UPSLIS facilitated this upskilling initiative by securing a partnership with DataCamp, which provided librarians with free or subsidized access to its comprehensive suite of online courses. The program was designed to be flexible, allowing participants to choose courses that best fit their interests and professional needs.

The initiative witnessed enthusiastic participation from librarians across various institutions. The flexible, self-paced nature of DataCamp's courses enabled librarians to balance their professional responsibilities with their learning goals. Participants engaged in hands-on exercises and projects, applying their newfound skills in real-world contexts.

Building on the momentum and interest generated by this upskilling initiative, UPSLIS faculty members led the establishment of the Data Librarians Special Interest Group (DLSIG). This group serves as a platform for librarians where they can share experiences, discuss best practices, collaborate on projects, and continue their professional development in the field of data librarianship.

The partnership with DataCamp significantly advanced the data literacy skills among librarians, empowering them to play a more active and effective role in supporting data-intensive research. The creation of the Data Librarians Special Interest Group has furthered this impact by fostering a community of practice that encourages ongoing learning and collaboration. Feedback from participants has been overwhelmingly positive, with many citing enhanced confidence and competence in handling data-related queries and projects. This initiative has not only bolstered the professional capabilities of individual librarians but has also contributed to the broader goal of enhancing reproducible research practices within the academic community.

## CONCLUSION

The initiatives undertaken by the UP School of Library and Information Studies (UPSLIS) represent a significant stride towards bridging the gap in reproducible research and data literacy. Through a series of innovative and collaborative projects, UPSLIS has demonstrated the pivotal role that libraries and librarians can play in addressing the challenges of the reproducibility crisis and in fostering a culture of robust, transparent research practices.

The census of Filipino librarians, the publication of its results using advanced, open-source tools, the creation of Open Educational Resources on digital scholarship, and the upskilling partnership with DataCamp have collectively enhanced the visibility and impact of libraries in the research ecosystem. These initiatives not only bolstered the capabilities of librarians and researchers but also engaged the wider community in the conversation around open data, reproducibility, and digital literacy.

The formation of the Data Librarians Special Interest Group is a testament to the sustainable impact of these efforts, providing a platform for continuous learning, collaboration, and advocacy. This group represents a growing community dedicated to advancing data literacy and reproducible research practices, indicative of a broader cultural shift within the academic and research landscapes.

This article underscores the strategic necessity of libraries in shaping the future of research, education, and society. It illustrates that libraries, far from mere information repositories, are dynamic and critical agents of change. They are equipped not only to adapt to the evolving demands of the digital age but also to lead in the transformation towards more reliable, transparent, and accessible research practices.

As we look to the future, it is clear that the journey of UPSLIS in promoting reproducible research and data literacy is not just about a series of projects or initiatives. It is about cultivating a mindset, a commitment to continual improvement, and a dedication to empowering researchers, librarians, and the wider community. The lessons learned and the successes achieved serve as a blueprint for other institutions and highlight the importance of collaborative, innovative approaches in the rapidly changing landscape of information science.

In conclusion, the work of UPSLIS embodies a significant step forward in addressing key challenges in the information and library sciences. It sets a benchmark for others to follow and contributes meaningfully to the global discourse on data literacy and reproducible research, ultimately bridging the gap between current practices and the ideals of transparency, integrity, and collaboration in scientific inquiry.

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# An Exploratory Study on the Application of Transformer Models in Library and Information Science Based on Literature Review

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## ABSTRACT

*Background.* Information technology is widely applied in Library and Information Science (LIS), with natural language processing techniques improving library workflows and services. Targeted efforts to accumulate domain-specific resources and optimize transformer models can further realize their potential in LIS.

*Objectives.* This study focuses on a literature review of transformer models, comprehensively organizing the status and effects, providing guidance for future developments in LIS.

*Methods.* The research steps comprise literature collection, classification, analysis, and summarization. Literature on Transformer, BERT and GPT models are organized, different features and outcomes compared, and application types in LIS evaluated.

*Results.* The self-attention mechanism of transformer model enhances semantic understanding and enables cross-task transferability of knowledge, making these models well-suited for applications in LIS. Suggestions include expanding domain-specific corpora and exploring transfer learning across tasks to further facilitate developments in LIS.

*Contributions.* This study finds that transformer models have great potential for semantics-related tasks, which could provide advantages and open up new research directions in LIS.

**Keywords:** Transformer Model, BERT, GPT, Knowledge Transfer

## INTRODUCTION

Information technology has been increasingly applied in the library and information science (LIS), involving information collection, processing, storage, retrieval and communication (Vijayakumar & Sudhi, 2011). In recent years, the exponential growth of data and its accessibility will take the library and information science into a new era. However, it has the challenges of substantial investment, high-cost systems, and risks. In a research topic of library and information science, Habibi et al. (2021) used co-word analysis to study these trends and focused on investigating the evolution of research topics and emerging areas in LIS. The study found that information retrieval and bibliometrics were the most popular research topics, while sentiment analysis and cognitive approaches to information literacy were the main emerging topics. Furthermore, their study also examined the relationships between different topics and how they evolved over time (Habibi et al., 2021).



The emerging information technology, natural language processing (NLP), has introduced new capabilities which enable wider applications in this field (Taskin & Al, 2019). Automated indexing, abstract generation or auto classification can improve the work efficiency and service quality in library classification, indexing, cataloging, information retrieval and reference services (Chemulwo & Siorei, 2020; Shruthi & Chandru, 2021). In information retrieval, applications of NLP are used for text summarization, knowledge extraction and question answering systems. NLP can generate summaries when source texts are too long or across multiple files. Knowledge extraction facilitates queries and eliminates ambiguity by referencing semantic networks, especially for long texts or semantic retrieval (Baeza-Yates, 2004). NLP also applies data models for structuring objects and object descriptions as data schema for semantic network analysis and object information can be retrieved from large repositories and relationships between objects can be explored. Moreover, algorithms are key factors which transform data from models to user interfaces in knowledge graphic design (Green & Martínez, 2008).

With the development of NLP techniques, data augmentation (DA) has been applied in disciplines with scarce resources and in deep learning neural networks for training data (Feng et al., 2021). Solutions for NLP problems are to develop methods such as automating repetitive tasks by deep learning model, tracking experimentation, and reproducing and comparing the results (Pressel et al., 2018). The transformer model is a type of NLP centered model around the self-attention mechanism. It will assign different attention weights to each element in the sequence when processing sequence data to enhance reading comprehension ability (Vaswani et al., 2017). This is considered a key breakthrough in NLP. The transformer models utilize attention mechanisms and embeddings such as BERT and Generative Pre-trained (GPT) models, which are used in machine translation, text summarization, and sentiment analysis (Wang et al., 2021). GPT models are used in unlabeled textual corpora for each specific task to conduct discriminative fine-tuning to improve semantic understanding (Chung & Glass, 2020).

Knowledge organization and management along with information access are the core of library and information science. Although some studies have applied NLP models in this field, most remain at the theoretical level or small-sample exploratory trials and have not yet formed a consensus with significant effects and impacts, lacking systematic research overall. This study reviews literature on transformer models, compares different models' characteristics, and evaluates application types in the library and information field. It proposes research findings and limitations to provide future developmental guidance and suggestions. It carries higher significance in facilitating intelligent library and information services.

## **LITERATURE REVIEW**

In this Section, the transformer model and its variants are introduced.

### **The Transformer Model**

The transformer model is based on the sequence-to-sequence (Seq2Seq) and attention mechanism, which is a deep learning neural network architecture (Vaswani et al., 2017). Seq2Seq model is applied in machine translation, while attention mechanisms are used to enhance sequence labeling models (Bahdanau et al., 2016). The transformer model consists of an encoder and a decoder, both composed of attention mechanisms constituting a global dependence relationship. It assigns different weights to each element in the sequence, aggregating information from different positions of the input sequence into the hidden vectors when processing sequential data. The encoder transforms the input sequence into hidden vectors, and the decoder transforms the hidden vectors back into an output sequence. The transformer model avoids recurrence and relies entirely on attention mechanisms, allowing highly parallelizable model architectures (Vaswani et al., 2017).

According to Vaswani et al. (2017), Figure 1 illustrates the overall architecture of the transformer model. The encoder utilizes a stacked architecture comprising  $N=6$  identical layers. Each layer incorporates two sublayers: a multi-head self-attention mechanism and a feed-forward network. Residual connections surrounding each sublayer followed by layer normalization facilitate gradient flow during training. All sublayers and embedding layers output a fixed dimension to enable residual connections. This structure allows effective modeling of long sequential dependencies. The decoder is composed of  $N=6$  identical stacked layers. In addition to the sublayers in the encoder, a third sublayer called masked multi-head self-attention is included to process encoder outputs. Residual connections and layer normalization encompass each sublayer. Self-attention masking prevents positions from attending to subsequent positions, this ensures the prediction at position  $i$  is dependent solely on preceding outputs. Overall, the decoder architecture enables effective conditional generation based on encoder context.

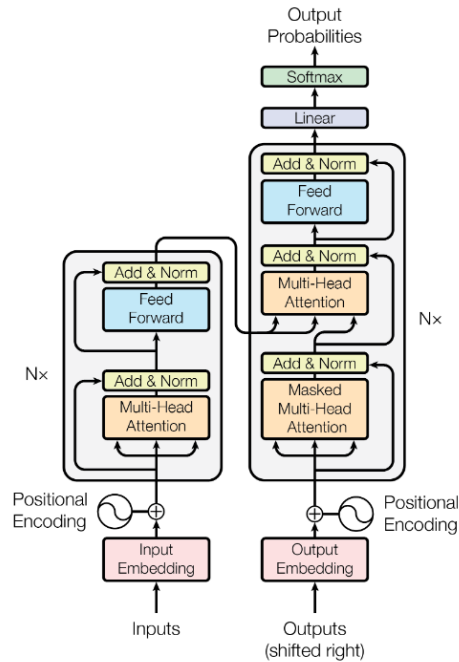


Figure 1: The Transformer Model Architecture (Vaswani et al., 2017).

The transformer model has the ability to explain itself through its attention mechanisms and provides insights into how linguistic knowledge emerges in its hidden states (Clark et al., 2019). Although the transformer model performs well on language understanding tasks, it still lacks common sense (Bosselut et al., 2019). Moreover, the transformer models require more substantial computational resources for data processing compared to past models (Wang et al., 2021). Therefore, follow-up studies focusing on model architecture and pre-training methods have been conducted to improve transformer model performance. Such studies include the ALBERT model which reduces parameters to construct a lighter-weight version (Lan et al., 2020), the RoBERTa model which enhances training data and improves generalization (Liu et al., 2019), and XLNet model which uses auto-regression for pre-training to predict words and improve performance (Yang et al., 2020)

In summary, applications in library and information science require acquiring semantic understanding and logical word-to-word relationships between sentences to perform tasks like data annotation, information retrieval, classification, and summarization. Compared with Recurrent Neural Networks (RNNs) and Long

Short-Term Memory (LSTM) models, the transformer model adopts attention mechanisms that indirectly capture global context and calculate relevance between any two words in a sequence. This allows them to capture dependencies across long texts and complex relationships between words for semantic understanding. The models also weight the importance of different words in a sentence for prediction, with parallelizability and without relying on sequential computation (Vaswani et al., 2017). Compared with previous models, transformers can evidently process massive amounts of data more effectively.

### **The Variants of Transformer Model**

The research topic on transformer model family are currently being extended with a focus on enhancing the model's architecture and refining the method of pre-training data. For example, the transformer-XL model uses a segment-level recurrence mechanism in its encoder and decoder to handle long-range dependencies (Dai et al., 2019). The Bidirectional Encoder Representations from Transformers (BERT) model is utilized for pre-training and fine-tuning to boost performance (Devlin et al., 2019). Generative Pre-trained Transformer (GPT) model to expand the application types of transformer models through auto-generated text (Radford et al., 2018). The following will focus on the BERT and GPT models.

The BERT model proposes a bidirectional architecture based on the transformer, pre-training on large amounts of text in both directions to acquire contextual word information. It can be applied in text classification, named entity recognition (NER), semantic labeling, and question answering (QA) (Devlin et al., 2019), and is considered an impactful paper. BERT also differs from transformer in several key aspects. Firstly, BERT uses a bidirectional encoder, while the transformer has a unidirectional encoder. Secondly, for training data, BERT uses large unlabeled corpora, while the Transformer used small parallel machine translation datasets. Finally, in applications, the transformer focus on machine translation while BERT can handle various NLP tasks (Devlin et al., 2019; Vaswani et al., 2017).

Figure 2 delineates the pre-training and fine-tuning procedures for BERT. Identical model architecture is utilized for both pre-training on unlabeled corpora and fine-tuning on downstream tasks, with the exception of task-specific output layers. Pre-trained parameters initialize the model for various downstream tasks. During fine-tuning, all parameters are fine-tuned. A "sequence" refers to the input token sequence to BERT, which could be a single sentence or two sentences combined together. The special symbol [CLS] is inserted at the start of every input sequence. If the input consists of a pair of sentences, the special token [SEP] is added in between them., e.g. demarcating questions from answers. The unified framework permits pre-trained representations to transfer effectively to diverse NLP tasks via fine-tuning, harnessing the generalizability from pre-training and the discriminability from task-specific fine-tuning. Overall, BERT capitalizes on masked language modeling and next sentence prediction during pre-training, and then leverages fine-tuning to adapt the model to specific tasks (Devlin et al., 2018).

Although BERT enhances semantic understanding, the pre-training method relies on data from broad domains such as Wikipedia and BookCorpus. Further research has to be conducted to determine whether BERT can effectively transfer to more specialized domains such as library and information science.

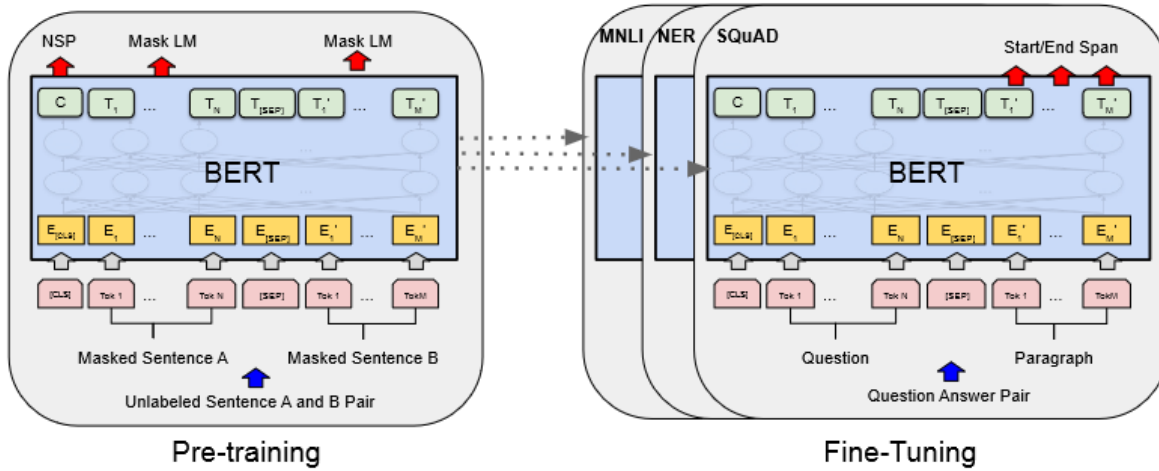


Figure 2: Overall pre-training and fine-tuning procedures for BERT (Devlin et al., 2018)

The GPT model also uses the transformer self-attention architecture but only utilizes the Transformer decoder for pre-training and fine-tuning, with applications that include text generation, translation, creative writing, and QA systems. During pre-training, large amounts of text and programming data are used to enable the model to perform self-supervised learning on unlabeled data, predicting the next word given context. For fine-tuning, supervised learning on labeled data is used for downstream tasks such as text classification and sentiment analysis (Radford et al., 2018). With each new version, GPT models have demonstrated significantly improved performance. From the original GPT which introduced pre-training and fine-tuning, GPT-2 that expanded model size and training data, and GPT-3 which reached 175 billion parameters (Brown et al., 2020). As GPT models evolve, text generation quality and efficiency are improved, which results in the expansion of applications (Liu & Lapata, 2019). Compared with traditional translation, generative translation with auto-generated summaries is more accurate and fluent for translating, reading, and understanding languages (Yang, Zhu, et al., 2020). The capabilities of auto-generated text with GPT models can be applied for intelligent services and internal process management, including recommendation systems, QA systems, classification, and multilingual translation (Radford et al., 2018).

Figure 3 delineates the transformer architecture and training objectives utilized in this work (left), alongside input transformations for fine-tuning on different tasks (right). This work converts all structured inputs into token sequences to be processed, followed by a linear and softmax layer for fine-tuning on specific downstream tasks (Radford et al., 2018).

In summary, the study reviews on Transformer, BERT, and GPT models, highlighting their technical features and development trends for semantic understanding and text generation for library and information science.

For semantic understanding, syntactic and semantic information, and domain terminology and background knowledge are need. This utilizes the Transformer's self-attention mechanism, which enables global modeling capabilities. It calculates relevance between any two words in a sequence to obtain long-range dependencies and complex relationships. The model can understand the overall semantics of sentences or logical relationships between them (Vaswani et al., 2017). These capabilities can enhance understanding of texts and improve benefits for annotation, classification, retrieval, and recommendation in library tasks.

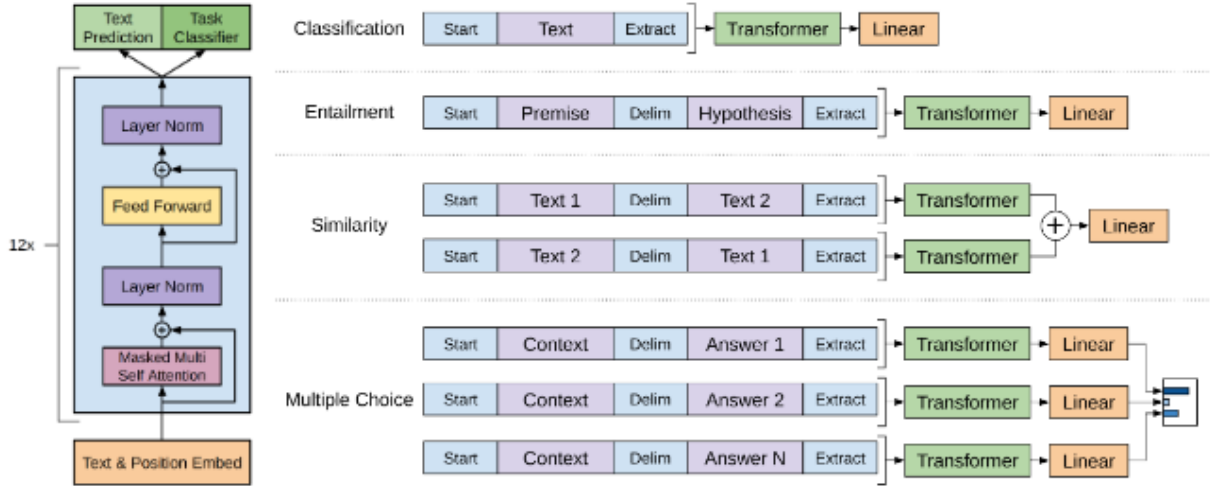


Figure 3: Language Understanding by Generative Pre-Training Model (Radford et al., 2018)

For text generation, BERT and GPT models are used for fine-tuning on limited labeled datasets, which demonstrate abilities to transfer knowledge across different tasks (Devlin et al., 2019; Radford et al., 2018). Potential applications include book subject classification or book summary generation in the library and information science domain.

Although these models improve performance, there are limitations in this field. For effectiveness, model training and optimization should incorporate domain knowledge. Books contain more technical terminology and background knowledge compared with general domain text. Whether general pre-trained models can effectively transfer to the professional library domain requires further research. Additionally, high computational and data resources are needed to achieve good model performance, requiring careful resource planning and infrastructure in practice. Finally, obtaining sufficient training data and computational resources will be the most significant challenges in applying these models to library and information science.

## METHODOLOGY

This study utilizes a literature review approach. It involves reviewing literature on Transformer models and variants such as BERT and GPT models, synthesizing findings according to key research goals and task categories. Common findings and challenges are identified through inductively categorizing tasks such as classification, text generation, knowledge extraction, recommendation, and information retrieval. This review establishes a theoretical baseline and framework to guide future research in applying these advanced models to library and information science applications. The methodology for this literature review follows four main steps:

1. Literature search: Relevant papers were searched in academic databases including Web of Science, Scopus, Library Literature and Information Science, ACM Digital Library, and arXiv.org e-Print archive. These papers were filtered by publication date, with only those from the last 10 years being considered in order to focus on current and emerging research. Studies published in the last decade encompass new advances and concepts that have arisen in recent years, providing key insights into the latest developments. The goal was to synthesize the most up-to-date findings, including novel techniques and methodologies

that represent the state-of-the-art for rapidly evolving topics and leverage the knowledge generated from the latest wave of research. Focusing on papers provides a lens into contemporary issues and innovations shaping in LIS.

2. Literature analysis: The 25 papers from Step 1 were read, extracting key information on research motivations, goals, methods, results, and conclusions. A standardized information extraction from application, conclusions, contributions, insights, limitations, methods used, practical implications, results and main points of the article were used to record details.

3. Knowledge organization: papers were categorized by themes or perspectives into tables and concept matrices. Commonalities and differences were identified through comparison of findings across studies. Categories included user recommendations, metadata, information retrieval, and more.

4. Key summation: Major themes and approaches were summarized regarding application to library and information science. Key findings highlighted improvements in semantic meanings, enhancing textual data, and providing more flexibility for tasks for library and information processing.

Through the literature review process of collecting, reading, analyzing, synthesizing, and summarizing prior research on Transformer model applications, this study aims to synthesize key insights and develop a conceptual framework to inform future research directions for applying these advanced models in LIS domain.

## **FINDINGS**

This study reviews literature on applications of Transformer, BERT and GPT models across diverse domains. The review highlights the wide-ranging capabilities of these models and their potential to enable new advances in the LIS. Table 1 summarizes the major application categories of transformer models identified in this review. The main application categories include text classification, text generation, recommendation systems, information retrieval, knowledge graph construction, and question answering systems by synthesizing findings cross disciplinary .

For text classification, Yang et al. (2020) leveraged self-supervised pretraining with transformers to enhance semantic understanding for the task. Additionally, Jiang et al. (2020) utilized pretrained BERT models to enable automatic classification of scientific literature, identifying relationships between research disciplines.

For text summarization, Liu and Lapata (2019) fine-tuned BERT to generate summaries automatically for library materials. In other work, Yang et al. (2020) combined transformer-based denoising autoencoders to improve summary quality.

For recommendation system, Sun et al. (2019) and Devlin et al. (2019) both capitalized on bidirectional transformer architectures, training them on user historical data to deliver personalized recommendations.

For information retrieval, Yang et al. (2020) used for self-supervised pretraining to boost semantics. Wang et al. (2021) implemented cross-lingual retrieval with BERT.

For knowledge graph construction, Bosselut et al. (2019) generated commonsense knowledge bases with GPT models. Jiang et al. (2020) constructed a practical example of the relation triples by building a knowledge graph from scholarly abstracts in the combined dataset, and they also improved scientific text relation classification with domain training in the BERT model.

For question answering services, Chung and Glass (2020) applied GPT transfer learning for automated voice consultations with readers.

Table 1. Application Types of Transformer Models in Library and Information Science

Type	Application	Research Method	Findings	Literature
<b>Classification</b>	Text classification	Self-supervised pretraining	Semantic understanding	(Yang et al., 2020)
	Automatic classification	BERT	Identify scientific relationship types	(Liu & Lapata, 2019)
<b>Text Generation</b>	Summary generation	BERT model for fine-tuning	Automatic summarization	(Liu & Lapata, 2019)
	Summarization system	Transformer denoising autoencoder fine-tuning, topic modeling	Improved summary quality	(Yang, Zhu, et al., 2020)
<b>Recommendation Systems</b>	Recommendation	Bidirectional self-attention	Incorporate user history and modeling for recommendation	(Devlin et al., 2019; Sun et al., 2019)
<b>Information Retrieval</b>	Information Retrieval System	Self-supervised	Semantic understanding	(Yang et al., 2020)
	Semantic Retrieval	BERT model	Multilingual Embeddings with Adversarial Networks for Cross-Domain	(Wang et al., 2021)
<b>Knowledge Systems</b>	Commonsense Knowledge DB	GPT model	Generate Commonsense knowledge to Automatically populate	(Bosselut et al., 2019)
	Knowledge Graphs	BERT model	Domain-specific pretraining corpus benefits classification models in identifying scientific relationship types	(Jiang et al., 2020)
<b>Question Answering Systems</b>	Reader services	GPT pretraining	Speech recognition, translation, and speaker ID for transfer learning	(Chung & Glass, 2020)

In short, these models with self-attention mechanisms used for semantic understanding demonstrate suitability for a variety of tasks that enable knowledge transferability across tasks, providing new research opportunities. It could be enabling cross-domain knowledge transfer and optimized computational efficiency, further elevating value in LIS. Meanwhile, Transformer models have potential to propel informatization processes and also offer model evolution, innovations and feature techniques.

In research are also finding specificity from the literatures:

1. In exploratory research, the utilization of small-scale datasets within transformer models is constrained by their limited data scale and modeling depth. Frequently, these studies employ diminutive language models that are trained and tested on small-scale datasets. Unfortunately, this approach falls short of effectively showcasing the complete potential of transformer models within exploratory investigations (Liu

et al., 2019; Sun et al., 2019; Wang et al., 2021; Yang et al., 2020). Due to differences in training data across studies, to truly validate the effectiveness and impact of transformer models, large-scale experiments are required. The limitations of data and model size lead to inadequate representation power, preventing current studies from realizing the full potential of transformer models. To better reveal the capabilities of transformers, domain-specific applications in LIS require expanded domain corpora and model architectures to further develop transformer capabilities tailored for the field.

2. Pre-trained models are often fine-tuned on generic corpora such as Wikipedia, news corpora, speech corpora (Bahdanau et al., 2016; Brown et al., 2020; Chung & Glass, 2020; Devlin et al., 2019; Liu & Lapata, 2019), which contain limited domain-specific terminology and constrain the relevance of knowledge learned by models, making findings more theoretical. The performance differences across models on LIS analysis tasks lead to blind spots in model selection, which prevents systematic evaluation and comparison of model effectiveness.

In summary, expanding data scale and leveraging pretrained models to improve language understanding, constructing domain knowledge bases, and conducting systematic cross-modal, cross-task comparisons to utilize models can better reveal the potential of transformer models. This will facilitate their application in processing techniques, providing new research directions to advance smart library and information services. It will also strengthen the applications and growth of information technology, further elevating the advantages and value of LIS.

## CONCLUSION

Through reviewing literature on the application, effects, and limitations of transformer models, this study makes the following contributions to library and information science:

1. Transformer models have self-attention mechanisms that compute relevance between any words in a text and long-range dependencies. This facilitates understanding of semantics and logical relationships between sentences and paragraphs, aiding in processing massive amounts of text (Vaswani et al., 2017). The application of self-attention effectively aggregates overall semantic meanings, enhancing holistic understanding of textual data and improving tasks such as library annotation, classification, retrieval, and recommendation.
2. Transformer models empower semantic capabilities through fine-tuning and neural network architectures, which have improved modeling of vocabulary usage, syntactic structures, and background knowledge for transfer learning (Radford et al., 2018; Vaswani et al., 2017; Waterworth et al., 2021; Yang, Dai, et al., 2020). Moreover, the knowledge extracted by transformer models through large-scale pretraining has transferability across tasks (Devlin et al., 2019), and it will help facilitate knowledge transfer and knowledge graph analysis in LIS.

Since Transformer models have advantages in textual and cross-task transferability, follow-up research can further realize the value of pretraining by expanding data scale and modeling depth, bringing new research directions to the library and information field. This study provides the following suggestions:

1. Large-scale domain-specific corpora constructed in LIS can enhance models by providing domain-specific knowledge, and leveraging enhanced feature extraction and representation with greater sensitivity to syntax and semantics. This can reduce data dependence and provide more flexibility in domain adaptation.
2. One research theme is exploring pretrained models with cross-lingual, cross-modal capabilities for diverse multilingual and multimodal data forms, such as texts, images, and audio in different languages



(Bahdanau et al., 2016; Chung & Glass, 2020; Liu & Lapata, 2019; Radford et al., 2018). The diversity of data can help improve model sensitivity. Joint pretraining on such cross-lingual, cross-modal data enables models to simultaneously learn semantic features across languages, and enhances the multilingual and multimodal capabilities for processing data

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# Session 7: Service Design and Design Thinking in Libraries

ALIEP 7-1 The Development of Learning Spaces in University Libraries Based on Changing User Needs  
(Yue Hu)

ALIEP 7-2 From Repository to Experience: Speculative Design for the Affective Intelligent Library  
(Han Chung and Ko-Chiu Wu)

ALIEP 7-3 An Exploratory Study of Emotional-Healing Audiovisual Works: The Case of Taiwanese Librarian with Emotional Exhaustion  
(Chen Su-may Sheih and Mei-Fang Tsai)

# The Development of Learning Spaces in University Libraries Based on Changing User Needs

## A case study of the Library Plaza at the University of Tokyo General Library

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### ABSTRACT

*Background.* As the educational functions of university libraries are undergoing a major turning point because of the importance placed on active learning, university libraries must support students' different learning approaches and meet users' various needs by providing them with a learning environment.

*Objectives.* Taking the Library Plaza (LP) at the University of Tokyo (UTokyo) General Library as a case study, this study aims to examine how users' needs have changed and adapted to the varying requirements of the library learning space over time.

*Methods.* This study conducted a comparative historical analysis. By comparing the development status of the LP with that of other university libraries from the 1960s to 2019, this research presents the relation between user preferences and learning spaces and information-seeking behavior.

*Results.* Since 1960s, the demand for more self-study areas has persisted until 2019, with users' needs for improved browsing space remaining consistent. The evolving needs that shape the library learning space include a greater emphasis on group study, expanded spaces for communication and conversation, and enhanced human support services.

*Contributions.* From a historical viewpoint, the relation between changes in user needs and learning space development must be clarified. By explaining the position of the learning space at the UTokyo General Library, one could imagine the future development of the space in university libraries.

### INTRODUCTION

In 2007, the "Research Report on the Future 'University Image' and the Role of the Library as the Foundation of Education and Information" discussed the relation between learning and library materials, the function of the university library as an educational infrastructure, and support for information literacy education (Tsukuba University National University Corporation, 2007). University libraries, no longer just repositories of information, have evolved into dynamic hubs that stimulate intellectual curiosity, critical thinking, and interdisciplinary collaboration. By creating a space that not only facilitates one-directional knowledge transfer but also fosters two-directional learning, university education currently has a positive impact on university library reforms.

The function of university libraries as spaces and the usage of these spaces themselves as active learning environments have emphasized the need to utilize the development of these buildings. While the traditional setup consisted of individually partitioned small study areas, the current design of learning spaces offers various functionalities, including individual study, collaborations, meetings, and academic support, such as study centers (Kawasaki, 2010, p. 121). This shift reflects the increasing demand for active learning environments, which is addressed by the emergence of "learning commons," which aim to create a conducive environment for active learning among students. Learning commons provide more interaction and collaboration opportunities, encouraging students to learn from each other and engage in discussions rather than just passively receiving information.

Recent years have observed significant changes in the way libraries are designed and utilized. The reduction in capital investment for dense bookcases, the rationalization of library spaces, and the emergence of electronic libraries have created new possibilities for transforming library spaces and have paved the way for the addition of study areas such as collaboration zones and technology-equipped learning commons. Space optimization has become a key focus in this transformation. University libraries are now focused on creating versatile learning environments that cater to their users' diverse study preferences and collaborative activities. By effectively responding to their users' needs, libraries aim to enhance the overall learning experience and foster a more dynamic and interactive educational atmosphere. User-centered services and personalized assistance become even more critical as libraries adapt to the dynamic needs of their users.

Under these circumstances, the library system of the University of Tokyo (UTokyo) has made various efforts to effectively align its offerings with user preferences. In the 1970s and 1980s, improvements in user services coupled with those in library operations were discussed with advances in information processing and communication technology. In 2012, the New University of Tokyo Library Project was implemented to change the library from a self-study space to an active learning space. This project introduced the UTokyo General Library Annex Library Plaza (LP), which functioned as a small room for lectures and research meetings, a learning space that supplements individual study. Based on the above, this study takes the LP as a case study and examines changes in users' needs and how these needs have adapted to the varying requirements of the library over time. By comparing the development of the LP with that of other university libraries in Japan across four periods from the 1960s to 2019, this study clarifies changes in learning spaces and user information-seeking behavior, shedding light on the dynamic nature of user preferences and how they affect the design and services of the library learning space.

## **OVERVIEW OF LEARNING SPACES IN JAPAN**

This section addresses the questions "What is the relation between the learning space of the university library and the form of learning in the university education context?" and "How can a learning space achieve successful learning?" to present an overview of the changes in the library learning space in Japan. This study examines the following components of learning spaces: spaces for reading and self-study; spaces for discussions such as group study, lectures, and presentations; and spaces for searching information, such as using a PC or an information terminal.

With regard to the relation between the university library learning space and the form of learning taking place in university education in Japan, changes in the learning space during class have been associated with the emphasis on active learning since the 2000s. Instead of students one-sidedly listening to lectures, active learning highlights interactions between lecturers and students in Japan. Changes in the learning space outside class are often examined after classifying learning types such as individual and group learning, static learning, and conversational learning. Because university classes have a certain effect on class-related learning and ability acquisition, learning styles cannot be considered effective for all students, and learning styles must be adopted according to the class contents and the students' characteristics (Morozumi, 2009, p. 205). As for self-study and group study in university libraries, studies have discussed individual independence, joint learning, and small-group learning, while others have mentioned the development of media centers.

Regarding the above question on the relation between the university library learning space and the form of learning in university education, it can be said that the former plays an important role in the latter. Users are demanding changes in conventional university library services, which emphasizes the library's function as a learning environment or learning space. With the increasing digitization of academic information, it is not enough for university libraries to simply accumulate knowledge mainly through paper books and provide a quiet study space (Kato, 2012, p. 1). In Japan, importance is being placed on the function of the university library as a learning environment.

Under these circumstances, this research not only focuses on how a space established with the starting point of promoting active learning affects learning itself but also examines how it can help achieve learning. Simply put, it clarifies the actions that a learning space must incorporate for learning

acquisition. In response to the trend in university education that emphasizes active learning, many studies have discussed the establishment or improvement of learning spaces associated with active learning, but they have also mentioned the ambivalence of active learning. As a method of education, active learning has been criticized by educational institutions and researchers from the fields of educational methodology and educational practice management. The introduction of active learning and proactive/conversational in-depth learning in the classroom may benefit only those with higher academic ability and exacerbate the gap in academic achievement (Kobari, 2018, p. 25). Furthermore, research must investigate how teaching methods and arrangements introduced in commentary books and handbooks are not implemented as they are as well as the conditions under which they were established.

While university libraries are required to function as a physical place, the problem of the functional disorder of the physical space has been raised. In addition, the issue of mixing intellectual activities that require completely different physical environments on the same open floor of a university library has been pointed out (Watanabe, 1998, p. 153). The balance between the learning and communication space and the efficient use of crowded time are issues that should be resolved by university libraries, for example, by using them during breaks and promoting discussions in places where conversation is not possible during busy periods such as exams (Ishizuka, 2013, p. 475). Based on the discourse on active learning and the problem of functional confusion in the physical space, this study conducted historical research on the LP from the 1960s to 2019 to determine the factors that influence the development of the library learning space.

## **LITERATURE REVIEW**

To describe the relation between the learning and library space and user needs, this section summarizes the status of research on study spaces in university libraries from the pedagogical significance of libraries, library information science, and architecture.

Studies on the pedagogical significance of libraries have clarified the current situation of university library usage and library services in Japan. Meanwhile, the question of how to improve library services, which was linked to how library facilities are developed and how the library as a learning space in a university is affected by changes in learning styles and views on learning, has not been sufficiently addressed. Specifically, as of the 2000s, the relation between study spaces and library services in university libraries has shifted from a place that provides electronic information access to one that provides human support (Yamauchi, 2011) and information resources. Research on the university library space before the 2000s focused mainly on the maintenance and improvement of library services (Miura, 1991), the current state of learning styles (Blimling, 1989), library user education (Anzai, 1982), and learning support (Masuda, 2000). Since the 2000s, studies on university library spaces have focused on the usage of university libraries and the delivery of information literacy education. Questions such as what kind of space for human support should be implemented and how the improvement of library services is linked to the development of library facilities needed to be considered.

In library and information science, many studies have examined the actual usage of libraries and users' self-awareness and behavior, yet fewer studies have investigated the association between the library as a space and user information behavior (Murakami, 1998). Research from the 1970s to the 1990s, which discuss the university library space from the perspective of information behavior, mainly focused on the development of academic information distribution systems and library networks (Murakami, 1996) and the factors that shape information (Tomie, 1992). From 2000 to 2019, studies examined the relation between information-related facilities and university libraries and learning support provided by information resources. Several studies also categorized information behavior by distinguishing between individual and group use and between conversation and quiet use (Nakai, 2014). This article referred to these studies to explain the type of information behavior at the UTokyo General Library, which has not been examined.

In university library architecture, discussions were focused on the spatial arrangement of chairs and seats (Tomie, 1987), users' information behavior based on the scale of university libraries (Hirayu, 2002), and case studies of space design plans for university libraries (Kayo, 2000). Based on these

research results, reforms aiming to create new libraries were implemented in various places. Examples include setting up a university-wide library system, actively introducing computers, adopting a fully open shelving system, and applying the concept of zoning of shelving according to the frequency of use of materials. Since 2010, many studies have discussed the facility layout of the university library as an environment that can support learning.

## **METHODOLOGY**

Rather than solely focusing on the current situation, this study examined the historical evolution of university library learning spaces, considering both spatial arrangements and students' information behavior within these spaces. It aimed to clarify the relation between users' needs and their information-seeking behavior by highlighting the dynamic nature of user preferences and how they influence library design and services. Specifically, this research explored changes in learning styles and learning spaces at the UTokyo General Library across four periods: 1960s–1980s, 1990s, 2000s, and 2010–2019. It adopted a historical perspective, conducting a comparative analysis from multiple angles, including changes in learning spaces, types of information-seeking behavior, the development of learning spaces in other university libraries, and shifts in user needs. By setting a development comparison axis between the LP at the UTokyo General Library and other university libraries in each period, this study described changes in learning spaces and the types of information-seeking behavior in the findings section. Based on these, we clarified users' needs and how they have changed with different requirements for libraries in the conclusion section.

Research materials mainly included the University of Tokyo Library Report, information published on the official website of the University of Tokyo New Library Project, and *The University of Tokyo Library System Bulletin*, which covers a wide range of topics including library collections, user services, innovative programs, renovations, and research conducted within the library system. As an official publication of the library, the bulletin plays a crucial role in keeping users and staff informed about the latest events within the library, making it an essential resource for this study.

## **FINDINGS**

### **1960s–1980s: The Modernization of University Libraries**

UTokyo integrated online searches, such as catalog searches and book browsing, with academic information systems, which emphasize information search behavior on the Internet. To respond to users' needs, the UTokyo General Library created a learning space for browsing books and journals on open shelves and enhanced the use experience of the academic information system. Specifically, to save space and improve users' research efficiency, the general library introduced computer output microform. The university general catalog, main library catalog, and bibliographies were organized to line up on the bookshelves, and the terminal devices on the tables complemented each other (Urada, 1982, p. 5). The number of open books was increased, and reading seats were placed in the center of the reading room.

Before the 1980s, university libraries in Japan mainly functioned as study libraries, with access to open books, back issues of journals, self-study spaces (use of seats only), audiovisual materials, and academic information systems. Information behavior observed during this period included browsing, self-learning, and individual learning. Moreover, while university libraries focused on the expansion of open bookshelves, the spatial scale of the storage of physical catalogs was reduced through the digitization of information. Influenced by this trend, audiovisual learning spaces in university libraries for lectures expanded. However, it was necessary to clarify whether the library's overall position followed the design of learning environments seen in other university libraries or the specifics of each university's situation (Mizuno, 1982). Tools for capturing the voice of users, such as surveys and evaluations of new learning spaces in university libraries from the 1960s to the 1980s, were inadequate.

## **The 1990s: Impact of the Digital Information Environment**

While Japan is proud of its large collection of books and its desire to preserve paper media, an extremely compelling need arose among students to access academic books electronically. Solutions such as the rationalization of paper materials through shared printing have been discussed (Research Infrastructure Subcommittee Academic Information Infrastructure Task Force, 2012, p. 3). The 1980s were an era of digitization and the provision of catalog information focused on bibliographic utilities, while the 1990s and later were an era of the utilization of the Internet and the expansion of electronic library functions (Takeuchi, 2005, p. 8).

Reports on the UTokyo General Library stated that between 1990 and 1999, the creation of media plazas, the addition of terminals for searching databases, and the provision of electric sockets for Local Area Network (LAN) terminals played a vital role in learning space development. The Media Plaza, which provided electronic information services such as search terminals installed in the library, CD-ROM integrated menus, and an educational computer center with resident consultants (Masuda, 2000, p. 18), was inaugurated in 1996 and was improved and expanded in 1999. Specifically, in response to requests for the use of notebook computers, information sockets connected to the campus LAN were installed in the reading seats so that these devices could be used in the seats in the open stacking rooms (The University of Tokyo Library, 1994, p. 45). However, the lack of a self-study space in the library was also raised during this period. In 1994, the “Future Image of the University of Tokyo Library” argued that while the library was being used as a space for self-study, it could not sufficiently provide this kind of space for students (The University of Tokyo Library Administrative Consultation Council, 1994).

In the 1990s, the main activity in the learning spaces of Japanese university libraries was information-seeking behavior to complete assignments and reports using electronic information. The style of teaching in universities changed from one-way lectures to one where students could find, research, and present problems independently in class. Thus, university libraries were required to respond to users’ personal needs. An example of an environment for presentations at a university was the media center at the Shonan Fujisawa campus of Keio University, which provided support for users, including equipment installation and human assistance (Murakami, 1996). In this period, alongside the installation of databases and LANs, self-study areas, places for interactions, spaces for independent activities such as presentations, and human support through information counselors were needed as well. However, with some exceptions such as Keio University’s Shonan Fujisawa campus, the organizational integration of the library function rarely took place in national universities.

## **The 2000s: Establishment of Automated Storage**

The spatial changes at the UTokyo General Library in the 2000s increased the amount of empty space and expanded learning spaces that can facilitate group learning and discussion. Some low-usage books and materials were moved to automated stacks. With the increase in free library space due to automated storage, the digitalization of catalogs, and the underground movement of open books, discussions about additional study space to support group study and interactions arose during this period. In the 2000s, self-learning spaces were the focus not only for quiet learning but also for information behavior, such as group learning where students can talk to one another. Many discussions on information behavior during this period were based on information behavior for individual study and conversational group study.

However, these measures also raised questions about the location of automated stacks and the convenience of user access to materials. A 2010 study on library use at UTokyo suggested that the library was used as a space and that campus location, rather than differences between the humanities and sciences, was a major factor in users’ different times for library use (Kawamura, 2010). Meanwhile, a 2008 survey revealed a dramatic increase in the number of postgraduate students using the general library whereas it had been assumed that undergraduate students were the ones who mainly used the library (Hoshino, 2008, p. 9). The library was used by a large number of postgraduate students, but the distribution of materials was not necessarily consistent with user trends.



In the 2000s, information media facilities merged with university libraries. Three functions were emphasized: the storage and lending of books and periodicals, education on information processing, and the open use of computers (Taniguchi, 2001, p. 96). After 1960, libraries and information media-related facilities started to combine. However, while there has been an increase in the number of information media facilities such as computer labs, the reality was that these facilities were generally not widespread in university libraries. In 2000, only 20% of university libraries had computer rooms for purposes other than research collection, of which only 12% had access to the Internet (Komamura, 2000, p. 196). Therefore, despite the increase in the number of information media facilities in libraries by 2010, one can assume that the situation was not that common in Japan.

### **2010–2019: Completion of the Library Plaza**

From 2010 to 2019, before the COVID-19 measures, the completion of the LP indicated that the UTokyo General Library focused on the establishment of hybrid libraries and the support for group learning. The LP integrated the electronic library and the traditional library in terms of providing materials. Learning spaces such as the educational campuswide computing system room and the computer room with access to networks and databases were added to provide materials for the electronic library service. Regarding the provision of materials for traditional library services, spatial changes included the addition of open stacks and the construction of underground automatic stacks. An automatic stacker room was created in the basement of the square in front of the main building of the general library, with a capacity of about three million books (The University of Tokyo Library, 2013, p. 2). This created space in the main building where more books could be collected. The need to preserve and use paper materials was also considered while emphasizing the accessibility of electronic materials. Creating a hybrid library, where electronic information can be freely interchanged with physical books, was considered a measure to meet the needs of the general library user.

Moreover, encouraging group learning was the starting point of the LP, with emphasis on support for active learning. The LP was expected to facilitate group work, such as discussions, presentations, and debates, to accommodate different learning styles and foster a stimulating environment for diverse users (The University of Tokyo Library, 2015, p. 6). However, according to the 2012 general library use survey, users did not strongly request for more space for voluntary, active group study. Focusing on the renovation plan of the general library, a questionnaire survey was carried out with 457 responses from those who visited the general library between July 9 and 16, 2012 (The University of Tokyo Library, 2012, p. 1). The survey results showed that 97% of the respondents often worked independently when studying, conducting surveys, and doing research (The University of Tokyo Library, 2014, p. 16). The most common reasons for using the general library were “It has the books and magazines I need, it is quiet, and I can concentrate” (The University of Tokyo Library, 2014, p. 10). Meanwhile, less than half of the respondents mentioned “working in groups, chatting, and increasing the number of study rooms that can be used in groups” (The University of Tokyo Library, 2014, p. 17).

Since the 2010s, greater emphasis has been placed on learning commons, which universities in Japan began to establish. By 2019, many universities had established their own learning commons, characterized by the small groups of people using the space. Research on learning commons showed that single desks were used when one or more people were not talking, but when three or more people were not using the single desks, the place was quiet (Abe, 2019, p. 348). Because large fixed tables for many people were arranged in a straight line, they were not used by three or more people working together and tended to be used by two or fewer individuals (Abe, 2019, p. 349). In this way, the establishment of university library commons in Japan should be divided by function and number of users, as the coexistence of many activities in one library should encourage student use.

### **DISCUSSION AND CONCLUSION**

Comparing the LP at the UTokyo General Library with other university libraries in terms of changes in learning spaces and types of information-seeking behavior, this study identified its multifunctional and comprehensive role. That is, the LP serves as an open space combining various functions and

simultaneously accommodating diverse learning activities. This study highlighted two key aspects of the LP's positioning. First, it functioned as a supplementary learning space within the general library. Second, it may evolve into a space for discussions and career support, which includes job searches.

By tracking the change in Japanese university libraries in each period, we described how user needs for learning spaces have changed and clarified how user preferences affect the design and services of the library learning space. Patrons require spaces to study and spaces to browse. Since the 1960s, the demand for additional areas for self-study or individual study has been evident and has persisted through 2019. Meanwhile, users' needs that have remained relatively constant focused on their desire for enhanced browsing space. Regardless of changes in the medium of library materials, such as paper and digital, users continue to demand access to them in the library learning space. With regard to reading materials other than books, many cases have discussed the expansion of magazine reading centers, the installation of terminals for electronic information access, and the establishment of new spaces where information can be searched and browsed, such as media centers and media plazas. Notably, some users consider the atmosphere of being surrounded by books and the exploration of materials without search targets in the library learning space as appealing. This desire has become particularly prevalent since around 2010, coinciding with the introduction of automated stacks and the increase in closed-shelving materials to optimize the book collection space.

Three major shifts took place with respect to users' needs: an emphasis on group study, the expansion of spaces for communication and other forms of conversation, and the provision of human support. While individual study has been the traditional function of the library, since the beginning of the 2010s, emphasis has been increasingly placed on group study spaces where students can interact. The library space is changing such that small, medium, and large groups can come together, for example, by creating a roundtable, setting up a lounge, and using the magazine reading room for lectures. The library learning space has become an option for friends or fellow students in a group. Active learning, represented by group learning, has also influenced the design of learning spaces in many university libraries since the 2010s.

Besides providing a traditional quiet learning environment, university libraries have also increased their spaces for communication and other forms of conversation. This may also reflect changes in the needs of library users. We have observed that because many students have nowhere else to go other than their classrooms, they were inclined to stay in the library. In addition, study spaces in university libraries have become places for users who cannot use a classroom and are looking for an area to practice presentations and pronunciation and use audiovisual materials. Diverse learning environments such as project box group rooms, soundproof seminar rooms, and research commons have emerged. Finally, users' need for human support became apparent alongside changes in the learning space. Combining human support with physical furnishings began to be emphasized. Many users not only demanded improvements in the arrangement of chairs and tables but also valued the human support provided in the space, such as the need for postgraduate tutorial resources to facilitate writing practice, while seeking a place to interact with others.

The integration of library services emerged as a formidable challenge, a consequence of evolving user preferences. This challenge encompassed multifaceted issues, including the perplexity arising from the coexistence of various learning activities within the same physical space and the potential hindrances encountered by library services due to the fragmentation and dispersion of resources. LP at the UTokyo general library which served as a case in this study, illustrated these challenges emanating from the interaction between the general library and its affiliated departmental or institution libraries. Examining how user requirements for learning spaces have changed over time and how user preferences influence the design and services provided within library spaces became pivotal factors. These considerations served as points of reference to address the functional confusion experienced within learning spaces and to achieve a seamless blending of services between the general library and departmental libraries.

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# From Repository to Experience: Speculative Design for the Affective Intelligent Library

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## ABSTRACT

*Background.* The evolution of libraries in the digital age requires a reimagining of their roles and services. The fusion of technology trends and the post-pandemic reality requires a reevaluation of library functions and a departure from conventional paradigms.

*Objectives.* This paper employs Speculative Design to envision an affective intelligent library that bridges the gap between traditional repositories and the evolving needs of post-pandemic learners. This study embarks on a journey to uncover both transformative capacities and research avenues within the realm of libraries by delving into the three fundamental components: information, human, and space.

*Methods.* Employing the Speculative Design approach, this study engages in speculative exploration of potential scenarios within the recognized dimensions through the lens of technology. Our speculation is grounded in three pivotal dimensions: information(books), human interactions, and spatial design.

*Results.* By utilizing Speculative Design across the three designated dimensions, the information(books) aspect focuses on restructured metadata frameworks, while human interaction delves into co-creation and community resonant spaces facilitated by AI. In spatial design, transformation into an intelligent space coupled with the integration of chatbots and AR/VR technologies enriches reader experiences. In line with these transformative shifts, the speculative scenarios we envision within these dimensions have the potential to redefine the library's role as an interactive, immersive experience hub. Metadata co-creation drives library transformation into dynamic, personalized repositories fostering deeper user engagement. Integrating Generative AI and blockchain mechanisms incentivizes active user involvement and co-creation. Emotionally sensitive spaces and interfaces cater to diverse reader profiles.

*Implications.* This paper underscores the urgent need for libraries to adapt to the changing landscape of modern learning. The proposed concept of an affective intelligent library, drawing on Speculative Design's forward-thinking potential, aligns with real-world technological advancements. The implications aim to catalyze discussions on the evolving role of libraries in the digital era. Specifically, several research areas are identified: (1) the interplay between learning patterns, cognitive processing, and emotional states; (2) the cognitive and emotional impact of different interface designs, the influence of interfaces on emotions, preferences, and selective perception; and (3) utilizing interfaces to filter information. These research avenues hold the promise of shaping more effective and emotionally resonant learning experiences, enhancing user engagement, and transforming libraries into vibrant knowledge co-creation spaces.

## **INTRODUCTION**

In an era characterized by technological leaps and post-pandemic shifts, libraries face a critical point in their evolution. The conventional concept of libraries as static repository of information is no longer sufficient. The confluence of technological trends and societal shifts demands a fundamental rethink of the library's role and function.

This paper employs Speculative Design to envision an innovative concept: the affective intelligent library. This forward-looking approach explores how libraries can bridge the gap between traditional repositories and the dynamic needs of learners in the digital age. By examining three dimensions—information/books, human interaction, and spatial design—this study seeks to uncover transformative potentials that could redefine the core purpose of libraries in the post-pandemic context.

Through the lens of Speculative Design, we delve into speculative scenarios within each dimension, envisioning how libraries can adapt to become vibrant, user-centered knowledge hubs. These scenarios anticipate the transformation of metadata frameworks, the rise of co-creation facilitated by AI, and the fusion of physical and virtual spaces through emotionally responsive interfaces.

Through this exploration, our goal is to stimulate discussions and drive research into unexplored areas, investigating how learning patterns, cognitive functions, and emotions intersect, alongside the significant role of interface design in user engagement. Through such discourse, we envision libraries as dynamic catalysts for personalized, emotionally resonant experiences, rather than mere static repositories.

## **LITERATURE REVIEW**

### **1. Transforming the Role of Libraries**

In the modern landscape, libraries face a range of challenges that inherently necessitate a thorough reevaluation of their fundamental purpose. The transition from serving merely as repositories of knowledge to evolving into dynamic learning spaces and sociocultural hubs signifies a significant and imperative transformation (Bennett, 2005). This evolution obliges libraries to transcend traditional roles and wholeheartedly embrace novel dimensions of interaction, engagement, and knowledge dissemination (Gylje, 2022). A notable trend in response to shifting user expectations and contemporary needs is the emergence of intelligent libraries, designed to facilitate personalization and co-creation (Cox et al., 2018).

### **2. Personalized Learning and Emotionally Responsive Environments**

In the digital era, the landscape of learning is undergoing a complex evolution that underscores the importance of personalized approaches and emotionally attuned settings. An influential contributor to this academic domain is Perkrun, who introduced the concept of academic emotions that encompasses a range of emotional experiences individuals undergo during their academic pursuits and learning journeys (Perkrun & Stephens, 2012). In education and research, there is increasing recognition of the pivotal role that emotions play in shaping learning pathways, educational experiences, and, ultimately, learning outcomes. This realization is strongly supported by Allison Druin's research, highlighting a robust correlation between emotions and information-seeking behaviors (Druin, 2005). The importance of understanding and interpreting readers' emotions as a cornerstone of appreciating their diverse learning styles, preferences, and emotional dimensions cannot be overstated (Lajoie et al., 2020).

In this context, intelligent libraries emerge as pivotal catalysts, poised to offer customized experiences that effectively address the unique learning styles and emotional engagement of individual users. This significant paradigm shift underscores the crucial role technology plays in empowering libraries to adeptly address users' distinct information needs and intricate emotional states.

### **3. Speculative Design: A Forward-Thinking Approach**

The deliberate integration of Speculative Design in this paper originates from its inherent effectiveness in stimulating a comprehensive re-examination and transformation of libraries' future roles. Imbued with the philosophy of boldly challenging established norms and creatively envisioning alternative possibilities, Speculative Design encourages discourse on the profound evolution of libraries' multifaceted functions (Dunne & Raby, 2013). This innovative approach, which traced its origins to the pioneering work of Dunne and Raby, serves as a robust methodology that actively prompts the formulation of bold inquiries and the exploration of uncharted scenarios.

Building upon this point of view, Johannessen improves our understanding by elaborating on speculative design as a form of discourse used to skillfully explore and expand concepts (Johannessen, 2017). In the context of this paper, the deliberate utilization of Speculative Design serves a dual purpose: it systematically probes the inherent essence of libraries, thoughtfully examines their anticipated relevance amidst evolving paradigms, and astutely reevaluates the complex interplay among diverse elements within the expansive library ecosystem. This multifaceted exploration underscores the idea that Speculative Design emerges as a potent tool to envision and chart the evolving path of libraries' contributions in an ever-changing realm of information and interaction.

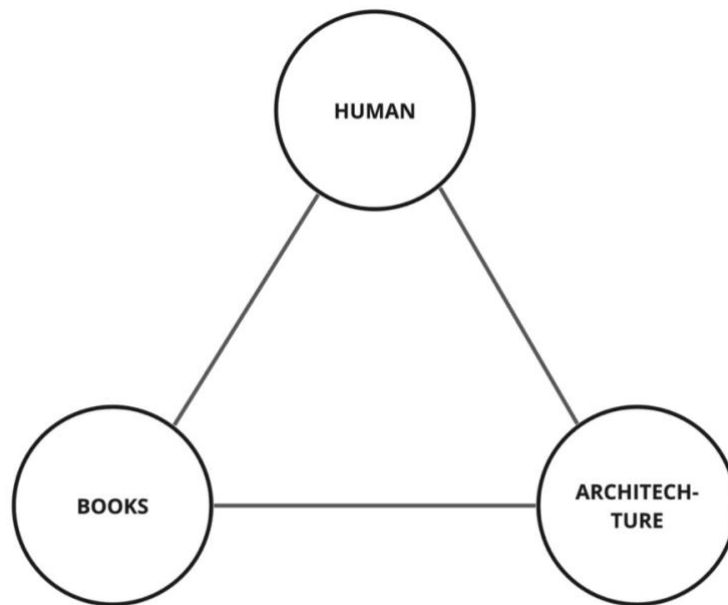
## **METHOD**

### **1. Envisioning the Affective Intelligent Library**

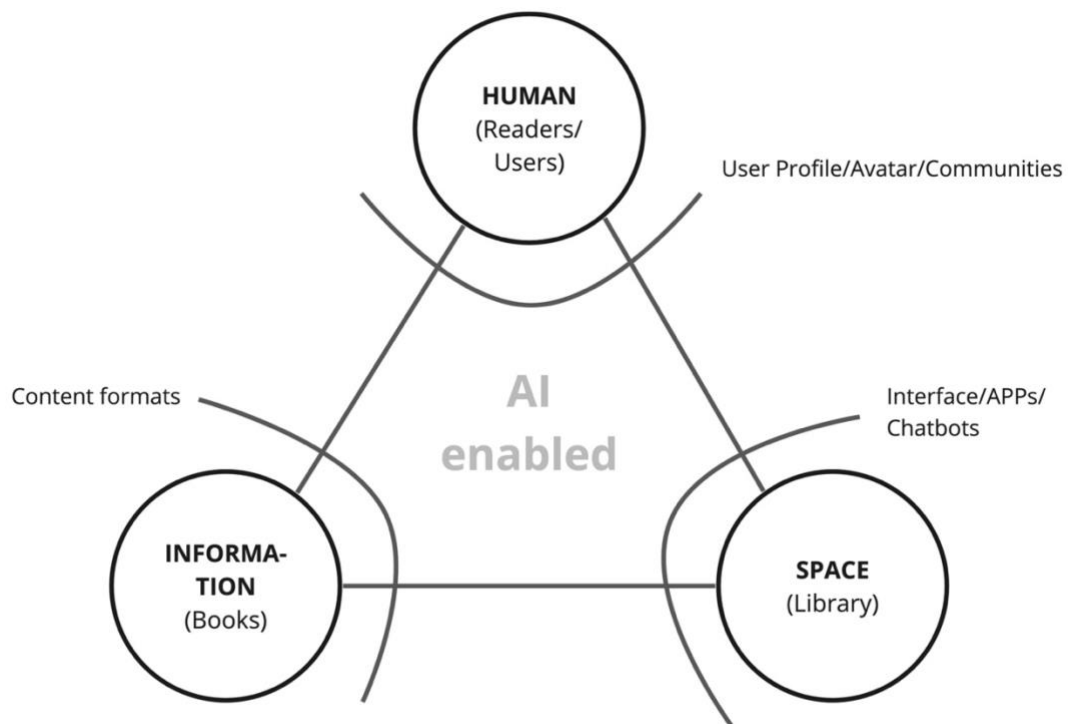
To guide the development of the affective intelligent library, we utilize Speculative Design as a creative tool to imagine different possibilities (Johannessen et al., 2019). Our exploration covers three key aspects: information/books, human interactions, and spatial design. These elements, illustrated in Figure 1., are the foundation of the digital transformation of library architecture, and their interactions play a crucial role in shaping the library's transformation (Wu, 2014).

### **2. Understanding Each Component and Their Connections**

Our analysis examines the connections among three fundamental components of the proposed model: information/books, human interactions, and space. The triangular relationship formed by these components lays the basis for how the library interacts with humans. From a broader perspective, the organization of information changes from rigid predetermined categories to adaptable structures shaped by users. On the user side, reader communities become active participants in creating knowledge, adding an emotional dimension to the information environment. The spatial aspect transforms into a blend of physical and virtual realms, with interfaces that detect and respond to users' emotions and preferences.



**Figure 1. A visual representation of the three main dimensions in library architecture (Books-Human-Architecture) (Wu, 2014)**



**Figure 2. A refined visual depiction of the AI-enabled triangular relationship among key components (Information-Human-Space)**



## RESULT

We depict the library through a visual triangle, showcasing the interconnectedness of its three core components: information/books, human interactions, and spatial design. These elements constitute the basis of the envisioned affective intelligent library, serving as the cornerstone for our speculative investigation. The transformation occurs across three dimensions:

### 1. Information (Books)

Within Figure 2, the information(books) dimension stands as a fundamental element of this model, encompassing a wide range of information forms. Our means of accessing information have diversified. While traditional methods center around reading physical books, modern approaches embrace digital devices such as Kindles. As multimedia gains prominence as an information storage medium, our pathways to accessing information have substantially widened.

The progression of libraries' informational dimension introduces two key paradigms: challenges and opportunities. Historically, libraries conserved information through physical books. However, in the digital age, the connection between information and its physical form has become more malleable. Traditional professional knowledge frameworks might not sufficiently captivate readers; consequently, the skill of crafting compelling information curation has gained significance.

Restructuring metadata has become imperative. The forthcoming library surpasses conventional categorizations and adopts personalized metadata. This shift entails a departure from rigid classifications towards reader-driven folksonomies. Metadata transforms from rigid divisions to flexible, user-generated folksonomies. User information, which encompasses recommendations, feedback, emotions, preferences, searched keywords, and shared personal anecdotes, collectively shapes a user-oriented knowledge framework.

The complexity lies in collecting these data, categorizing users, recognizing information-seeking patterns, and delivering tailored content. The objective is to institute a co-crafted repository upheld by a user-conscious, community-responsive system. The integration of current data and a blockchain-driven incentive mechanism amplifies user participation, nurturing active user participation in shaping the library's knowledge terrain and nurturing a vibrant knowledge ecosystem.

#### *Suggestions*

Libraries must evolve beyond their conventional role as simple repositories in a digitally limitless environment.

#### *Prospects*

A dynamic metadata system grounded in folksonomies arises, facilitating customized content suggestions and cooperative knowledge generation.

### 2. Human (Readers/Users)

Our engagement with information happens not solely by physically visiting libraries, participating in offline book clubs, or engaging in online communities, but also through non-physical means like avatars and even automated systems. People access knowledge through various channels, such as Google, YouTube, Siri, and Alexa, which cover a variety of formats.

Studies reveal a notable surge in digital media usage among 8th, 10th, and 12th graders in the United States. This trend has caused adolescents to dedicate more time to digital media, resulting in decreased reading hours (Twenge et al., 2019). This highlights the need to implement inventive multimedia consumption approaches within library settings. A possible resolution involves allowing community access and encouraging user input in shaping library knowledge. Collaborative content creation is now prevalent in the realm of social media, even leading to the term "Prosumer," signifying both "Producer" and "Consumer." Applying this concept to the library context presents a notable challenge.

However, through collaboration and community support, value is enhanced, facilitating smooth social interactions and knowledge gathering. Consequently, the envisioned library evolves into a center for collaborative knowledge generation. Assisted by Generative AI tools, a future scenario envisions ongoing collaboration between AI and humans in content development. Blockchain technology introduces a rewarding system that motivates user engagement while safeguarding privacy through decentralized identity management. As diverse reader profiles converge and exchange preferences and values, a blockchain-driven Decentralized Autonomous Organization (DAO) becomes pivotal in achieving secure consensus. Library patrons transition from being passive consumers to becoming active contributors in content co-creation. Generative AI empowers readers to participate, reshaping the library's role into a vibrant space for collaborative knowledge creation. The use of blockchain technology introduces a reward mechanism that incentivizes active participation while maintaining privacy through decentralized identity management.

### *Suggestions*

Libraries must move from passive to active, collaborative participation to maintain their relevance.

### *Prospects*

Generative AI facilitates collaboration, and blockchain encourages contributions, nurturing a shared community for personalized and emotionally meaningful interactions.

## **3. Space (Library)**

In Figure 2, the concept of "Space" also encompasses the library, whether physical or digital. Interactions with this space can occur through visiting a physical library, exploring its virtual counterpart using AR/VR technology, using an app interface, or even interacting with a virtual agent like a chatbot or voicebot.

In terms of physical spatial design, following the principles of Universal Design becomes crucial in accommodating a diverse range of readers' needs (Wu, 2011). When considering service touchpoints, the library serves readers through a variety of means—interfaces, apps, chatbots, both physical and virtual. The readers engage with these touchpoints to access the information they seek. To cater to diverse readers and provide personalized responses, an intelligent library ecosystem is necessary. This means that touchpoints, interfaces, or chatbots need to have a certain level of intelligence. Using large language models (LLMs) and semantic analysis, the library can gain a deep understanding of users' needs, enabling a more profound approach to interaction and response. Therefore, the development of efficient detection and responsive systems becomes a crucial research domain. Moreover, exploring emotion and behavior detection within both virtual and physical spaces emerges as an important area of focus.

We envision libraries transitioning from mere reading spaces to responsive environments through personalized and emotionally aware interfaces. These interfaces, sensitive to the preferences, emotions, and expressions of the readers, revolutionize the interaction. The library's role surpasses that of a repository, becoming a collaborator and an enabler of personalized experiences. Incorporating conversational AI technologies such as chatbots and voicebots has the potential to significantly enhance learners' intrinsic motivation, as supported by research evidence. Studies have shown that students in the chatbot learning group showed notably higher levels of intrinsic motivation compared to their counterparts in traditional learning settings (Yin et al., 2021).

### *Suggestions*

Embrace Universal Design principles for physical spaces, implement intelligent design for library interfaces and chatbots to cater to diverse user needs, and be emotionally responsive to enhance engagement.

### *Prospects*

Integrating conversational AI, such as chatbots and voicebots, could notably boost learners' intrinsic motivation and foster more personalized library experiences. The interfaces adapt to the user's emotions, offering personalized experiences. Libraries become collaborative, emotionally aware spaces.

## **DISCUSSION & IMPLICATIONS:**

Exploring the interconnected dimensions—Information (Books), Human (Readers/Users), and Space (Library)—opens avenues for vital discussions and research inquiries. These dimensions offer fresh insights into the potential of modern libraries while posing intricate challenges that warrant further exploration.

### **1. Learning Patterns and Information Consumption**

Understanding the intricate relationship between learning patterns, cognitive processes, and emotional responses is a significant research domain. Investigating how information consumption is linked to emotional impact could reveal insights into optimizing learning environments. This might lead to customized educational methods that integrate emotional intelligence and cognitive adaptability.

#### **2.1 Interface Influence on Cognitive and Emotional Factors**

The role of interfaces in shaping cognitive processes, cognitive load, and emotional responses deserves a thorough examination. Researching how interfaces impact people's cognitive styles, emotional reactions, and learning experiences can guide interface design that promotes efficient information processing and emotional engagement.

#### **2.2 Emotional and Preference Effects of Interfaces**

Exploring the complex interaction between interfaces and users' emotions and preferences is a crucial focus area. Understanding whether interfaces trigger selective thinking and how emotions and preferences affect information absorption can provide insight into creating emotionally

engaging, customized learning experiences. This could improve content delivery by catering to individual preferences and emotional states.

### **3. Information Filtering through Interfaces**

Strategically using interfaces to filter and present information is a promising research avenue. Analyzing how interfaces influence user information selection, consumption, and retention could result in user-centric, intelligent information delivery systems. These systems might optimize content presentation to ensure users receive information aligned with their cognitive abilities and emotional states.

In general, these research areas can reshape the course of modern libraries and learning settings. These discussions prompt libraries to evolve from static repositories into dynamic knowledge hubs that address individual learners' cognitive and emotional requirements. Advanced technologies like Generative AI and blockchain underscore the importance of cultivating user engagement and co-creation. By addressing these research questions, libraries can redefine their role as transformative spaces that not only grant information access, but also facilitate emotional intelligence growth, cognitive development, and personalized learning experiences.

As libraries move toward emotionally responsive, technologically advanced environments, tackling these research areas empowers educators, designers, and policymakers to guide libraries to become vital facets of learners' cognitive and emotional progress. Ultimately, the consequences of these discussions go beyond libraries, influencing education and technology, ushering in an era of intelligent, user-centered learning encounters.

## **CONCLUSION**

The dynamic interplay of Information, Human, and Space within libraries in the digital age illustrates the library's evolution. This model not only illuminates the present challenges and possibilities, but also sets the stage for future research directions and transformative changes in the library landscape.

The concept of information has expanded beyond traditional boundaries, embracing digital formats and blurring physical and virtual repository lines. As libraries navigate this evolution, reconstructing metadata and moving from rigid classifications to personalized folksonomies becomes vital. This shift offers libraries an opportunity to become living repositories, co-created by users and supported by technologies like blockchain, which incentivizes participation, rewards input, and safeguards privacy.

Human interaction with libraries is undergoing transformation, with interfaces and co-creation driving active engagement. The introduction of Generative AI and blockchain facilitates the creation of collaborative content and the building of secure consensus. This marks the end of passive consumption, propelling users into content co-creators, revitalizing the library's relevance, and fostering emotionally resonant learning environments.

The spatial dimension of libraries, physical or digital, is redefined by innovative interfaces and emotionally tuned designs. Embracing the possibilities of conversational AI, such as chatbots and voicebots, promises enhanced learning motivation. Universal design principles for physical spaces and intelligent interfaces nurture an inclusive, responsive environment, cultivating personalized experiences that transcend reading spaces.

In conclusion, this model portrays libraries as vibrant hubs of co-created knowledge, fostering meaningful human interactions, and catering to diverse user needs. Shifting from

passive to active, co-creative engagement aligns libraries with the digital landscape's evolution. The possibilities are vast: dynamic metadata systems, emotionally tuned interfaces, and community-driven knowledge creation. As libraries embrace transformation, they shape the future of learning and knowledge sharing, ensuring lasting relevance in a rapidly changing world.

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# **An Exploratory Study of Emotional-Healing Audiovisual Works**

## **The Case of Taiwanese Librarian with Emotional Exhaustion**

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### **ABSTRACT**

*Background.* Emotional exhaustion among employees has become a major concern in today's workplace and can negatively affect both employees and organizations if not promptly detected and addressed. Surveys have found that librarians also suffer from emotional exhaustion. Studies have also shown that movie therapy can help alleviate negative emotions and foster psychological resilience. However, no research has investigated whether audiovisual works can ease the distress of librarians who experience emotional exhaustion.

*Objectives.* To understand work stressors and the resulting emotional exhaustion among librarians, as well as to explore their underlying causes. Additionally, to examine how specific audiovisual works facilitate the emotional healing of librarians who experience emotional exhaustion through processes of identification, catharsis, and insight. Finally, to analyze the relevant factors that contribute to the emotional healing efficacy of audiovisual works on librarians with emotional exhaustion.

*Methods.* This study performed content analysis to initially select film materials on workplace situations. A total of 14 Taiwanese librarians experiencing emotional exhaustion underwent two semi-structured in-depth interviews to understand their work stressors, experiences with emotional exhaustion, and the emotional healing efficacy of certain audiovisual works in terms of identification, catharsis, and insight. The study also aimed to identify the contributing factors to these effects.

*Results.* Four main factors were found to contribute to emotional exhaustion among librarians. First is the inherent nature of library work. Second is organizational issue or ineffective management. Third is poor interpersonal communication. The last factor involves temporary circumstances such as the COVID-19 pandemic or playing the dual role of a working parent. Among the 14 audiovisual works matched with the participants, 13 were found to induce the emotional healing efficacy of identification, catharsis, and insight. The factors that drove these effects included the characters' resemblance to the participants, logical and coherent plot developments, portrayal of emotional fluctuations, display of positive character traits, and positive resolutions to the relevant issues in the audiovisual works.

*Contributions.* Firstly, for individual librarians, those facing similar challenges are encouraged to watch the emotion-healing audiovisual works featured in this study to ease their negative emotions and regain positive energy to cope with various workplace difficulties. Similarly, library organizations and management personnel can also use the emotion-healing audiovisual works in this study as part of their in-service training courses on emotional management, interpersonal communication, and conflict resolution for librarians. Moreover, the emotion-healing audiovisual works featured in this study can also serve as references for collection development in libraries.

## INTRODUCTION

Burnout has become an increasingly prominent issue in the contemporary workplace. Particularly, the COVID-19 pandemic has significantly intensified the variability of work demands, causing a sudden outburst of long-held negative emotions among employees and further exacerbating the burnout situation (Kelly, 2021; Limeade, n.d.). Similarly, recent surveys involving library professionals have revealed incidences of burnout among librarians with a severity comparable to that experienced by professionals in other caregiving industries, which are known for high levels of job-induced stress (Agyei et al., 2019; Lindén et al., 2018; Sheih, 2010; Wood et al., 2020). Despite ongoing calls from the library community for organizations and managers to assume leadership responsibilities, address the emotional well-being of librarians, and propose coping strategies for work-related stress and negative emotions (Artman, 2017; Quinn, 2017; Sheih, 2016), librarian burnout has been consistently overlooked (Christian, 2015; Hogarth, 2017; Salyers et al., 2019).

Nevertheless, the World Health Organization (2019) has officially included burnout in its 11th revision of the *International Classification of Diseases*. Burnout is characterized by

three main symptoms: emotional exhaustion, depersonalization, and diminished personal accomplishment (Maslach & Leiter, 2016; Maslach et al., 2001). Among these dimensions of burnout, emotional exhaustion is widely recognized as the central aspect by most scholars (Kristensen et al., 2005; Shirom & Melamed, 2006). When employees experience symptoms of emotional exhaustion, they may have been burdened by excessive workloads or inadequate resources to meet their job demands. This in turn can weaken their commitment to the organization, lead to poor job performance, and further amplify their intentions to quit, which may compel them to leave their current position (Leiter & Maslach, 2016; Maslach & Leiter, 2008).

Recent surveys have found that watching television and movies and engaging in online activities are common ways for employees to unwind and rejuvenate (Huang, 2019; Qui, 2020). Particularly, with the rise of streaming media services, Taiwanese individuals have increasingly preferred watching drama series or movies to relieve their psychological stress (Kantar & LifePoints, 2020). Be it a movie or a TV series, what truly captures people's hearts is the underlying story (Peng, 2016; Shuiwang & Shuimou, 2019). Specifically, individuals link their experiences to those of the characters while interacting with them, giving rise to a sense of "identification." Subsequently, as the plot unfolds, individuals undergo emotional ups and downs alongside these characters, providing them with a sense of "catharsis" that helps alleviate their personal negative emotions and induces positive feelings. Ultimately, by witnessing how the characters deal with challenges and dilemmas, individuals gain "insight" into resolving their problems. This process of emotional healing, achieved through engagement with appropriate materials, embodies the essence of "bibliotherapy," in which materials beyond books are used, including audiovisual works, such as films and TV series (Sheih, 2020; Sheih & Huang, 2016). This extension of bibliotherapy into the realm of films and TV series is commonly referred to as "movie therapy" or "cinematherapy" (Higgins & Dermer, 2001).

Research has explored the emotional healing efficacy of films or TV series on university students dealing with heartbreak or career development challenges, homeless individuals, and adults experiencing conflicts in their intimate relationships (Eğeci & Gencoz, 2017; Huang, 2015; Sheih, 2021; Yeh, 2011). However, a review of existing literature highlights an absence of empirical research on the use of films or TV series as a supportive approach for librarians dealing with emotional exhaustion.

This study aims to promote an understanding among librarians who experience emotional exhaustion that watching emotional-healing audiovisual works can alleviate their



negative emotions due to work-related stress as well as reignite their resilience. Ultimately, this can empower them to courageously confront different challenges in their work.

## **LITERATURE REVIEW**

### **Definition, Consequences, and Common Work Stressors for Librarians Resulting in Emotional Exhaustion**

This study defines *emotional exhaustion* as “the initial symptoms of burnout, resulting from an individual’s perception of excessive job demands, which cause a profound sense of fatigue and emotional depletion.”

Based on comprehensive findings from relevant research, the work stressors commonly experienced by librarians can be categorized into five main aspects:

**Library work:** Some stressors are attributed to the monotonous and highly repetitive nature of library tasks, which can lead to a stereotypical perception of librarians’ roles. This causes readers and related stakeholders to overlook the professionalism of librarians, making it challenging for librarians to receive acknowledgment and positive feedback (Jordan, 2014; Sheih, 2010). Additionally, rapid advancements in information technology entail constant changes, budget constraints, and staffing reductions alongside diverse information demands from patrons, which can make librarians feel overwhelmed by their workload and a lack of control (Christian, 2015; Lindén et al., 2018; Smith et al., 2020).

**Patrons:** Various situations involving patrons, such as criticism and complaints, unreasonable demands and attitudes, a lack of constructive feedback and respect, and misconduct, not only make librarians feel unappreciated but also accumulate negative emotions (Lowe & Reno, 2018; Martini et al., 2019; Sheih, 2016).

**Supervisors:** Issues with management and leadership styles, such as a lack of positive feedback from supervisors, insufficient support or unclear strategic direction, failure to consider librarians’ opinions or address their concerns, unfair workload distribution based on job responsibilities, and poor communication, significantly affect librarians’ emotions and work burden (Salyers et al., 2019; Shupe et al., 2015; Smith et al., 2020).

**Colleagues:** Lack of support, trust, recognition, or feedback from colleagues, as well as ineffective communication with one another, can lead to negative emotional experiences for librarians (Jordan, 2014; Sheih, 2010).

**Organization:** Problems associated with resource allocation and policies, such as inadequate budget, unsatisfactory salary and benefits, limited opportunities for professional

development or career advancement, and biased performance evaluations or differences in organizational values or goals, can make librarians feel a lack of control and trigger negative emotions related to inequity (Lindén et al., 2018; Sheih, 2010; Smith et al., 2020).

### **Emotional Healing Mechanisms and Principles for Selecting Materials in Movie Therapy**

Like bibliotherapy, movie therapy triggers an emotional healing process among viewers through the consumption of appropriate film materials, resulting in identification, catharsis, and insight (Berg-Cross, et. al., 1990; Hesley & Hesley, 2001; Sharp et. al., 2002). Simply put, by watching movies, individuals relate their thoughts, emotions, or experiences to those of the characters, thus comprehending their behaviors and motivations, leading to a sense of resonance. Concurrently, during the film-viewing process, individuals share the characters' joys and sorrows, which allows them to release suppressed emotions and achieve a sense of tranquility. Ultimately, the viewers' exposure to how the characters in the film confront challenges and dilemmas prompts novel perspectives and behaviors. Consequently, individuals regain the fortitude to confront difficulties (Sheih, 2021; Wolz, 2010).

The researchers synthesized the criteria for selecting emotional healing audiovisual works from relevant literature and categorized them into four main principles. The first principle emphasizes that the plot or theme should align with the emotional issues that the individuals face and consider the similarity between the characters and the individuals in terms of age, socioeconomic background, educational level, values, and life stage (Hesley & Hesley, 2001; Kuriansky et al., 2010; Wedding & Niemiec, 2003). The second principle entails organizing the plot to portray how characters respond to challenges, whether by demonstrating positive attitudes or coping with such difficulties correspondingly. This can prompt individuals to contemplate effective or ineffective approaches to addressing their issues (Hesley & Hesley, 2001; Huang, 2015; Sheih, 2021; Yeh, 2011). The third principle considers the individual's preferences for movie genres and avoids films that may evoke discomfort, such as violence, horror, or explicit content (Kuriansky et al., 2010; Wolz, 2010). Lastly, with regard to TV drama materials, the duration of the video content is an essential consideration. This involves selecting episodes that provide relevant content without compromising the overall context of the storyline while also ensuring that viewers do not spend excessive time and energy watching the videos (Haddad & Shechtman, 2019; Huang, 2015).

## METHODOLOGY

### Instruments and Procedure

This study conducted content analysis and semi-structured in-depth interviews to collect and analyze research data. Content analysis is an objective and systematic technique for gathering articles and analyzing their substance (Liang, Chuang, & Wu, 2012; Neuman, 1997/2000). First, a wide range of relevant books, websites, online forums, and personal blogs related to audiovisual works were collected. The plot outlines of these works and viewers' comments or reviews underwent content analysis to identify which audiovisual works focused on workplace issues or may induce emotional healing processes of identification, catharsis, and insight among librarians experiencing emotional exhaustion. Based on this analysis, suitable emotional-healing audiovisual works were preliminarily compiled.

Subsequently, to identify librarians experiencing emotional exhaustion, this study designed a supplementary questionnaire. The questionnaire consisted of five sections: demographics, emotional exhaustion scale, work-related problems, film-viewing preferences, and willingness to participate in interviews. According to the literature review, the Maslach Burnout Inventory (MBI) is one of the most widely used scales for measuring burnout (Maslach & Leiter, 2016). Therefore, the section of emotional exhaustion scale in the supplementary questionnaire was derived from the "Librarians' Emotional Exhaustion Scale" used in Sheih's (2016) empirical study, "The Emotional Labor of Public Service Librarians Encountered Problem Patrons in Taiwan's Public Libraries: A Quantitative Study." This particular scale was adapted from the MBI emotional exhaustion subscale. In line with this, the study modified both the content and the scoring method, resulting in a set of seven items. All items were assessed on a 5-point Likert scale ranging from 0 (*never*) to 4 (*always*). As a result, the aggregate score ranged from 0 to 28. Furthermore, to ensure inclusivity and consider insights from relevant literature (Doulougeri et al., 2016), the study defined the threshold at one-third of the total score, effectively categorizing librarians with scores of 9 or higher as prospective participants for interview.

Next, the study proceeded to the interview phase. To appropriately focus on the researchers' areas of interest, this study implemented a semi-structured in-depth interview approach. To guide the interviews, an interview outline was prepared, and the participants were directly consulted to ascertain their genuine thoughts and emotional responses. Each participant underwent at least two interviews. The first interview aimed to understand their background, work-related stressors that cause their emotional exhaustion, and their preferences for watching movies. Using this information, at least three appropriate audiovisual works were

recommended to each participant, allowing them to choose one that aligned with their personal preferences. Following that, the corresponding viewing instructions were provided, which allowed the participants to watch the film materials comfortably at home. The subsequent interviews focused on the participants' feelings and opinions regarding the selected audiovisual works after viewing them, allowing for an analysis of the emotional healing efficacy of these materials.

Finally, the researchers produced verbatim transcripts of the audio recordings from the interviews. Content analysis was then employed to analyze the participants' psychological states of identification, catharsis, and insight during the movie-watching process based on the emotional healing mechanisms of movie therapy. Additionally, to ensure the participants' privacy, each of them was assigned a code name, and any specific terms, names, locations, or other information that might reveal their identities were anonymized in the transcripts.

### **Participants**

Because of time and manpower constraints, this study conducted purposive sampling and snowball sampling. Invitations for interviews and supplementary questionnaires were distributed on the social networking platform “fb『我是圖書館員 I am a librarian』” (I am a librarian), an online community for librarians. Additionally, through personal connections, familiar librarians were asked to refer other librarians who have experienced emotional exhaustion to participate in the interviews. The participants must be library professionals with a “emotional exhaustion” score of 9 or higher on the supplementary questionnaire and willing to share their thoughts and feelings.

This study was conducted between March and October 2021. To validate the effectiveness of the research instruments and ensure that the participants could understand the content of the study's supplementary questionnaire, interview outlines, and viewing instructions, two participants were involved in the preliminary study. The preliminary study confirmed that these instruments were comprehensible to the participants and effectively aligned with the research objectives. As a result, these tools were retained and utilized in the formal study, which involved an additional 12 participants. The significant richness and analytical value of the interview data obtained from the two participants in the preliminary study justified the inclusion of their data into the formal study, resulting in a total of 14 participants. Among these 14 participants, 13 were female, and one was male, with ages ranging from 31 to 54 years. In terms of job roles, three participants held managerial positions, while the other 11 were operating staff with a diverse range of responsibilities, including collection development, information organization, reader service, and library promotion. Moreover, seven

participants served in public libraries, four in college and university libraries, and the remaining three in specialized libraries. The shortest experience in library-related work was four years, while the longest was 26 years.

## FINDINGS

This study found that the librarians' emotional exhaustion was due to four main factors. First, the repetitive and monotonous nature of library work undermines their sense of value and diminishes their feelings of accomplishment. Second, management or organizational issues cause them to face heavy workloads and feel a lack of control. Third, inadequate interpersonal communication prevents them from receiving positive feedback or support, which hinders progress in their tasks. Lastly, temporary factors such as a pandemic or taking on parental roles can affect work resources, leading to psychological and emotional fatigue.

Based on the participants' work stress situations and individual characteristics, this study curated 14 audiovisual works for them to watch, of which 13 were found to evoke a complete emotional healing phase of identification, catharsis, and insight, and one was observed to lack catharsis, only achieving the other two (Table 1).

**Table 1**

*Work Stress Context of the Participants and a List of Audiovisual Works*

Work stress context	Participant	Audiovisual work
The inherent nature of library work, which led to a perceived lack of value or accomplishment.	B	The Great Passage (movie)
	C	The Secret Life of Walter Mitty (movie)
Organizational issue or ineffective management resulting in excessive workloads and a sense of lack of control.	A	Morning Glory (movie)
	D	Dear My Room (series episodes 1–4)
	E	Live (series episodes 16–18)
	G	The Shawshank Redemption (movie)
	J	On the Verge of Insanity (series episodes 1–4)
	L*	Still Life (movie)
Poor interpersonal communication, which causes a lack of positive feedback or support.	F	Hidden Figures (movie)
	H	Moneyball (movie)
	I	The Favourite (movie)

Work stress context	Participant	Audiovisual work
Temporary circumstances such as the COVID-19 pandemic or playing the dual role of a working parent, affecting work resources.	K	Live (series episodes 1–5)
	M	Nankyoku Ryorinin (movie)
	N	Workin' Moms (series season 1)

*Note.* \*represents one participant who did not experience the complete emotional healing process.

The analysis of the factors influencing the emotional healing efficacy of the audiovisual works showed that, first, in terms of the identification aspect, the viewers and the characters were more likely to develop a strong connection when the plot or theme aligns with the viewers' emotional disturbance, and the traits or experiences of the characters closely resemble those of the viewers. For example, the female protagonist in *Dear My Room*, who ultimately resigns after experiencing a high-pressure work environment, resonates with participant D's situation and thoughts of quitting. Similarly, the male protagonist in *On the Verge of Insanity*, who confronts an organizational restructuring and compromises for survival, overlaps with participant J's experiences, leading to a stronger sense of resonance. These factors are consistent with the criteria for selecting emotion-healing audiovisual works in other studies (Hesley & Hesley, 2001; Huang, 2015; Knickerbocker, 2009; Sheih, 2021; Yeh, 2011). It is also essential to examine whether the film's plot development and storyline are consistent and realistic and avoid significant logical errors or impractical situations that might prevent participants from immersing themselves in the plot (Hesley & Hesley, 2001; Knickerbocker, 2009; Sheih, 2021).

Regarding catharsis, when the participants empathized with the characters' emotions as the film plot progressed, especially during the characters' ups and downs, they experienced emotions along with them. This effect was enhanced by careful design in terms of scene, lighting, and music, highlighting the characters' emotional states in films such as *The Secret Life of Walter Mitty* and *The Great Passage*.

Furthermore, when the characters encountered difficulties but still demonstrated their strengths and eventually overcame challenges, the participants were more likely to experience inspiration and excitement, which aligns with the criteria of positive psychology movies (Niemic, 2020). For example, *Hidden Figures* and *The Shawshank Redemption* feature characters who maintain goodness, persist in their beliefs, and continue to move forward to

overcome obstacles despite facing adverse systems and environments, providing great encouragement to the participant librarians.

Regarding the insight effect, when the films presented positive responses to problems, the participants improved the way they clarified their situations and problems, and learned potential solutions to their difficulties through the characters' coping strategies. Additionally, the growth that the characters displayed after encountering setbacks and challenges inspired the participants to see and aspire toward positive change. These findings are consistent with those of other studies suggesting that when characters in films take specific actions to address problems or face them with a positive attitude, viewers are afforded an opportunity for observational learning and may even become role models (Hesley & Hesley, 2001; Huang, 2015; Phaire, 2013; Sheih, 2021; Yeh, 2011). For example, in *Live (series episodes 1–5)* and *Moneyball*, scenes of conflict and communication between characters prompted participants to reflect on the importance of considering others' perspectives and emotions while also internalizing their own, learning how to engage in rational communication for smooth progress.

Lastly, the ending of the film and its alignment with the participants' expectations can have different effects on their emotional healing, particularly catharsis. For example, *Still Life* did not fulfill participant L's expectations as the male protagonist does not achieve a positive outcome despite his good deeds, leading to a lack of solace. Conversely, *The Favourite* depicts characters that face a losing situation, prompting participant I to perceive their current work environment positively and derive a sense of gratitude and contentment from it. These differing emotional healing efficacy can be attributed to the participants' film preferences and viewing needs as well as the occurrence of meta-analysis, where participants transform their initial negative emotions into positive meta-emotions to find satisfaction.

## CONCLUSION

### **Work Stressors for Librarian with Emotional Exhaustion and the Emotional-Healing Efficacy of Audiovisual Works**

The interview results showed that the factors leading to librarians' emotional exhaustion are attributed to four main causes. First, the inherent nature of their work often leaves them feeling undervalued or lacking a sense of accomplishment. Second, organizational issues and ineffective management result in excessive workloads and evoke a sense of lack of control. Third, poor interpersonal communication leads to the absence of positive feedback or support, hindering the smooth progress of librarians' work. Lastly, temporary circumstances such as the COVID-19 pandemic or the dual role of working parent affect their work resources.

Of the 14 audiovisual works paired with the participants, 13 effectively induced the emotional healing efficacy of identification, catharsis, and insight, which were achieved through factors such as the participants' relatability with the characters, logical and coherent plot developments, the depiction of emotional ups and downs, the portrayal of positive character traits, and positive responses to problems.

### **Implications for Libraries**

Several suggestions are proposed for both individual librarians and library organizations.

#### *For individual librarians:*

Watching emotionally healing audiovisual works: Among the 13 librarians who encountered emotional exhaustion in this study, those who watched the recommended films and TV series achieved emotional healing through identification, catharsis, and insight. Therefore, if librarians experience emotional exhaustion due to work-related pressures, they may consider watching the audiovisual works featured in this study to mitigate their negative emotions and find inspiration to maintain and promote their psychological well-being.

#### *For library organizations:*

Strengthening emotional management and interpersonal communication training: Library organizations may incorporate emotional management and interpersonal communication skills, conflict resolution, and other relevant training courses into their internal employee training activities. In addition, library organizations and management personnel can also use the emotion-healing audiovisual works in this study as part of their in-service training courses. Doing so would help them implement preventive emotional management so that librarians can avoid falling into emotional exhaustion and thereby enhance their work performance, ultimately creating a healthy and happy workplace environment. Furthermore, the emotion-healing audiovisual works featured in this study can also serve as references for collection development in libraries. This way, more workplace professionals facing similar challenges can benefit from these resources.

### **LIMITATION**

This research is a qualitative exploratory study. Because of time and manpower constraints, this study primarily focused on 14 Taiwanese librarians, and conducted content analysis and semi-structured in-depth interviews to examine the selected audiovisual works and their potential emotional healing efficacy on the librarians experiencing emotional exhaustion. Therefore, the



findings of this study can only be applied to the 14 librarians studied and should not be generalized to all librarians or professionals in other industries.

Additionally, this study cannot encompass all potential audiovisual works that may have emotional healing efficacy. Furthermore, the scope of materials covered in this research was limited to those publicly released before August 2021 and available on the market or authorized for public distribution on online streaming platforms.

\* This article was drawing from Mei-Fang Tsai's master thesis *A Study on Emotional Healing Efficacy of Audiovisual Work: The Case of Librarian with Emotional Exhaustion in Taiwan* which was supervised by Dr. Chen Su-may Sheih.

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## Session 9: Information Institutions, Their Collections and Services

ALIEP 9-1 Descriptive study of universities' attributes and their library collections: Focusing on the prices of books and social science collections  
(Shohei Yamada)

ALIEP 9-2 Information Management of Woven Fabrics in Karen Community in the North of Thailand  
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# **Descriptive study of universities' attributes and their library collections**

## **: Focusing on the prices of books and social science collections**

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### **ABSTRACT**

*Background.* Japan has various universities, each with unique educational and research directions. Although library collections differ by university, the relationships between university attributes and university library collections have not yet been clarified.

*Objectives.* This study aims to describe the relationships between the attributes of universities, as perceived by their students, and library collections. Specifically, we focus on the prices of books as an important characteristic. The attributes of universities perceived by university students are establishment type, entrance exam deviation value, and location.

*Methods.* We divided the universities into groups based on each attribute and compared the book titles held by each group. We selected three academic fields from the social sciences (economics, law, and education) and described the characteristics of each attribute while comparing the results of our analyses by field. We targeted 203 institutions and 134,404 titles in these three fields.

*Results.* The analysis of establishment types revealed that the prices of books in public universities tended to be higher than those in national and private universities. Regarding the university entrance exam deviation values and locations, no common trends were observed across the three fields.

*Contributions.* This study provides foundational information for understanding university library collections and contributes to expanding our understanding of university libraries and their collections.

### **1. INTRODUCTION**

This study aims to describe the status of collections in Japanese university libraries, focusing specifically on the prices of books, while considering the differences among universities. As of 2022, Japan has a considerable number of universities—807 institutions. Although these institutions are uniformly treated as universities in the Japanese system, considerable diversity exists among them in terms of their approaches to education and research. In this context, the university library collections that each user encounters vary, and the collective image of what constitutes the collection may also differ. Consequently, this leads us to wonder what phenomena these university library collections represent. To answer this question, the author seeks to describe the status of university library collections in-depth from the perspective of their relationship with the attributes of universities. As part of this endeavor, this study focuses on book prices of university library collections.

Although we analyze the relationships between the university's attributes and library collections, there are multiple attributes to consider, and the emphasized attributes can differ depending on the observer's point of view. Among the various perspectives that exist in relation to universities and

university libraries, the perspective of library visitors who use the collections is especially important. Therefore, in this study, we consider the perspectives of university students, who are the main users of university libraries, and we use three attributes of universities often considered by students: establishment type, entrance exam deviation value (a measure of entrance exam difficulty that is unique to Japan), and location. As university libraries are principal learning environments on campus for students, the description provided by this study can also be understood as one of the differences in the learning environments for university students.

In this study, books written in Japanese are selected for the analysis. The author is conducting simultaneous analyses focusing on various characteristics of books such as subject classification, page count, and publishers. Within this context, this study focuses on book prices. Books cost money, and it might not be possible for individuals to purchase all the books they may seek. The cost issue places a particularly heavy burden on university students, who need to refer to a variety of books for their courses and assignments. Therefore, the price of a book can be considered as an indicator of its accessibility to university students.

One of the roles of university libraries is to help alleviate these difficulties. Hence, indicating the price range of books is worthwhile when analyzing university library collections. Moreover, there has been little research on the prices of books in university library collections.

We focus on the social sciences and analyze related collections. Specifically, we select three areas of focus: economics, law, and education. Given the assumed trends in the collections for the social sciences, humanities, and natural sciences, it is best to analyze each field individually. We start with the social sciences, because they are widely taught and researched in universities throughout Japan. The three areas of economics, law, and education are selected because of the considerable number of universities with related departments and the ease of identifying books related to each field by the subject classification used in Japanese university libraries.

The significance of this study is two-fold. First, this study makes an original contribution to the literature by focusing on book prices. Second, the study results enhance understanding of university library collections. As indicated in the next section, there has been little research on the relationship between the attributes of universities and university library collections. This study provides a foundation for future in-depth analysis of university libraries and their collections

## **2. LITERATURE REVIEW**

In this section, we review previous research that has primarily focused on analyzing the relationship between university attributes and university library collections. Research centered on this relationship includes the works of Missingham and Walls (2003) and Shaw (2016). Missingham and Walls (2003) analyzed the results of a survey of duplicate and unique holdings in university libraries in Australia. They examined the unique holdings at the state level for both monographs and serial publications. Additionally, they analyzed the number and proportion of duplicate and unique titles within each state. Shaw (2016) selected 13 universities and colleges and compared their monograph collections. The study compared the number of titles in each individual library and the number of titles held by each group according to the publication year and subject field.

In holding checks, although the relationship between the attributes of universities and university library collections is not the primary focus, several university attributes are considered. For instance, curriculum offerings have been considered both in the holding check of marketing journals (Urbancic and Sallors, 1997) and in the holding check of information systems journals (Hu et al., 2002). In the holding check of LGBTQ youth literature (Williams and Deyoe, 2014), the Carnegie Classification and region



were considered, and in the holding check of books published in Hispanic American countries (Oliva et al., 2020), the number of enrollees was considered. These studies have been conducted in North America. In Japan, Kuriyama (2018; 2019) considered establishment type, region, and number of departments in the holding checks of bestsellers.

In large-scale research on university library collections, to the best of our knowledge, only Perrault (1999) has conducted an analysis that specifically examined the annual number of titles purchased and their prices at institutions affiliated with the Association of Research Libraries (ARL). Thus, efforts to investigate the relationship between university attributes and library collections are scarce at the international level. Moreover, there is an insufficient understanding of book prices. Only a few studies have been conducted in Japan, indicating that the relationships between the attributes of universities and university library collections in Japan, as well as the state of book prices, remain largely uninvestigated.

### **3. METHODOLOGY**

In this section, we provide detailed explanations of the resources and universities that are the targets of this study and outline the procedures employed.

#### **3.1 Targets**

##### **3.1.1 Books**

The primary resources for university libraries are books and journals. This study focused on the analysis of books. Books serve as a central resource for learning and education, particularly for undergraduate students, who comprise the majority of university students. Furthermore, the scope of this study was narrowed to include books written in Japanese. This decision was taken because undergraduate education in Japan is predominantly conducted in Japanese and that most of the books that university students read for their studies are written in Japanese.

In this study, a book was defined as 1. printed materials and 2. at least 49 pages long. The first condition was established because the primary materials accumulated by university libraries thus far have been printed. The second condition was set in reference to the Revised recommendation concerning the international standardization of statistics on the production and distribution of books, newspapers and periodicals (UNESCO, 1986, p. 134) to clearly delineate the scope of this study.

In Japan, the National Institute of Informatics created a union catalog database with the collaboration and participation of many academic institutions. In this study, the book bibliographic dataset provided by the union catalog database (National Institute of Informatics, 2017) was used as the data source for books. This dataset, which was extracted from the union catalog database, contains the bibliographic records of 3,894,728 books written in Japanese. This dataset enabled us to analyze university library collections based on the multiple characteristics of books.

Information on library holdings, classification codes, and prices was not recorded in this dataset. Therefore, the holding information was retrieved using an API provided by the National Institute of Informatics ([https://support.nii.ac.jp/ja/cib/api/b\\_opensearch\\_hold](https://support.nii.ac.jp/ja/cib/api/b_opensearch_hold), retrieval period 2017-6-5–2017-8-10). Since the classification information of the Nippon Decimal Classification (NDC), which is widely used in Japanese university libraries, was not recorded, it was obtained by scraping the catalog information search webpage provided by the National Institute of Informatics (<https://ci.nii.ac.jp/books/>, retrieval period 2017-6-5–2017-7-30). Price information was obtained using the API provided by the National Diet Library of Japan (<https://iss.ndl.go.jp/information/api/>, retrieved between 2019-9-11–2020-2-24).

At the time of data acquisition, bibliographic records in the union catalog database were created for each monographic bibliographic unit and the highest level of collective bibliography unit. In this study, we defined a monographic bibliographic unit as the book unit. A monographic bibliographic unit was created for 1. a single volume of material and 2. an entirety of materials published in separate volumes (National Center for Science Information System, 1999, p. 30). As stated in point 2, they are not necessarily composed of a single volume of physical material. Collectively, materials published in separate volumes become one monographic bibliographic unit. For these materials published in separate volumes, we did not take the sum of the prices but identified the material equivalent to the first volume and used its price. In the following parts of this study, a single book identified as a monographic bibliographic unit is referred to as “one title.”

### **3.1.2 Universities**

The universities targeted in this study were four-year institutions. We used the 2016 version of the university information database created by the Department of University Management and Policy Studies at the Graduate School of Education of the University of Tokyo (Department of University Management and Policy Studies, Graduate School of Education, The University of Tokyo, 2017).

In this study, we used three university attributes: establishment type, entrance exam deviation value, and location. These attributes relate to the differences among universities as perceived by university students. Although there has been no classification of universities from the viewpoint of students in previous Japanese higher education research, it is understood that the most significant point at which university differences are recognized by students is during the university selection process. Thus, it is reasonable to assume that the perspective from which students cognitively perceive the attributes of their universities is almost equivalent to what they are aware of during the university selection process. These three attributes are particularly considered in the process of narrowing university choices.

Establishment types (national, public, or private) are a common category of universities in Japan. Differences exist in terms of entrance exam systems and tuition fees, and particularly, private universities are different from national and public universities. Private universities have higher tuition fees and more diverse entrance exam systems than national and public universities. One characteristic of higher education in Japan is the substantial number of private universities that have social science departments. This categorization is commonly used in various materials that university applicants encounter during their university selection and is, therefore, naturally recognized by them.

Entrance exam deviation values are relative measures of entrance examination difficulty and are calculated based on past examinee data from companies conducting practice examinations. These are calculated for each department of every university and are the most popular indicators of the difficulty of university entrance examinations in Japan. They serve as references for university applicants when considering their academic performance during university selection.

This study divides the locations into urban areas and other regions. This type of categorization could be relevant to the context of students' lives after enrollment. From 777 universities, 295 are in the so-called urban areas—the special wards of Tokyo and the ordinance-designated cities—suggesting that universities are concentrated in those areas (Ministry of Education, Culture, Sports, Science and Technology, 2016). Although circumstances can vary by residence, potential lifestyle changes, such as commuting from somewhere other than one's home to attend an urban university, could be a major consideration for university applicants.

**Table 1. Descriptive statistics for all the titles**

Field	Number of universities	Number of titles	Mean book prices	Median book prices	Standard deviation of book prices	Coefficient of variation of book prices
Economics	124	58,740	2,832.68	2,200.00	3,517.62	1.242
Law	92	28,692	4,376.13	2,718.00	7,477.59	1.709
Education	84	46,972	2,256.23	1,900.00	2,207.90	0.979

### 3.2 Procedure

In this study, we grouped universities according to their attributes and compared the compositions of their library collections by focusing on book prices. As mentioned in section 1, the price of a book can be considered as an indicator of its accessibility to university students, and indicating the price range of books is a worthwhile consideration when describing university library collections.

The collection of books for each university group is a set of titles held by the universities forming that group, excluding duplicates. To conduct comparisons, we used descriptive statistics and histograms. Given the difference in the number of titles across groups, we utilized relative frequency distribution in the histograms to compare the compositions.

Universities were divided into groups according to their attributes. University establishment types were divided into three categories: national, public, and private. The locations were divided into two groups: urban areas and other areas. Urban areas were the 21 major cities consisting of the special wards of Tokyo and ordinance-designated cities. The special wards of Tokyo constitute the central part of Tokyo Prefecture. Ordinance-designated cities are 20 representative large cities within Japan's administrative system. These are collectively referred to as 21 major cities. Although some universities may have multiple campuses, classification was conducted by referencing the addresses of their headquarters.

The entrance exam deviation values require additional clarification as they are a unique index for Japan. Companies in the education industry calculate these values. Every year, these companies conduct practice examinations and provide each examinee with a relative score adjusted to an average of 50 and a standard deviation of 10. These are the deviation values of the examinees. By analyzing the pass/fail information of examinees, companies set the deviation value for each university department as a score where the percentage of successful examinees exceeds a certain criterion. Thus, the deviation values of each department, presented in the form of a list, are distributed at a higher position than the distribution of the examinees' deviation values. Therefore, we set three groups: 60 or more, 50 or more to less than 60, and less than 50. While this is a categorical indicator, we decided to capture trends by group, because there can be variations between companies within the same year and even within the same department of the same university across different years.

Comparisons among the groups were conducted within the fields of economics, law, and education. The targeted universities have established departments of economics, law, and education. The book collections analyzed consisted of titles classified under NDC33 (Economics), NDC32 (Law), and NDC37 (Education).

Upon examining universities with data available in the university information database and those that had their collection records registered in the union catalog database, 124 universities had a department of economics, 92 had a department of law, and 84 had a department of education. Furthermore, 203 had at least one of these three departments.

Regarding the union catalog database, some universities in the sample had a low registration rate for their collection records. Thus, rather than focusing on the number of titles held by each individual university, we established an analytical focus on sets of titles held by the universities that form each group. This approach ensured that universities with a low registration rate would not pose a significant problem for the analyses, as even if some universities had a low registration rate, the sets of titles could be substantially complemented by those of other universities within the same group. Although some groups had a limited number of universities, resulting in relatively incomplete data, this large-scale dataset was still deemed to be sufficient for a pioneering exploration into the relationship between the attributes of universities and library collections.

## **4. ANALYSES**

### **4.1 Basic Data**

Before the specific analyses, we present data on the yen-dollar exchange rate from 1991 to 2015. In addition, as basic data for each field, we report the descriptive statistics and histograms of prices for the titles analyzed in each field. Furthermore, we reveal mean and median price trends by publication year.

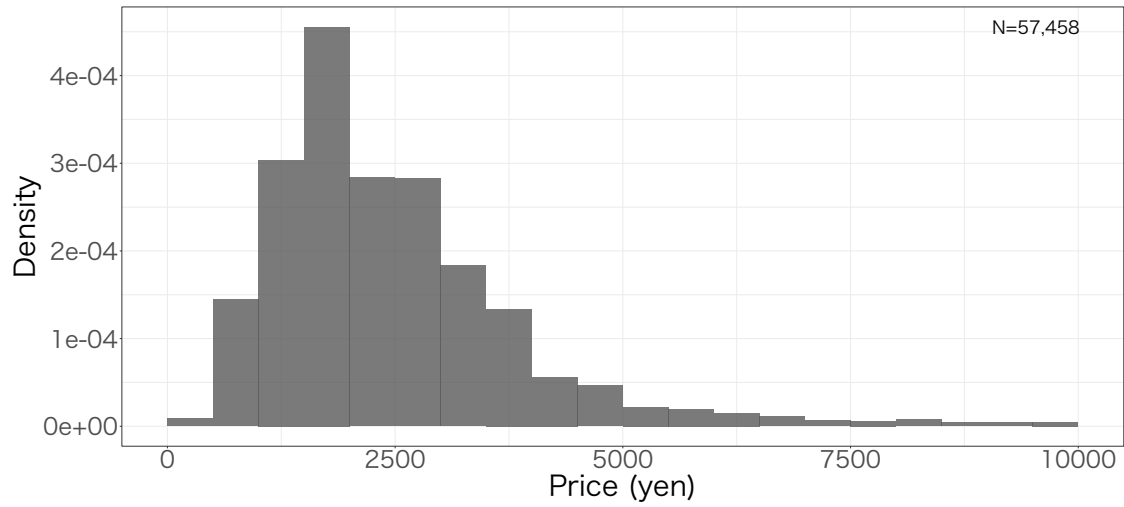
Regarding the yen-dollar exchange rate during the period from 1991 to 2015, the mean of the annual average exchange rate was 109.40 yen per dollar, the median was 110.20 yen, the minimum value was 79.79 yen, and the maximum value was 134.70 yen (International Monetary Fund, 2023).

Table 1 presents the descriptive statistics of the prices for all titles analyzed in each field. Comparing the three fields, both the mean and median prices are the highest for law, followed by economics and education, with particularly high values for law. The standard deviations and coefficients of variation follow the same order, with law showing the highest values for these measures.

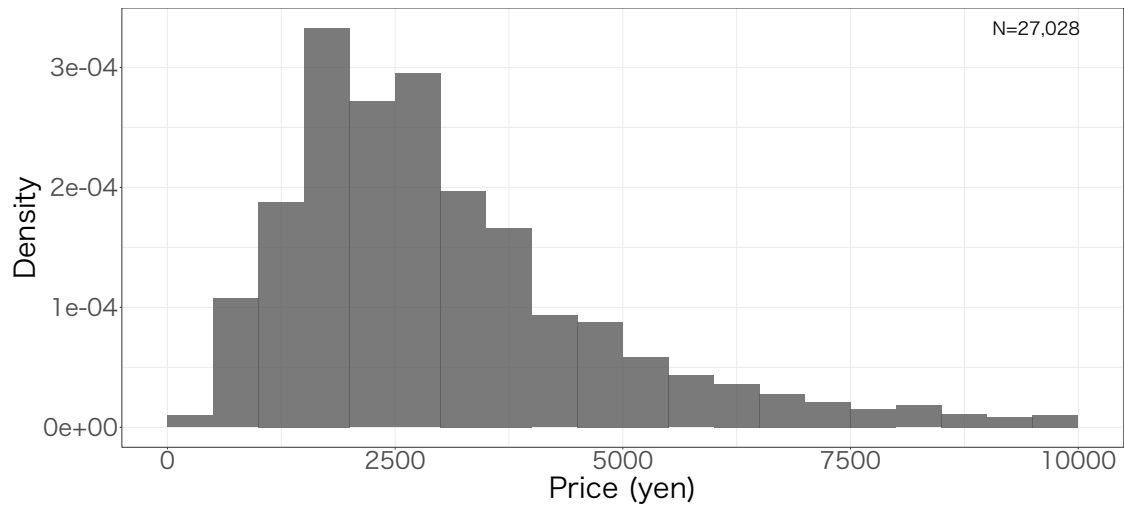
Figures 1–3 display the histograms of the titles analyzed in economics, law, and education. As the proportion of titles priced over 10,000 yen is low, the histograms focus on titles priced less than 10,000 yen. The bin intervals were set in increments of 500 yen, such as between 0 or more to less than 500 yen, 500 or more to less than 1,000 yen, 1,000 or more to less than 1,500 yen. This binning method is consistent with the histograms presented in the following sections.

In each field, the tallest bin is between 1,500 or more yen to less than 2,000 yen. Among the three fields, education exhibits the highest concentration of titles around the tallest bin, and the proportion of titles priced at 4,000 or more yen is low. Economics shows the concentration of titles around the tallest bin is intermediate among the three fields, and the proportion of titles priced at 5,000 or more yen is low. In law, the concentration of titles is the lowest. The bins for the price ranges of 2,000–2,500 yen and 2,500–3,000 yen form the center of the distribution along with the tallest bin. Furthermore, the proportion of titles priced 4,000 or more is higher than that of economics and education.

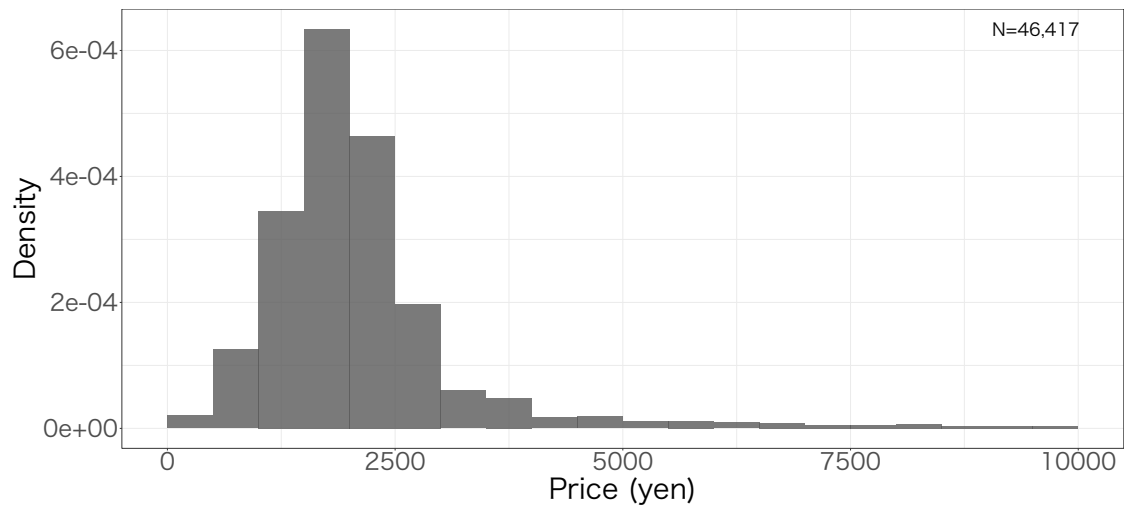
Figure 4 and 5 present line graphs of the mean and median prices, respectively, for each year of publication. Figure 4 demonstrates that the mean prices of law began increasing around the end of the 2000s. Prior to this, the values fluctuated around 4,000 yen, but by 2011, they had surpassed 5,000 yen. For economics, the values during the 1990s remained around 3,000 yen but have shown a slight declining trend since the 2000s. Since 2003, the values have not surpassed 3,000 yen. The values for education display slight variation and remain at around 2,300 yen.



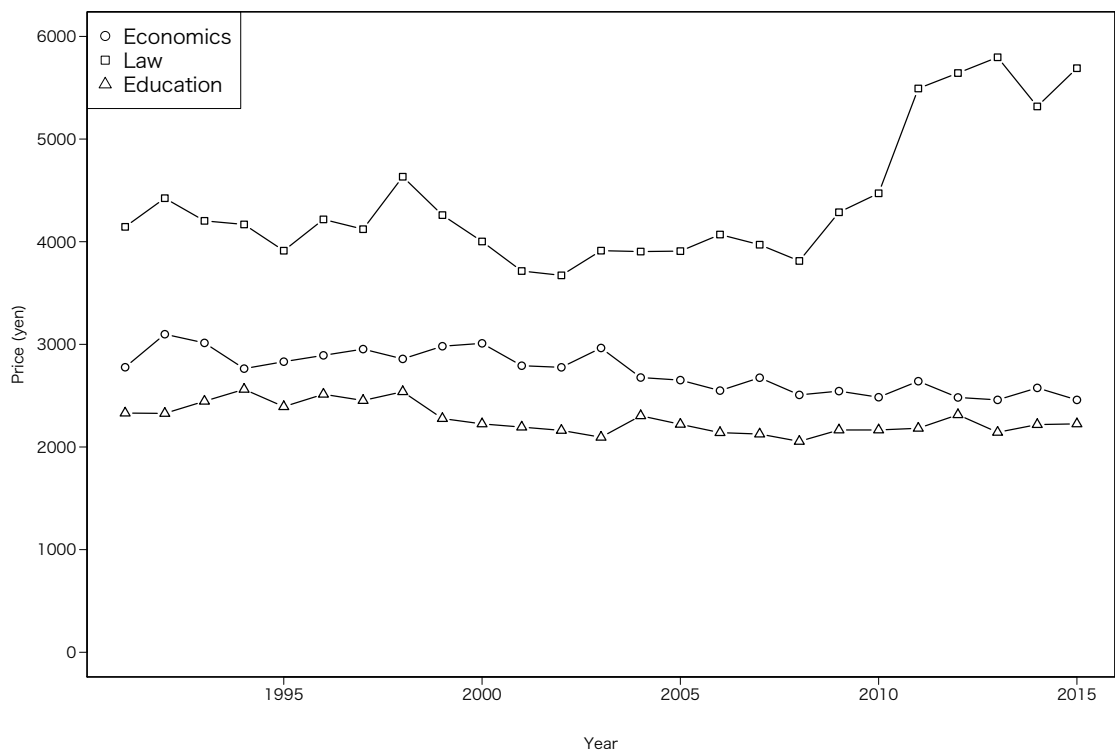
**Figure 1. Histograms for titles less than 10,000 yen (Economics)**



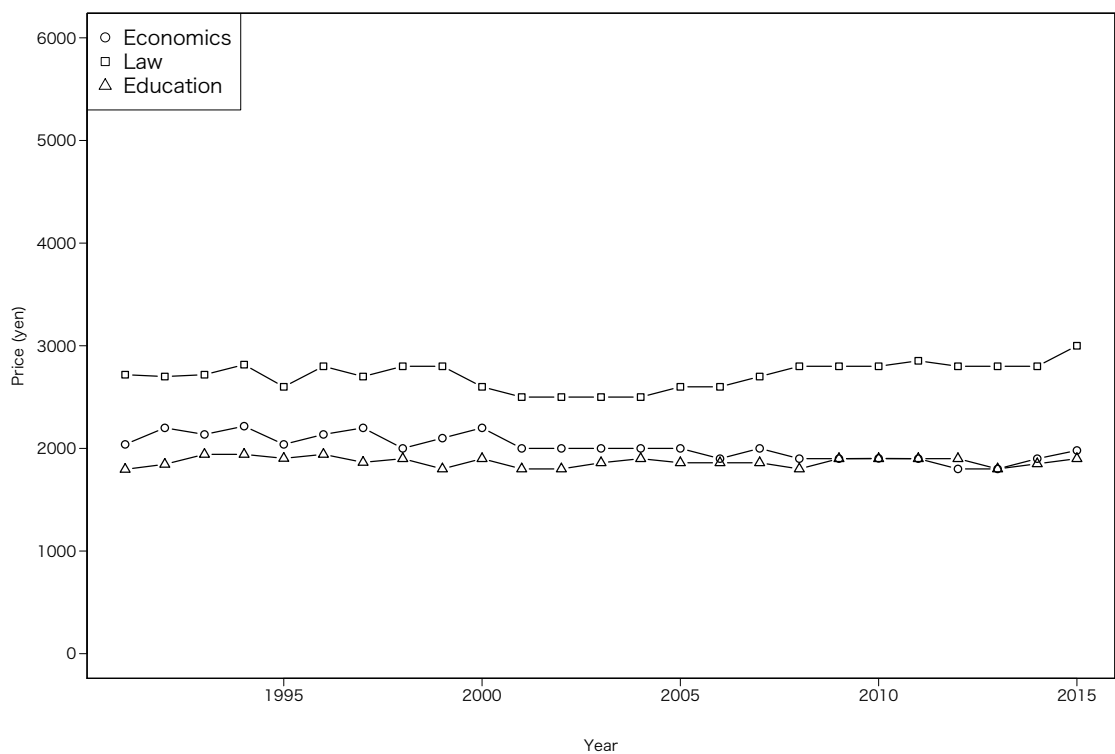
**Figure 2. Histograms for titles less than 10,000 yen (Law)**



**Figure 3. Histograms for titles less than 10,000 yen (Education)**



**Figure 4. Mean prices for each year of publication**



**Figure 5. Median prices for each year of publication**

**Table 2. Descriptive statistics for establishment types**

Field	Establishment types	Number of universities	Number of titles	Mean book prices	Median book prices	Standard deviation of book prices	Coefficient of variation of book prices
Economics	National	23	50,282	2,926.40	2,300.00	3,479.33	1.189
	Public	9	39,120	2,999.04	2,400.00	3,329.69	1.110
	Private	92	64,066	2,725.02	2,000.00	3,363.03	1.234
Law	National	14	24,643	4,748.31	2,800.00	7,967.62	1.678
	Public	2	15,551	5,034.69	3,200.00	7,480.60	1.486
	Private	76	28,274	4,404.78	2,718.00	7,519.61	1.707
Education	National	44	42,804	2,321.26	1,900.00	2,294.28	0.988
	Public	1	8,427	2,878.62	2,200.00	2,794.75	0.971
	Private	39	42,693	2,293.01	1,900.00	2,108.29	0.919

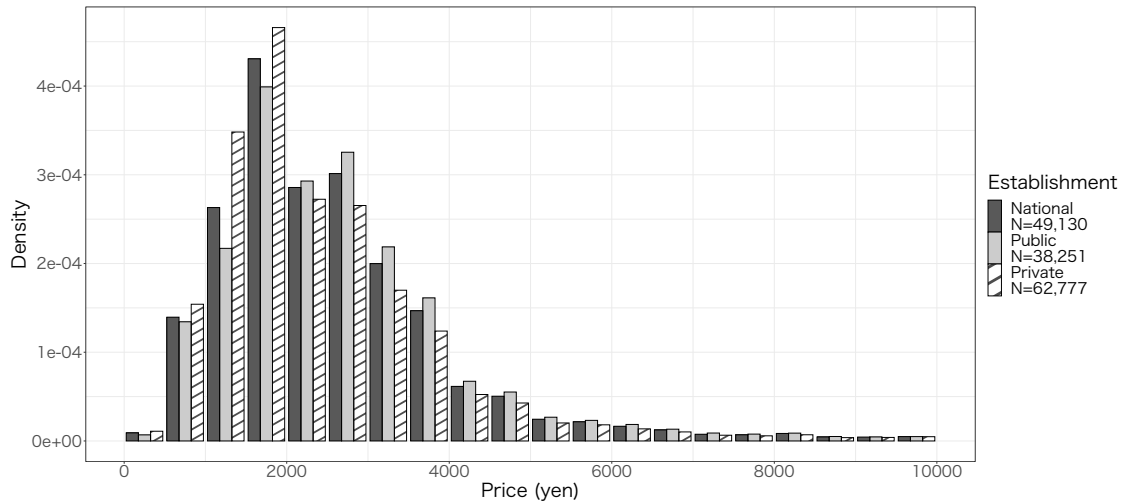
Figure 5 highlights that there is no notable change in the median across the three fields. Some minor trends are that the values in law were slightly lower in the early 2000s than in other periods, and, while not as pronounced as the mean values, a slight decreasing trend can be observed in economics.

#### 4.1 Establishment Types

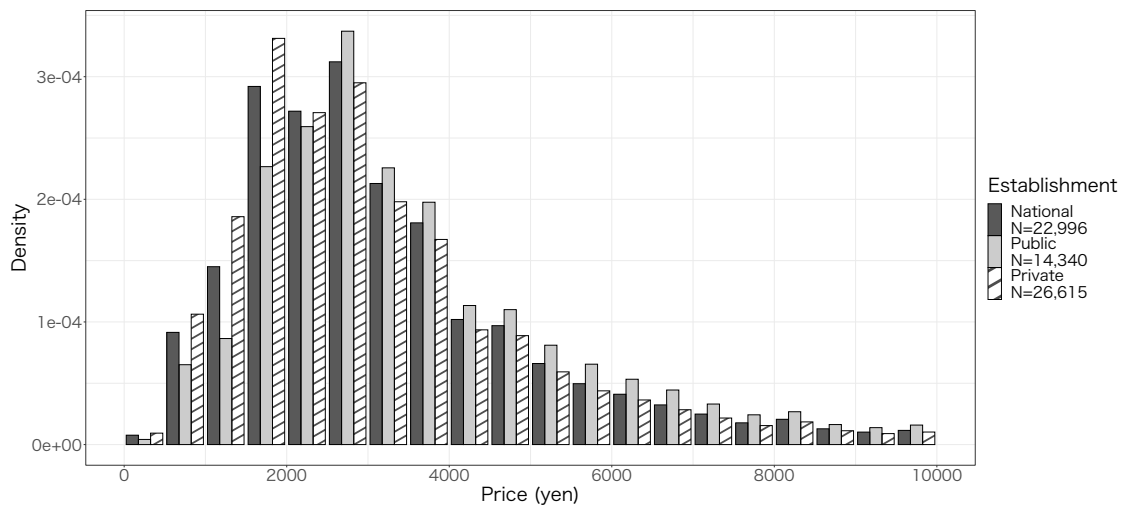
Table 2 presents the descriptive statistics of prices for each university group, distinguished by establishment type, for the three fields. Figures 6–8 show the price distribution of titles with prices less than 10,000 yen, organized by establishment type in each field.

Descriptive statistics show that the mean prices in all three fields follow the order of public > national > private. The median prices in economics and law follow the same order as the mean prices, whereas in education, the order is public > national = private. The order of standard deviations is national > private > public in economics and law, whereas in education, it is public > national > private. In economics and law, the coefficients of variation follow the order of private > national > public; whereas in education, it is national > public > private.

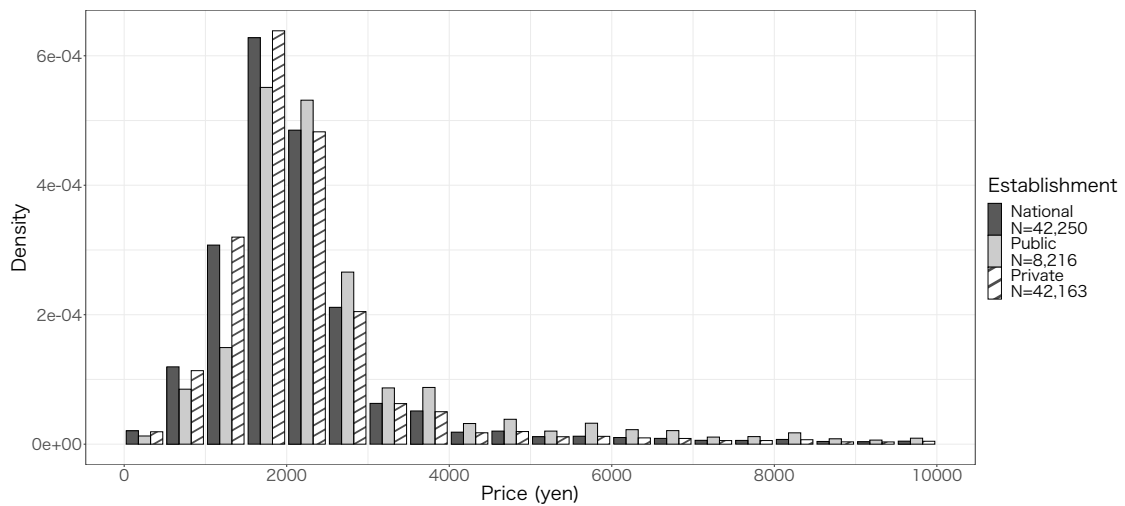
Analyzing the histograms with a focus on public universities, initially, in Figure 6 for economics, the bins for public universities are shorter than those for national and private universities in the range of less than 2,000 yen, but taller in the range of 2,000–6,000 yen. In Figure 7, for law, the bins for public are shorter in the range of less than 2,500 yen, but taller in the range of 2,500 or more yen compared to national and private. In Figure 8, for education, the bins for public are shorter in the range of less than 2,000 yen, but taller in the range of 2,000 or more yen. These differences result in the price distribution for public institutions being skewed toward higher prices in all fields compared with that for national and private institutions. For national and private, in economics and law, the distribution for private is skewed toward lower prices, while in education, almost no difference is observed between these two groups.



**Figure 6. Histograms for establishment types (Economics)**



**Figure 7. Histograms for establishment types (Law)**



**Figure 8. Histograms for establishment types (Education)**



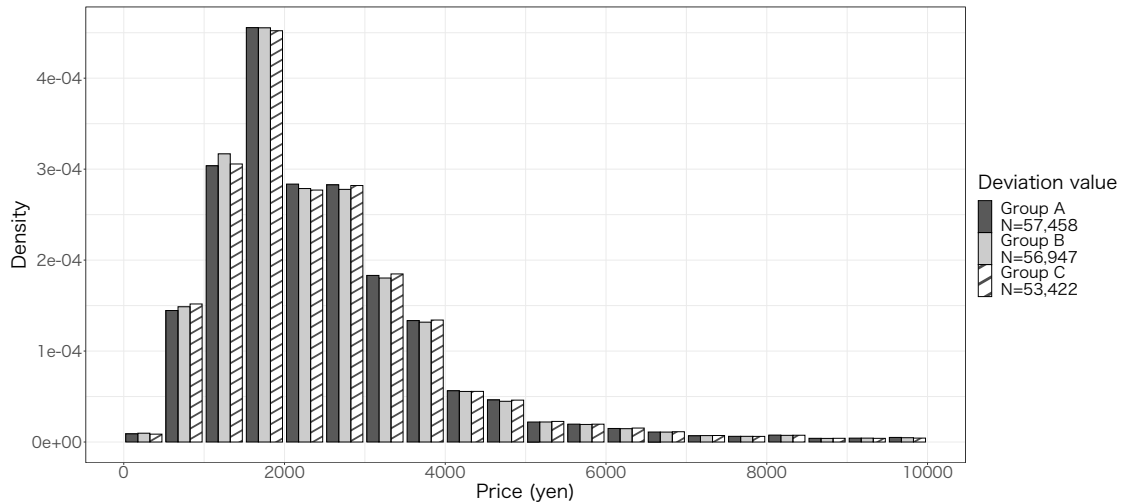
**Table 3. Descriptive statistics for entrance exam deviation values**

Field	Deviation value group	Number of universities	Number of titles	Mean book prices	Median book prices	Standard deviation of book prices	Coefficient of variation of book prices
Economics	Group A	36	58,740	2,832.68	2,200.00	3,517.62	1.242
	Group B	43	58,136	2,775.18	2,136.00	3,252.35	1.172
	Group C	37	54,477	2,756.63	2,200.00	3,056.82	1.109
Law	Group A	36	27,531	4,474.48	2,800.00	7,603.90	1.699
	Group B	27	26,235	4,562.30	2,800.00	7,737.58	1.696
	Group C	26	24,463	4,673.80	2,800.00	7,953.55	1.702
Education	Group A	17	40,741	2,346.47	1,922.00	2,177.25	0.928
	Group B	47	43,669	2,299.04	1,900.00	2,249.03	0.978
	Group C	9	25,980	2,367.50	1,960.00	2,216.68	0.936

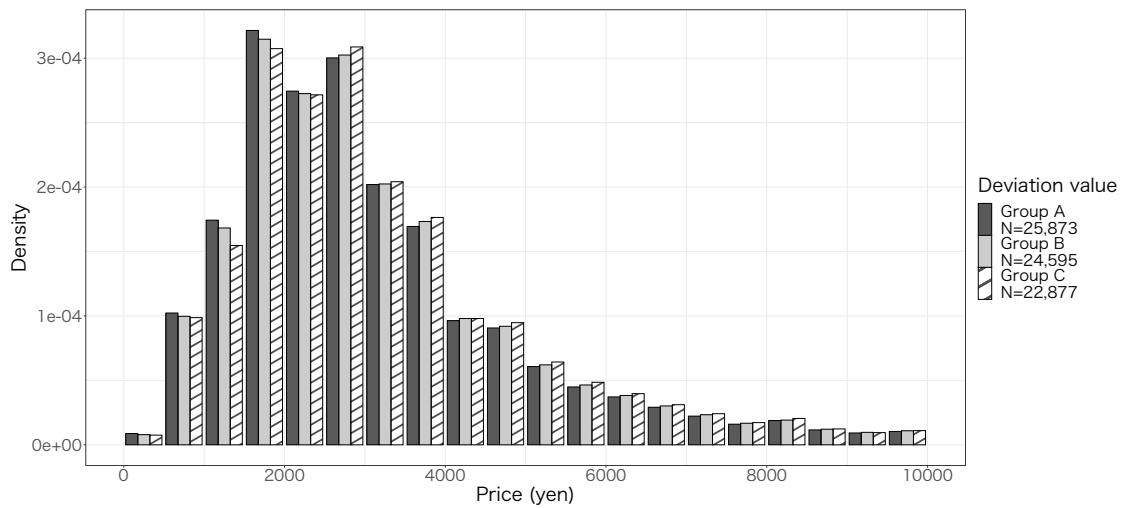
In summary, public universities tended to have a lower proportion of low-priced titles that were less than 2,000 yen and, additionally, less than 2,500 yen in law compared to national and private universities. As for national and private universities in economics and law, both the mean and median prices were higher for national universities, with the price distribution for private universities skewed toward the lower side. In these two fields, considering that the total number of titles is larger in private universities, it can be inferred that there are many cheaper titles priced at less than 2,000 yen among the titles held by only private universities.

#### 4.2 Entrance Exam Deviation Values

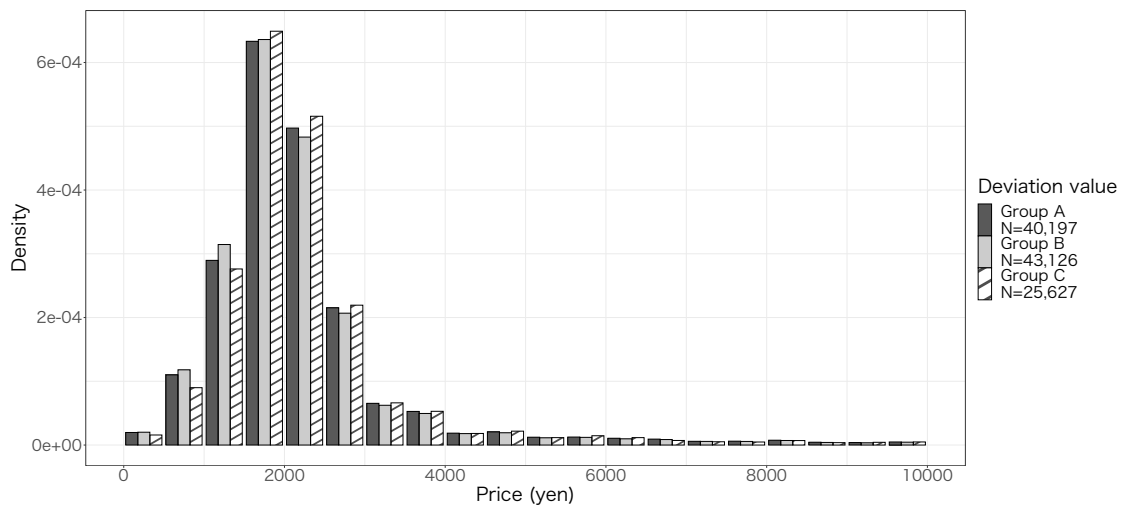
Table 3 presents the descriptive statistics of the prices for each university group, distinguished by entrance exam deviation values for the three fields. Figures 9–11 demonstrate the price distribution of titles with those less than 10,000 yen, organized by entrance exam deviation values in each field. For simplicity, we refer to the group with a score of 60 or more as Group A, the group with a score of 50 or more to less than 60 as Group B, and the group with a score of less than 50 as Group C. Note that information on entrance exam deviation values for some universities are not available. The number of universities with this information was 116 of 124 in economics, 89 of 92 in law, and 73 of 84 in education.



**Figure 9. Histograms for entrance exam deviation values (Economics)**



**Figure 10. Histograms for entrance exam deviation values (Law)**



**Figure 11. Histograms for entrance exam deviation values (Education)**

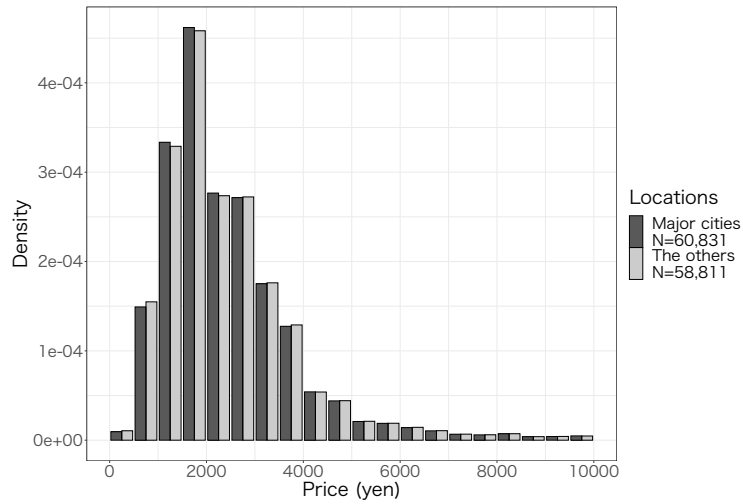
**Table 4. Descriptive statistics for locations**

Field	Deviation value group	Number of universities	Number of titles	Mean book prices	Median book prices	Standard deviation of book prices	Coefficient of variation of book prices
Economics	Major cities	61	62,135	2,773.27	2,000.00	3,439.16	1.240
	The others	63	60,027	2,750.84	2,000.00	3,316.08	1.205
Law	Major cities	54	28,035	4,428.92	2,800.00	7,547.21	1.704
	The others	38	26,588	4,531.10	2,800.00	7,700.92	1.700
Education	Major cities	32	42,045	2,324.90	1,900.00	2,226.01	0.957
	The others	52	44,999	2,285.54	1,900.00	2,238.79	0.980

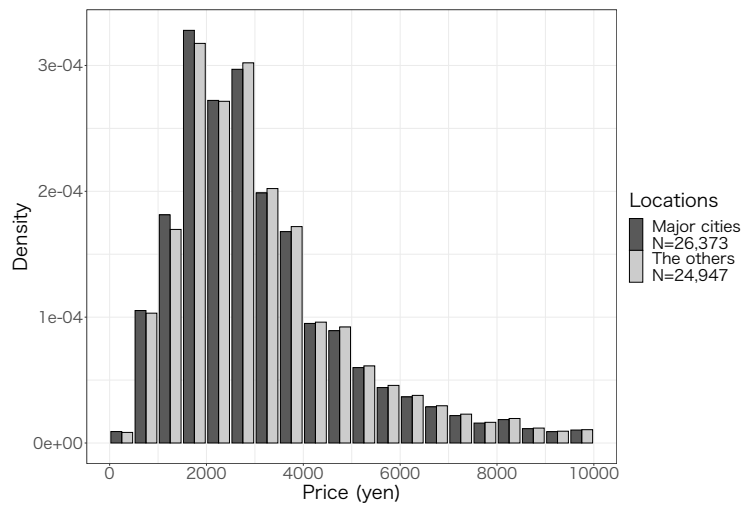
The descriptive statistics demonstrate that the mean prices in economics increase in the order of higher deviation values: Group A > Group B > Group C. In contrast, in law, the mean prices decrease in the order of higher deviation values: Group C > Group B > Group A. In education, the order is Group C > Group A > Group B. However, in economics and education, the difference between the maximum and minimum mean prices is not as much as 100 yen. The median prices show almost no difference across all three fields, and, especially in law, they are 2,800 yen for all groups. The order of standard deviations varies for each field: in economics, Group A > Group B > Group C; in law, Group C > Group B > Group A; in education, Group B > Group C > Group A. The coefficients of variation are higher, in the same order as the standard deviations, for both economics and education. In law, they are higher in the order of Group C > Group A > Group B, but the difference is almost negligible.

In terms of economics, Figure 9 indicates that there is hardly any difference among the three groups. In Figure 10, for law, the height of the bins tends to follow the order Group A > Group B > Group C in the range less than 2,500 yen, whereas it tends to follow the order Group C > Group B > Group A in the range of 2,500 or more yen. In Figure 11, for education, the bins for Group B are taller than those for Groups A and C in the range of 500–1,500 yen, but shorter than those for Groups A and C in the range of 2,000–3,000 yen. Consequently, the distribution of Group B is more skewed toward lower prices than that of Groups A and C. Between Groups A and C, the distribution of Group A is more skewed toward lower prices.

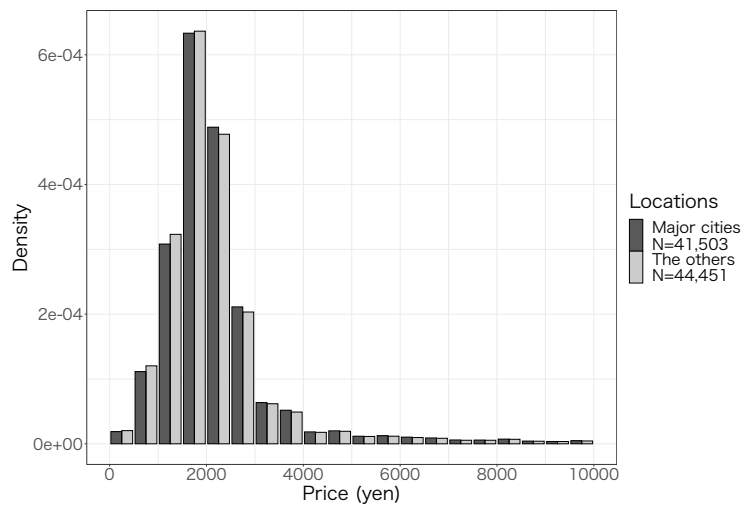
Considering both the descriptive statistics and histograms, there were no common trends across the three fields. In each field, there were unique tendencies; differences among the three groups in economics were relatively small, whereas unique variations were observed among groups in both law and education. In these two fields, the more the distribution leans toward lower prices, the larger the number of institutions and total titles. It can be inferred that there are many cheaper titles priced at less than 2,000 yen among titles held by fewer universities. As the number of institutions within a group increases, these cheaper titles are likely to be incorporated into the total titles.



**Figure 12. Histograms for locations (Economics)**



**Figure 13. Histograms for locations (Law)**



**Figure 14. Histograms for locations (Education)**

### 4.3 Locations

Table 4 presents the descriptive statistics of the prices for each university group, distinguished by the locations of the three fields. Figures 12–14 show the price distribution of titles with prices less than 10,000 yen, organized by location in each field. To simplify, we refer to the group of universities in the 21 major cities as “major cities” and the group of universities in the other areas as “the others.”

Observing the descriptive statistics, the mean prices are higher in major cities than in the others for both economics and education; while in law, the reverse is true, with higher values in the others than in major cities. However, the difference in economics and education does not exceed 50 yen. The median prices are the same for both groups across all fields. The standard deviations in economics are higher in major cities than in the others, whereas for both law and education, they are higher in the others than in major cities. Regarding the coefficients of variation, the difference between the two groups is minimal in law. In economics, they are higher in the major cities than in the others; whereas in education, they are higher in the others than in major cities.

In Figure 12, for economics, the bins for major cities are slightly taller than those for the others in the range of 1,000–2,500 yen, and alongside, the bins for the others are slightly taller. In Figure 13, for law, the bins for major cities tend to be taller than those for the others in the range of less than 2,500 yen; whereas for the range with higher prices, the bins for the others are taller. In Figure 14, for education, the bins for the others are taller than those for major cities, in the range of less than 2,500 yen. On the other hand, in the range of 2,500–4,000 yen, the bins for major cities are taller.

Overall, there were no common trends across the three fields. In economics, the difference between the two groups was negligible. In law and education, both the mean prices and skewness of the distribution revealed opposing trends. Considering that the number of institutions and the total number of titles are larger in major cities for law and larger in the others for education, as highlighted in the previous section, it can be inferred that there are many cheaper titles priced at less than 2,000 yen among titles held by fewer universities. As the number of institutions within a group increases, these cheaper titles are likely to be incorporated into the total titles.

## 5. CONCLUSION

This study analyzed the relationship between the attributes of universities and library collections, focusing on book prices. This study is the first of its kind to analyze large-scale library collection data considering the attributes of universities. The collections analyzed are sets of titles held by the universities that form each group. Thus, the findings are limited to indicating the general trends of universities possessing certain attributes and may not necessarily apply to every university in each group, nor do they propose immediate theories. Nevertheless, in Japan, only a few studies have clarified the state of university library collections by the attributes of universities, and there is no research on the prices of books in university library collections. The detailed description offered by this study is of significant value. The description provided by this study acts as a map, for understanding university library collections and contributes to expanding the perception of both current and future generations toward university libraries and their collections.

To succinctly summarize the outcomes of this study, we first present the descriptive statistics and distributions of book prices across all titles in each field. To date, no previous research has been conducted with such precision concerning the prices of books in university library collections, and it would be valuable to provide basic data on the prices of books in each field.

Second, in the analysis by attribute, when divided by establishment type, the prices of books in public universities tended to be higher than those in national and private universities. While fewer public universities for law and education required verification in other fields, this was a clear result.

No common trends were observed across the three fields for university entrance exam deviation values and locations. Specifically, in economics, the differences between groups were minimal. Nevertheless, even when cases where no difference was observed were included, revealing the characteristics of each individual field fulfilled the purpose of the descriptive study.

In the summary of entrance exam deviation values and locations, titles held by fewer universities tended to have lower prices, often less than 2,000 yen. As the number of universities included in a group increases, cheaper titles are likely to be included in the total titles. This line of thought leads to questions regarding the relationship between the number of titles and their prices in each university, as well as questions on unique and duplicate holdings. The third achievement of this study is that it provides a foundation for generating such questions, which is of great significance.

Two future research directions are outlined: 1. to analyze the fields of humanities and natural sciences within the same framework, aiming to provide a comprehensive description of the prices of books, and 2. to formulate theories and hypotheses by integrating the results of analyses based on other characteristics of books.

## ACKNOWLEDGEMENTS

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# Information Management of Woven Fabrics in Karen Community in the North of Thailand

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## ABSTRACT

*Background.* For over 200 years, the Karen ethnic group, renowned for their distinctive culture, particularly their weaving techniques, has migrated to Thailand and other parts of Southeast Asia. The knowledge of these techniques is deeply ingrained within the Karen people and has been passed down through generations.

*Objectives.* This study aims to explore the management of information related to woven fabrics within the Karen community located in the Doi Tao district of Chiang Mai, Thailand. The study focuses on information collection, categorization, preservation, and dissemination.

*Methods.* This qualitative research employed semi-structured interviews for data collection, along with non-participant observations. Eleven individuals engaged in woven textile activities were selected using purposive and snowball sampling. Descriptive methods were employed for presenting the results.

*Results.* Regarding information collection, it was observed that weaving wisdom and patterns were transmitted orally across generations. The fabrics were crafted from the cotton tree, locally grown plants within the community and dyed using local plants, trees and leaves. In terms of categorization, woven fabrics were organized by genre, such as shirts, skirts, bags, etc. As for preservation, pattern-related information was recorded as memories and pictures in a notebook. Additionally, certain information and knowledge were documented in print and online media. The community also established the Karen Woven Fabrics Learning Center to showcase both traditional and modern-adapted weaving costumes. In terms of dissemination, information was shared through printed and online social media, as well as through exhibits at the community's learning center and merchandise.

*Contributions.* The successful aspects of information management in the community were attributed to leadership, technology, and learning and adaptation. These factors significantly contributed to the community's information management practices.

## INTRODUCTION

Ban Laikaew is a community, situated in Bong Tan Subdistrict, Doi Tao District, Chiang Mai Province, is a time-honored settlement with a history spanning hundreds of years. Its population comprises ethnic Karen villagers who speak at least three languages: Central Thai, Karen, and Northern dialect. The primary source of income for this community is derived from doing agriculture i.e., longan cultivation which is harvested once a year. So, supplementary activities such as handicraft production, broom making, textile weaving are ways to make a living. According to the unique pattern, the Karen weaving textiles are produced with the traditional method in every stage from cotton cultivation and dye extraction to the weaving process. The



utilization of natural fibers and colors is a prominent feature, contributing to the appeal of these handcrafted products. These attributes cater to the preferences of both Thai consumers and foreigners alike (Phiwongkun, Boonlikitsiri, & Pantupakorn, 2019). The allure of Karen weaving fabrics is further accentuated by their exquisite and exclusive patterns, such as the Pakangdong pattern, known as a spider pattern, as well as the Lueng Decling Lai pattern, known as a Pumpkin Seeds pattern and Kai Kong pattern (Crooked pattern). Embracing this distinctive identity, the community has tried to preserve its traditional woven fabrics while adapting to evolving trends. Therefore, the Weaving textile learning center was founded in Ban Laikaew community in 1994 aiming to gather weaving fabrics from the villagers and contribute the collection of community products for sale, generating crucial income for the villagers (North Public New, 2019).

In order to ensure the sustainable transmission of knowledge, the art of Karen weaving fabrics must be accompanied by comprehensive education in management. This includes mastery of dyeing techniques, proficiency in fabric creation and pattern design, and the ability to maintain consistent color quality through each dyeing process. Such education is pivotal for the continuous advancement and refinement of Karen weaving products (Tong Kor Family, 2021).

Weaving information management involves the systematic gathering of information, ensuring the accessibility of information resources. The production process is enhanced and optimized to meet efficient standards, ultimately contributing to elevated production quality. Proper information storage guarantees comprehensive data, facilitating convenient and swift searches. This, in turn, fosters the creation of contemporary products aligned with the preferences of consumer groups. Given these considerations, the information management in the production of Karen weaving fabrics is essential. Preserving the knowledge associated with Karen weaving fabrics assumes a pivotal role. The information management procedures for Karen woven fabrics encompass the stages of Acquisition, Storage, Distribution, and Use of Information (AIMS, 2016; Boonyakanchana, 2014). The study reveals a lack of information management for Karen weaving fabric production in Chiang Mai. However, there was a study done by Tak Provincial Cultural Office (2008) that investigated the production process and weaving patterns of the Karen community. Furthermore, the research uncovered that most of the weaving groups within the Ban Laikaew community were the elderly women, while the younger generation's interest in the art of Karen weaving is very limited. This generational shift poses a risk of the weaving tradition fading from the community due to the reasons mentioned.

As a result, the author would like to investigate the Information Management of Karen Weaving Fabrics including the Karen weaving process, fabric dyeing techniques, and product design. The information management covering the areas of Acquisition, Storage, Distribution, and Use of Information, becomes a crucial focus within the Ban Laikaew Community of Bong Tan Sub-district, Doi Tao District, Chiang Mai Province. This endeavor aims to safeguard the perpetuation of this invaluable wisdom for future generations.

## **LITERATURE REVIEW**

### **Information Management Framework**

Various authors provide explanations of information management with regards to the tasks involved (Bytheway, 2015; Choo, 2002; Butcher and Rowley, 1998). Butcher and Rowley (1998) define information management as encompassing the processes of obtaining information, maintaining information stewardship, disseminating information, and disposal. Choo (2002), on the other hand, perceives information management as a sequence of activities: Identifying information requirements, procuring information, arranging, and storing information, offering information services and products, distributing

information, utilizing information, and adapting behaviors. Information management is depicted as a chain of interconnected tasks culminating in adaptable behaviors, after which the cycle restarts with the identification of new information needs and information acquisition.

Detlor (2010) views information management as the overseeing of processes, activities, and resources—both systems and materials—that contribute to the creation, acquisition, organization, storage, distribution, and utilization of information. The primary objective of information management is to facilitate efficient and effective access, processing, and utilization of information by individuals and entities, leading to heightened knowledge among individuals and increased competitiveness and strategic acumen among organizations (Detlor, 2010). The preceding discussion underscores the task-oriented nature of information management. For the scope of this study, the tasks outlined by Choo (2002) serve as the foundational framework upon which the conceptualization of information management is based, specifically focusing on information acquisition, storage, distribution, and utilization. Choo (2002) was chosen due to the clarity of the tasks proposed (acquisition, storage, distribution, and utilization of information), as indicated by other sources referenced earlier.

In the realm of organizational contexts, Nguyen et al. (2014) put forth an information management framework that comprises four key components: people, processes and practices, technology, and information. These frameworks have significantly contributed to the refinement of information management practices within organizational spheres, ensuring the realization of information management goals in these contexts.

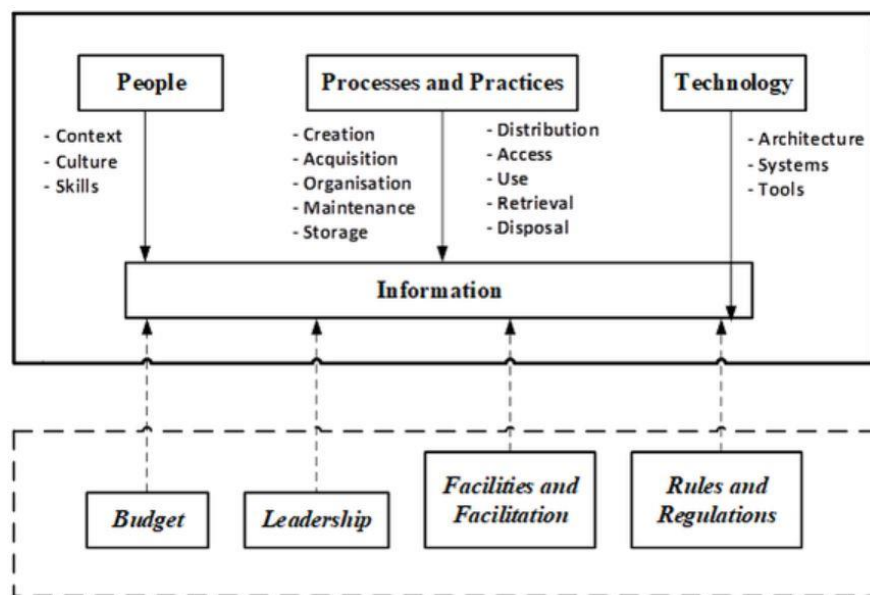


Figure 1. The conceptualized overarching information management framework (IMF) (Mugejjera, & Nakakawa, 2023)

## Karen Weaving

Karens are skilled weavers. Weaving fabric is an integral part of Karen culture and is produced using the traditional loom by the Karen women. Their weaving incorporates intricate patterns and vibrant colors derived from self-cultivated cottons. Even in the present day, despite the remote mountainous locations, the Karens continue to spin and dye fabrics from their own cotton cultivation (Tong Kor Family, 2021).

Nowadays, it's common to find the Karen people using “Kae Eew”, a traditional backstrap loom to create fabrics. According to Rattanakul and Burusphat (1995), the weaving of fabrics within the Karen ethnic group, or what they refer to as "Pa Ka Kue Yor," express and reflect their cultural heritage, customs, and longstanding traditions. Their creativity extends to the decoration and patterns they incorporate, often inspired by nature. They select raw materials from the natural resources surrounding them. The resulting fabrics, woven using the backstrap loom technique, are intended for practical purposes such as blankets or daily wear.



Figure 2. A traditional back strap loom used by a Karen woman (North Public News, 2019)

Moreover, some studies in the past illustrated that "Weaving" is the process of taking fibers obtained from plants, animals, or synthesis, and intertwining, rubbing, or compressing them into a fabric. This is achieved by arranging the fibers into two sets, warp and weft, and interlacing them perpendicular to each other. One set of fibers is known as the "warp yarn," and the other set is called the "filling" or "weft yarn." The resulting pattern is referred to as the "interlacing pattern," which serves as the foundational design that can be modified to create various woven patterns (Phakamas, 1985; Saithong, 1986).

## METHODOLOGY

In this study, a qualitative research approach was employed. The research population consisted of local wisemen within the community who possess expertise in Karen weaving fabrics. This included community leaders, individuals knowledgeable about Karen weaving, and members of the Karen weaving group in Ban Laikaew community, Bong Tan Sub-district, Doi Tao District, Chiang Mai Province. The sample size consisted of 11 participants. The names of the subjects in this research were anonymized and coded, C01 to C11 (C stands for Community), to substitute roles, and sex according to the professional code of research ethics. Semi-structured interviews were conducted, with the interview questions covering topics related to the production of Karen weaving fabrics, dyeing, weaving techniques, and design of the woven products. This aimed to ensure alignment between the interview questions and the research framework. The content validity of the interviews was assessed and followed by the calculation of the Index of Item-Objective Congruence (IOC) using the formula proposed by Rivioelli and Hambleton (1977). In this study, the researcher employed the analytic induction technique to analyze data. Then the data derived from observations, interviews, and notes were descriptively narrated.

## **FINDINGS**

### **Information Gathering**

The information regarding Karen weaving fabrics was sourced from knowledgeable individuals i.e. the elders with expertise and deep understanding of Karen weaving fabrics. These individuals encompassed grandparents, parents, aunts, uncles, and individuals who possess insights into Karen weaving fabrics as some of the informants stated that:

*"I learned to weave fabrics from my mother and grandmother when I was a child. I've observed how my mother weaves fabric all along." (Informant codes: C02, C03, C04)*

These individuals with significant experience in Karen weaving fabrics served as invaluable sources of information for the study.

### **Collection Process**

The collection process involves gathering woven patterns, dyeing methods, and product design ideas. This is accomplished through a method of preserving information, where patterns and products are recounted in a form of storytelling based on actual items. Also, some items are passed along from one generation to another generation, as stated by one of the informants. (Informant code C01)

This process of collecting and preserving information ensures the continuity of knowledge and traditions associated with Karen weaving fabrics.

### **Categorization of Karen Weaving Fabrics**

Karen weaving fabrics, as they are produced, are not typically categorized into groups. The classification is primarily based on individual weavers' preferences, with categorization often arising when specific designs or patterns are favored by particular weavers. Through the researcher's investigation, three main aspects have been identified for categorization:

*Type of Product:* This includes a range of products such as shirts, pants, skirts, dolls, bags, hats, fabric pieces, and shoes.

*Natural Dye Colors:* Categorized by colors obtained from natural resources, including yellow, orange, pink, red, green, brown, purple, blue, gray, and black.

*Patterns:* Patterns encompass both traditional and contemporary designs. Traditional patterns consist of interwoven curves, beehive patterns, bird nests, pumpkin seeds, crossroads, slithering snakes, eyes, and new patterns like strawberries, elephants, hearts, turtles, fish, and crabs.

This categorization approach enables a structured understanding of the diversity within Karen weaving fabrics, capturing product types, dye colors, and an array of patterns.

### **Knowledge Storage about Karen Weaving Fabrics**

Most weavers rely on memory to recall weaving techniques and patterns due to their experience and expertise in weaving. If there are patterns that cannot be remembered, each member may adopt different approaches to store this information. For instance, some may jot down or draw the patterns in a notebook, or some may capture them through photographs on their phones or seek assistance from friends who remember. The following statements from key informants provide insights into their knowledge storage practices:

*"I remember and also capture them on my phone. Then, I pass on the details to my sister." (Informant code: C03)*

*"I remember and record them in a notebook. For older patterns, we still conserve them, and for new patterns, we design them ourselves." (Informant code: C09)*

The methods employed by each weaver for storing and retaining weaving knowledge are diverse, ranging from personal memory and documentation to collaboration with others.



Figure 3. Sample of patterns illustrated in a notebook (Photo taken by author, 2022)

### **Preservation of Karen Weaving Fabrics**

Presently, the Ban Laikaew community continues to uphold the conservation of Karen weaving fabrics. Older fabrics are showcased in the community's learning center, offering a platform to pass down weaving knowledge. This includes providing opportunities for children to learn and experience the weaving process, promoting a sense of preservation. Moreover, community members continue to wear traditional woven clothing. The following statements from key informants highlight these preservation efforts:

*"At present, the community showcases old fabrics in a community learning center to preserve and transmit the weaving knowledge. Support is extended to children to learn and experience weaving techniques as part of preservation." (Informant code: C01)*

*"After finishing the woven fabric, we wear our fabrics. Also, we won't forget to tell our children and grandchildren about the significance of specific patterns and show them how they were worn in the past during events." (Informant codes: C08, C09)*

The community's commitment to preserving Karen weaving fabrics is demonstrated through various means, including educational activities, exhibitions, and the continuation of traditional clothing practices.



## Enhancing the Quality of Karen Weaving Fabrics

The Ban Laikaew community has undertaken initiatives to enhance the quality of their Karen weaving fabrics. These efforts encompass various aspects, from cultivating raw materials to weaving processes, resulting in improved fabric quality. Key aspects of these enhancements are as follows:

*Cultivating Raw Materials:* The community's approach involves growing their own cotton, ensuring a controlled and efficient process. By having control over each step of cotton cultivation, they can maintain the quality of the cotton threads used in weaving. This method has proven effective in maintaining fabric quality.



Figure 4. Cotton cultivation in the Ban Laikaew community (Karen Weaving Doi Tao, 2022)

*Natural Dyeing:* Traditionally, chemical dyes were used for weaving. However, the community has transitioned to using natural resources for dyeing, achieving 100% natural dye extraction for fabric coloring. This shift has led to the production of high-quality, captivating fabrics that are a hallmark of Ban Laikaew's weaving tradition. This idea is in line with the study of Rattanakul and Burusput (1995) that the weaving of fabrics within the Karen ethnic group represent and reflect their cultural heritage, customs, and longstanding traditions.

*Innovative Patterns:* The weaving group members have introduced new patterns into their fabrics, such as turtle, elephant, and strawberry, alongside traditional designs. These innovative patterns are a result of their self-directed learning and experimentation. By combining new and traditional patterns, the community produces new products that are distinctive and contemporary, enhancing the overall appeal of Ban Laikaew's woven fabrics.

These initiatives reflect the community's commitment to preserving and enhancing the quality of their Karen weaving fabrics. The adoption of natural dyeing techniques, innovative patterns, and meticulous cultivation methods showcases their dedication to maintaining the cultural heritage and ensuring the fabrics remain vibrant and relevant. (Informant codes: C07, C08, C09, C10)

## Dissemination and Promotion of Information about Karen Weaving Fabrics

The Ban Laikaew community employs various methods to disseminate and promote information about their Karen weaving fabrics to the wider audience. These methods encompass a range of formats, including

storytelling, knowledge sharing, and media channels such as print, online platforms, and learning resources. The community utilizes the following approaches:

*Print Media:* Information about Karen weaving fabrics is shared through printed materials. These materials may include brochures, pamphlets, and informative guides that highlight the cultural significance, techniques, and patterns of Karen weaving. Print media serves as an accessible means to educate and inform both locals and visitors about their weaving tradition.

*Online Platforms:* The community leverages online platforms to reach a broader audience. Information about Karen weaving fabrics is disseminated through social media platforms such as Facebook and Instagram. This digital presence allows the community to engage with individuals who are interested in their weaving heritage, regardless of geographical location.

*Learning Resources:* The Ban Laikaew community found a community learning center as a source to facilitate knowledge transfer. This includes workshops, demonstrations, and interactive sessions that enable interested individuals to learn about the art of Karen weaving firsthand. By offering these learning opportunities, the community not only actively engages with the young generation within the community but also those who wish to explore their weaving techniques and history.

*Exhibitions and Sales:* The community showcases their woven products and promotes information about Karen weaving fabrics through exhibitions and sales events. These events provide visitors with the chance to view and purchase authentic Karen weaving products, fostering a deeper appreciation for the craft.

Through these dissemination and promotional strategies, the Ban Laikaew community effectively preserves and shares information about their unique Karen weaving fabrics, contributing to the preservation and awareness of their cultural heritage.

## **DISCUSSION**

In terms of information management of Karen weaving fabrics in the Ban Laikaew Community, the community employs various strategies to manage and disseminate information about Karen weaving fabrics. These strategies contribute to the success of preserving and promoting their weaving heritage. The key factors that contribute to the success of their information management include:

*Leadership and Community Engagement:* The community leaders play a crucial role in introducing new knowledge and ideas to the villagers. They actively engage the community members in collaborative activities and coordinate with external organizations. The leaders also possess a strong vision, creativity, commitment, transparency, and ethical values.

*Technological Proficiency:* The community members exhibit proficiency in technology and possess creative thinking skills. This proficiency enables them to effectively communicate with customers, analyze data, and manage information. The use of technology, including social media platforms like Facebook and live sales events, enhances their marketing efforts and information dissemination.

*Continuous Learning and Adaptation:* The Ban Laikaew community has a proactive learning culture. They continuously learn and adapt to changing circumstances. This adaptability is demonstrated through their commitment to improving the quality of weaving fabrics, from raw materials to weaving techniques, and embracing new design patterns. As mentioned, the community members learn from both traditional knowledge transmission and self-directed learning. They collect and store patterns through memory, notes, and recording. By combining traditional patterns with new designs, they create innovative products that appeal to contemporary tastes.

Regarding this, the Ban Laikaew community has shown all four elements required for effective information management—people, processes and practices, technology, and information suggested by Nguyen et al. (2014). Hence, it comes as no surprise that their achievements in terms of cultural preservation, social identity consolidation, and economic viability are noteworthy.

## SUGGESTIONS

1. Government and Local Organizations: The government, particularly local agencies, should provide continuous support and collaboration with the Karen weaving community. This support can include financial assistance and widespread promotion of Karen textiles. Additionally, disseminating good practices in managing textile-related information within the Karen community and neighboring areas can help establish a broad and strong network.

2. Collaborate to Cultivate New Leaders: Weaving groups should collaborate to develop new leaders who can preserve the weaving heritage within the community. They should also leverage information technology to disseminate information about Karen textiles in a more diverse manner. This can include using online media, websites, and applications to broaden avenues for sharing and encourage weaving groups to enhance their technology skills.

3. Collecting and Organizing Knowledge: Weaving groups should collect and organize knowledge about Karen textiles, including product design and patterns, in a systematic manner. This knowledge could be stored in databases or digital tools to facilitate access and utilization by group members in their weaving and design processes. Moreover, the collected knowledge could be summarized and publicized on website where people could easily access.

Improving and managing information related to Karen textiles in the Ban Laikaew community will strengthen the community's capacity to conserve and develop their local weaving heritage. This effort will not only contribute to sustainable development but also generate income for the community.

## CONCLUSION

In summary, the success of managing information about Karen weaving fabrics in the Ban Laikaew community is attributed to effective leadership, technological proficiency, a commitment to continuous learning, and a strong connection to their cultural heritage. These factors enable them to adapt, innovate, and share their weaving traditions with a global audience while preserving their unique identity.

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# **The Great InfoHunt**

## **A narrative analysis of the UP Diliman's first library gamification activity**

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### **ABSTRACT**

*Background.* The Great InfoHunt of 2022 (TGI 2022) is the first library gamification program of the University Library (UL), University of the Philippines Diliman (UPD). As libraries continuously adapt to the ever-changing learning needs and behaviors of library users, the UL UPD designed a modern strategy on promoting its resources and services through a scavenger hunt-inspired library program. TGI 2022 allowed students to explore the various library databases, execute different search strategies, and become familiar with different library services (i.e. Ask SINAG, DROID, AKLAT-TAAN, and etc.) at their own pace and with little to no supervision.

*Objectives.* This study seeks to identify the individual experiences (i.e opportunities and challenges) of the current and former ISAIS librarians, the main proponents of the program, based on the following production components: (1) TGI stories; (2) TGI promotional materials; and (3) TGI culmination, through a structured one-on-one interview. Furthermore, this study intends to be the basis for improvements of the succeeding course of TGI.

*Methods.* Employing a narrative analysis research method, the research is intended to collect the narrative experiences of the informants following the production of TGI 2022.

*Results.* The study uncovers the exceptional collaborative achievement of the UL-ISAIS IL Core Group in the creation of the TGI 2022 initiative, a testament to their dedication to transforming the library experience of their patrons through innovative gamification. Despite encountering challenges, the project's key proponents adeptly navigated sensitivities, effectively promoting library resources and services while addressing the question of political neutrality. TGI 2022 stands as a vivid representation of the University Library's ongoing commitment to innovation, adaptation, and the cultivation of an engaging learning environment amidst the swiftly changing information landscape.

*Contributions.* The Great InfoHunt 2022 narrative analysis has a number of potential implications. This study sheds light on the innovative utilization of gamification in library services, showcasing how engaging experiences can enhance user engagement and information

literacy. It also underscores the adaptability of library orientations to meet the demands of the digital age, offering insights into effective ways of introducing library resources and services to the modern generation. This study also emphasizes the importance of collaborative efforts among library professionals in creating immersive learning journeys that resonate with diverse academic disciplines and cultural backgrounds. The study also provides a blueprint for other institutions to follow, offering guidance on how to develop similar library gamification activities that foster a deeper connection between students and library resources and services.

## INTRODUCTION

***Library is a growing organism (Ranganathan, 1931).*** Libraries are continuously evolving to meet the changing needs and behaviors of library users. Through the years, libraries, particularly the academic libraries have adopted several modern strategies to deliver quality and improved services. From physical books to electronic resources, from catalog cards to improved library systems, these are just some of the enhancements that the libraries have fully embraced. In recent years, imparting information literacy (IL) skills to the users has grown to be one of the main objectives of the library. By imparting IL skills at all stages of school, librarians play a significant part in preparing people to use information effectively and efficiently and become informed members of society (Kumar Dhiman, 2006). In the Philippines, academic libraries have stepped up their game by developing innovative and creative IL activities and programs. Innovation is seen by the librarians as the key to attract more users in the library. Gone are the days where libraries are seen as a reading space only; it has evolved to becoming a learning space where all intelligences are welcome – where all are welcome.

### University of the Philippines

**The University of the Philippines (UP)** is the country's national university. Established in 1908, this prestigious institution of higher learning is currently a university system with eight member universities and one autonomous college spread across 17 locations throughout the archipelago. *Section 3 of the UP Charter of 2008 (Republic Act 9500) states that: As the national university, a public and secular institution of higher learning, and a community of scholars dedicated to the search for truth and knowledge as well as the development of future leaders, the University of the Philippines shall perform its unique and distinctive leadership in higher education and development.* Furthermore, the university is committed to lead in setting academic standards and **initiating innovations** in teaching, **research**, and faculty development. The University of the Philippines Diliman (UPD) is the main campus of the University of the Philippines System (UP System), the national university by virtue of Republic Act 9500. UPD is the biggest constituent university of the UP System in terms of degree-granting academic units, student population, faculty and library resources.

### The University Library, UP Diliman

**The University Library (UL)** Diliman operates under the helm of the Office of the Vice Chancellor for Academic affairs. The UL is mandated to be the information resource center of excellence for a wide range of academic disciplines including social, natural, and applied sciences, as well as in the humanities. Aligned with the overall objectives of the University, the UL commits itself to provide top-notch quality library services through its key functions.

The UL fosters an open, accessible, and engaging Learning Space, encouraging fruitful learning and exploration. By creating a welcoming atmosphere/environment, students and researchers can fully utilize the library's resources to their advantage. To empower library patrons, the UL strives to uplift Information Literacy and research skills by designing and library instruction programs. Additionally, the

UL diligently collects, organizes, and provides access to a plethora of Information Resources in support of teaching, research and creative work, and extension work. In the digital age, the UL remains committed to modernizing its functions and services by leading innovations in Information Technology, ensuring its relevance and benefit to patrons. Ultimately, the UL places great importance on preserving and safeguarding its valuable resources, such as rare and special collections, historical records and documents, through its dedicated University Archives, ensuring a rich heritage for future generations.

### **Information Services and Instruction Section, UL**

One section under UL is the Information Services and Instruction Section (ISAIS). It underwent significant changes in 2016 as part of the Library's reorganization, evolving from the General Reference to ISAIS. It absorbed functions from the abolished Media Services section. ISAIS is vital for promoting information literacy skills through various programs, aligning with the University Library Organic Act of 1991. This Act initially established the General Reference and Media Services section, which provided information and reference services using various materials, including Filipiniana references, thereby expanding the section's collection of print and electronic reference materials.

One notable accomplishment is the Research Made Easy @ Your Library program, which received the 2011 Outstanding Library Program Award from the Philippine Association of Academic/Research Librarians, Inc. (PAARL). This program introduces faculty, staff, and students to library facilities, online subscriptions, and features of the library website and iLib. A decade later, ISAIS once again secured the PAARL Outstanding Library Program Award in January 2023, "in recognition of its innovative programming that infuses creative strategies, gamification, and social engagements in the promotion of lifelong learning; raising awareness on the importance of honing learners into becoming information literate individuals; and ultimately, by empowering learners and librarians beyond the boundaries of the university, thus encompassing community outreach" (Philippine Association of Academic/Research Librarians, Inc., 2023). Additionally, ISAIS excels in providing prompt responses to chat and email reference queries and offers virtual library orientations, ensuring convenient access to physical resources through the Resource on Demand Service.

### **UPD UL The Great InfoHunt of 2022 (TGI 2022)**

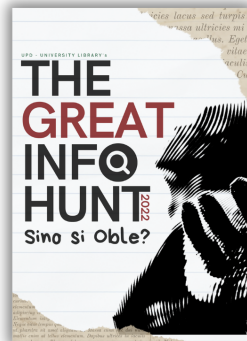
**TGI 2022** is the first library gamification program of the UL, University of the Philippines Diliman (UPD). With the goal of introducing a modern strategy on promoting the UL's resources, the Information Services and Instruction Section designed a scavenger hunt-inspired library program. In 2020, the COVID-19 pandemic forced the libraries to close its doors and shift to digital and hybrid services. Due to this, a number of webinars, online presentations, online orientations, and the like were attended by both librarians and users. It is with this reason that the group came up with a gamification library program. TGI 2022 allowed students to explore the various library databases, execute different search strategies, and become familiar with different library services (i.e. Ask SINAG, DROID, AKLAT-TAAN etc.) at their own pace and with little to no supervision. The main objectives of TGI 2022 are the following:

- Explore the library resources and services;
- Execute different search strategies;
- Become familiar with the different university library services; and
- Utilize the university library's learning space reservation app, Aklat-Taan

As the nature of classes conducted in UPD and other UP constituents are in blended format, TGI was designed as a blended gamification program. It was classified into two (2) categories: one is exclusive for (1) UP Diliman's Senior High School, Undergraduate, and Graduate students; another is for the whole (2) UP system students (Diliman, Baguio, Cebu, Open University, Mindanao, Visayas, Manila, Los Baños). TGI for UPD includes a task which requires the participants to accomplish it onsite (i.e

Library visit via Aklat-Taan) which makes it blended; while ALL TGI for UP system's tasks are to be accomplished remotely. Figure 1 presents the official posters of the TGI 2022; *Sino si Oble?* is intended for UP Diliman constituents, while *Blue Shirt*, *Bamboo Cart*, and *Medals and Flowers* are intended for the UP System Constituents.

**Figure 1.** Official posters of TGI 2022



TGI 2022: Sino si Oble?



TGI 2022: Blue Shirt



TGI 2022: Bamboo Cart



TGI 2022: Medals and Flowers

Deemed as the Philippine Association of Academic Research Librarians' Outstanding Library Program of 2022, and having received good feedback from the students who participated in the program, ISAIS librarians, particularly the IL Core Group of the section, who is in charge of the overall production of the program, is challenged to take TGI to yet another level.

### TGI 2022 Stories

The TGI 2022 program featured four socially relevant stories as themes, all designed to mimic an exciting scavenger hunt virtually. The first story, "*Sino Si Oble?*" was intended for students at the Diliman campus, with the challenge of deciphering the meaning of Guillermo Tolentino's Oblation.

The second story, "*Blue Shirt*," centered around the tragic case of Kian Delos Santos, a 17-year-old victim of extra-judicial killing during the drug war in the Philippines (McKirdy & Jorgio, 2017). Kian's blue shirt became a symbol of his story and the broader discourse on extra-judicial killings.

The third story, "*Bamboo Cart*," highlighted the initiative of Ana Patricia "Patreng" Non, who started the community pantry movement during the lockdown in 2021. Her efforts inspired the concept of "*Magbigay ayon sa kakayahan, kumuha ayon sa pangangailangan*" (Give what you can, take what you need).

The fourth story, "*Medals and Flowers*," celebrated the achievements of weightlifter Hidilyn Diaz, who won an Olympic gold medal in the Tokyo 2020 Olympics Games (Mogul, 2021). Her journey embodies the empowerment of women and the triumph of breaking through barriers.

These stories were woven into the InfoHunt, emphasizing the themes and challenges that encourage participants to use library resources and services to complete the tasks.

### **Integration of Media in TGI 2022**

In order to execute the vision of the proponents' towards TGI, the group utilized several media, particularly those that belong to the group of new media due to the limitations brought about by the COVID-19 pandemic in education. As TGI 2022 is the first library gamification program of the UPD UL, the proponents capitalized on the opportunity to integrate the use of free online resources such as Google Forms and Canva to design and create instruments needed to conduct such programs.

The tasks for each story as well as the registration process for the four stories were all developed using Google forms. Proponents have also integrated media collateral produced through Canva in order to make striking, visually appealing, and impactful tasks. The group made the most out of the library section's Google Drive to store the necessary tools and materials to carry out the program. This cloud service platform enabled the group to freely work and monitor the progress of TGI 2022 regardless of the time and place.

Canva, a free online tool, allows students and teachers to work on photo editing, design layout, and other tasks on an intuitive platform (Edwards, 2022). All of the still media and promotional materials of TGI 2022 are made and produced using Canva. From the initial posters down to the announcement of winners, all layouts were freely made in the said freeware.

The group made use of social media to market the program. A total of 5 videos were produced by the team and made available in the Official Facebook page and Youtube account of the UPD UL. It is worth noting that the official teaser of *Sino si Oble?* obtained a total of 22,000 views on Facebook and reached a handful of students within and outside the UP community. The utilization of media in the creation of TGI 2022 is highly significant as this allowed the program to fully display its visualization and objectives.

## **LITERATURE REVIEW**

This research explores gamification, which uses game elements to enhance learning. This study combines narrative inquiry and content analysis as the analytical framework for this research.

### **Gamification**

Gamification is a technique that uses game mechanics, elements, and game-based thinking to promote motivation and ease learning (Rivera & Garden, 2021). A number of authors and scholars have discussed the concept of gamification but there is still no concrete and/or universally accepted definition of the term (Sailer et al., 2016). The concept that gamification has the ability to promote motivation, behavioral changes, friendly rivalry, and collaboration in a variety of situations, including customer engagement, work performance, and social loyalty, is the root of its rising popularity (Dichev & Dicheva, 2017). Gamification has been applied to a variety of fields including: marketing, business, healthcare, corporate, education, and many more.

### **Gamification in Academic Libraries**

In the field of education, teachers have used this method to enhance the engagement of students in their class discussions. Similar to how games can increase levels of student engagement, gamification of

education can do the same to help students develop certain skills and maximize their learning (Smiderle et al., 2020). Many activities in higher education can benefit from the additional motivation and incentives that come with gamification. By giving us fast, in-depth feedback and methodically directing us with all the knowledge required for improvement, games motivate us to perform better (Kim, 2013).

A number of libraries have already utilized and integrated the concept of gamification in their services. Academic libraries can increase student engagement and motivation to learn more about library resources and services by promoting their collections and taking advantage of the trend toward gamification in higher education (Kim, 2013).

## METHODOLOGY

This study employs a narrative analysis research method, a type of qualitative data analysis that focuses on deciphering the main narratives drawn from the experiences of a study group. Data is collected and structured using first-person narration to enable the researcher to comprehend how the subjects experienced things (Dovetail Editorial Team, 2023). A structured one-on-one interview with the proponents of TGI 2022 *was* conducted to collect their narrative experiences based on the following TGI 2022 production components: (1) Informants' involvement in the production of TGI 2022; (2) Idea behind TGI 2022; (3) Goals set for TGI 2022; (4) Development of TGI 2022 stories; (5) Challenges encountered in the production of TGI 2022; and their (6) Vision for the library services of UL.

**Table 1.** Demographic profile of the informants

Informant	Designation
A	ISAIS Head Librarian
B	Former ISAIS IL Core Group Team Leader
C	Former member of IL Core Group / TGI 2022 Core Group
D	Former member of IL Core Group / TGI 2022 Core Group
E	Member of IL Core Group / TGI 2022 Core Group
F	Member of IL Core Group / TGI 2022 Core Group

Table 1 shows the demographic profile of the informants involved in the production of TGI 2022. The informants include the ISAIS Head Librarian, a former IL Core Group Team Leader, former and current members of the IL Core Group. Their diverse roles provide insights into the production process, challenges, and opportunities in the production of TGI 2022.

## FINDINGS

The findings are presented in terms of themes identified during our analysis, namely the categories of involvement in the production, idea, goals, challenges, development of stories, and challenges encountered in the production process of TGI 2022, as well as the informants' vision on the future library services of the UL through Information Literacy Core Group of the Information Services and Instruction Section (IL Core Group).

### Involvement in the production of TGI 2022

In the production of TGI 2022, a diverse group of people took on different roles, much like a well-coordinated team. IL Core Group from ISAIS played a leading role as the driving force behind this pioneering gamification effort. Leading the way, Informant A (female) emerged as the principal architect, responsible for assessing and deciding on proposals related to the project. This responsibility involved not

only accepting or rejecting ideas, but also deciding on important matters and fostering communication with partner publishers and providers for essential support.

Alongside, Informant B (female), the former Team leader of the ISAIS IL Core Group, was instrumental in establishing the groundwork for the activity's success. Informant B is primarily engaged in the planning phase, also presiding over initial meetings that paved the way for the roadmap shaping the project's development.

As new members of the IL Core Group, Informant C (female), Informant D (female), Informant E (male), and Informant F (female), collectively as TGI 2022 Core Group were primarily tasked with the production of TGI 2022, from the title, concept, stories, mechanics, and the flow of activity. However, due to an emerging need to lead another significant activity, only Informant E and Informant F continued the proposal and in producing TGI 2022.

Interestingly, Informant C and Informant D onboarded again to evaluate the answers of the participants to The Great Tasks of *Blue Shirt* and *Medals and Flowers*, respectively. Both Informant E and Informant F mentioned that they were involved in all phases of the production process of TGI 2022.

### **Idea behind TGI 2022**

The idea of conducting a scavenger hunt-like library orientation did not exist out of thin air. It started when Informant A presented the IL Core Group with a challenge: to conceive and develop a proposal for an innovative and interactive addition to the virtual library orientation activities. This initiative arose due to the decline in participation observed during virtual library orientations over the previous semesters.

Informant B highlighted that before TGI, webinars were the go-to method for promoting the library's resources due to pandemic restrictions. As conditions improved, the team faced the need for a new IL activity. With webinar fatigue on the rise, Informant B emphasized the team's determination to break away from the usual webinar approach.

In brainstorming for a new activity, the TGI 2022 Core Group faced an immense pressure and challenge. For Informant C, faced the challenge of reimagining how the library's services and resources were introduced to students. Beyond the usual webinars, they aimed for a more engaging program. Informant C also recalled that the idea of gamification sparked from Informant F, who had relevant experience; inspired by the college days of Informant C, the team settled on a scavenger-hunt style approach. It was not a different experience for Informant D as she saw the concept for TGI 2022 emerged as a creative response to the evolving needs of library patrons. Hence, integrating gamification into the library services came from a deep commitment to enhancing user experience with the vision in mind to captivate library patron's interest by infusing an element of fun yet challenging library orientation experience.

For Informant E, it has always been a dream – to reimagine and reintroduce the library services. Together with Informant F, they would always discuss enhancing specific library services. They contemplate ways to optimize these services, aiming to expand their impact and engage a broader audience of library patrons. Thus, when presented with the challenge, it was met with enthusiasm and embraced wholeheartedly.

With basic knowledge in the concept of gamification and game-based learning in libraries, particularly in school libraries, Informant F suggested that the UL should veer away from the usual webinars and explore modern takes on the promotion of library services, thus, incorporating gamification. The suggestion was welcomed by the group, though there were some who had doubts in its effectiveness as this shall require more effort and time from the librarians. Nevertheless, Informant E and Informant F, with their dedication and commendable partnership, led the group in the creation of TGI 2022.



In terms of pre-TGI 2022 library services, all informants agreed that webinars were indeed effective and valuable. Informant B added that the group focused on webinars to promote the library services and resources as it was the most feasible thing to do, as the movements were limited. However, she also mentioned that webinar fatigue was becoming a prevailing issue; and that there is a need for the group to come up with a more innovative approach. Informant D also highlighted that although the webinar approach was effective, they saw an opportunity to inject more excitement and interactivity. Prior to TGI 2022, Informant C also shared her admiration for UL's extensive resources and services. However, she expressed concern about underutilization of these, especially for the allocated budget for online resources, highlighting the need for innovative marketing and promotion strategies based on database usage reports.

### **Goals set for TGI 2022**

Informants shared their perspectives on the overarching goal of TGI 2022, providing valuable insights into the program's objectives. Informant A shared that the only goal in mind is to promote the library resources and services in a new perspective. Informant B mentioned that the primary goal was to come up with an activity that will encourage students to consult and maximize the use of the library's resources in the form of an exciting game. Building upon this, Informant C emphasized the main objective of TGI 2022 – familiarizing students with library resources and services, enhancing their utilization, a goal that expanded from UP Diliman to encompass the entire UP System.

Informant D shared that the main aim was to make fun and engaging stories that also taught important details about the library. All of this came together to achieve the program's main goal – to help everyone at the university become more familiar with what the library has to offer, using exciting stories to capture the attention and interest of a wide audience. Exploring diverse databases, interactive search strategies, familiarity with library services, utilizing Aklat-taan, self-paced learning and independence are among the specific objectives set for TGI 2022, added by Informant D.

For Informant E, TGI 2022 just really started with a great ambition to provide a great library experience to Isko and Iska despite the onset of the pandemic. It was also timely that the UL has developed a new learning spaces reservation App for the easing of the community quarantine restrictions. Related to this, Informant E and Informant F took this opportunity to ensure that there was a dedicated task related to this new app in TGI 2022.

Aside from the technical objective of TGI 2022 as mentioned by the other Informants – that is to promote the services and programs of the UL, together with Informant E, Informant asserted that TGI 2022 is made to change the UP community's stereotype perception towards reading, librarians, libraries, and literacy in general.

### **Development of TGI 2022 Stories**

Informant B revealed that while not directly involved in character selection, the plan was to feature impactful figures in Filipino consciousness. This approach aimed to engage participants with characters that were relevant and resonated with them. While Informant C and D were only involved in the creation of the pilot story, *Sino si Oble?*, including the setting of objectives of it, the latter three stories available for the whole UP system were designed and created primarily by Informant E and Informant F. According to Informant C, the TGI 2022 Core Group was determined to think of personas that would stay relatable and relevant to the theme; and that the main consideration for the characters of the stories is that they should be youth that have stories that serves as an eye-opener to the community.

Informant F had one goal in mind when thinking of a story to pitch – impactful. Whether impactful emotionally or mentally, the stories should raise awareness among its participants and would enable them to continue reading literature related to the personas of each story even after the. Luckily, Informant E had the same thing in mind which made it less difficult for them to plot the tasks.

### **Challenges encountered**

The journey of producing TGI 2022 came with its share of challenges and each informant shared insights into the hurdles they faced while bringing the project to life. For Informant A, a significant challenge arose when the scope of TGI 2022 was expanded from UP Diliman to the entire UP System. This expansion required the team to reevaluate decisions that had previously been made in order to accommodate a much larger audience. Additionally, Informant A highlighted that this change in scope placed considerable pressure on her to secure additional partner publishers and providers for prizes awarded to the winners.

Informant B, Informant E, and Informant F discussed the challenges they encountered regarding characters with political nuances. Informant B added that the team weren't sure how people on social media would react to the activity, considering how reactive people can be without informing themselves first. Still, they pushed forward with the support of the University Librarian, valuing that backing more than anything else.

Informant C recalled about the challenges they met along the way. There was always pressure due to limited time, and picking the main characters for each story was tough. TGI 2022 Core Group had to explain why they chose certain people out of many well-known figures. Overcoming this involved lots of research to find relatable and interesting people. They also got input from the team to finalize choices. Another challenge was making questions and tasks that fit well with the stories and related to library resources. For the InfoHunt story "*Sino si Oble?*" Informant C and Informant D contributed to this, while Informant E and Informant F took care of the other InfoHunt stories.

Informant D talked about working together to create interesting stories for TGI 2022. As part of the TGI 2022 Core Group, each of them was in charge of a group of subjects and had to come up with good stories that connected with different courses. Putting these different subjects together in a good story was a big challenge. They wanted to make stories that were fun but also informative in the context of the UL. There were also tough parts in the story-making, especially in addressing sensitive topics like political views and a character's dark past.

One of the challenges that Informant E mentioned was quite uncommon from the challenges mentioned by other informants. Informant E recalled how tough it was to pass through some members of the team who were afraid to change the dynamics in delivering traditional library services. Similar to Informant A, another challenge remembered by Informant E was when the scope of TGI 2022 was the expansion from UP Diliman to include the whole UP System. It was extremely difficult as the community quarantine measures are easing up in Metro Manila, while for some other Constituent University still has a stricter and limited movement. In light of this, the TGI 2022 Core Members thought of having two sets of InfoHunt: one infoHunt exclusively for UP Diliman and 3 infoHunt stories for the whole UP System. Informant F and Informant E shared a mutual sentiment that their roles as mere proponents took a toll on them, making it challenging to develop TGI 2022 while simultaneously fulfilling their primary assigned tasks. However, they both agreed that producing the first-ever gamification activity gave enough fulfillment to their desire to give a better library experience to the patrons.

According to Informant F, another challenge that the main proponents encountered was task delegation. Since this is the first gamification program of the library, the group did not expect the amount of workload it requires. From the planning of stories, shooting of teasers, designing of questions per story, down to the formulation of the culmination program of TGI, Informant E and Informant F were primarily in charge. There were instances where misunderstandings and miscommunication among these two main proponents would arise because the overall production of TGI 2022 was physically and mentally demanding. Nevertheless, these challenges made an effective and successful gamification library program.

## **Vision on the Library Services**

As we chart the course for upcoming library services, each informant presents a unique perspective that ultimately aligns with a common objective of pursuing innovation and staying relevant.

Informant A wants to continue exploring innovative library programs that would support in realizing the UL's objective of strengthening its impact within the UP community and fostering a culture of information utilization. Informant B emphasizes the importance of going where the people are, exploring platforms to showcase the library's strengths and projecting a post-pandemic library that is able to keep up with the times. This sentiment resonates with Informant C, who envisions library services becoming an accessible friend to the UP community, offering innovative and engaging concepts that bring library resources closer to the patrons. Informant C foresees The Great InfoHunt evolving into a staple program, keeping engagement and interest in the library.

Amid the fourth industrial revolution, Informant D envisions a dynamic evolution within the UL's ISAIS and IL Core Group. The focus is on seamlessly blending cutting-edge technology and digital literacy initiatives, empowering the university community to flourish in the ever-evolving digital landscape. Within this vision, the IL Core Group emerges as a beacon of transformative education, exemplified by experiences like TGI 2022, guiding students through immersive learning journeys that refine essential skills. Informant D also envisions the Information Services and Instruction Section as a digital powerhouse, employing AI-driven tools for personalized research assistance, virtual reality workshops, and data analytics training to equip students for future workforce demands. Collaborations with emerging industries enrich resources, while faculty engagement reinforces curricula with a robust information literacy emphasis. This united vision positions the UL as a forward-looking, agile center for holistic learning, fostering innovation amidst the transformative forces of the fourth industrial revolution.

Informant E envisions that the UL continuously provides innovative and out-of-the box library services. These services should not only showcase the library's extensive resources and services but also serve as a means of enlightening the UP Community about the prevailing societal dynamics. Informant E acknowledges that UL through ISAIS and IL Core Group shall remain non-partisan on political issues. However, he believes that it should be reconsidered when a political party deliberately spreads false news.

Informant F envisions a library where all multiple intelligences are welcome. By designing modern programs like TGI 2022, it somehow coincides with Informant F's vision of changing the perception of the society towards the library – that it is not a place for just reading anymore; it is a place where one's learning style is welcome, accepted, and honed. Embracing such modern changes is a big bold move from the UL as the university is being benchmarked by other institutions, thus, TGI 2022 shall be included in the hall of quality programs and services it showcases.

## **CONCLUSION**

The production of TGI 2022 was a remarkable collaborative endeavor that showcased the collective expertise and dedication of the UL-ISAIS IL Core Group. This innovative initiative highlighted the group's commitment to redefining the library experience through engaging and interactive gamification. As the TGI 2022 Core Group, especially the two main proponents diligently worked to shape the project's title, concept, narratives, mechanics, and overall flow, they encountered challenges that tested their creativity and problem-solving skills. Despite the obstacles, their dedication shone through as they navigated sensitive topics and ensured the stories resonated with patrons.

At its core, TGI 2022 aimed to achieve a dual objective: to effectively promote the library's extensive resources and services, and to enhance user familiarity with these services. Looking forward, the UL envisions an exciting and technologically integrated future, where innovative approaches are seamlessly blended with digital literacy initiatives to empower the university community. The library's role in the

midst of the ongoing fourth industrial revolution is seen as crucial, as it continues to evolve and adapt to meet the changing needs of its patrons.

However, the question of political neutrality adds an intriguing layer to this vision. While the library endeavors to remain non-partisan on political matters, there is a growing recognition that deliberate misinformation can warrant reconsideration of this stance. This highlights the dynamic nature of the library's role in a rapidly evolving information landscape, where staying relevant and providing accurate information are of greatest importance. In this context, TGI 2022 not only stands as a creative and engaging initiative but also as a representation of the library's ongoing commitment to innovation, adaptation, and the pursuit of a well-informed community.

The Great InfoHunt 2022 – started with a simple vision; ended with a huge success – to make the University Library of UP Diliman a livelier and innovative learning environment for its library users.

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## Understanding the Lived Experiences of Displaced Library Workers during the Pandemic using the CHIME Framework

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### **ABSTRACT**

*Background.* The education sector experienced unparalleled disruptions on a global scale as a result of the COVID-19 health crisis. In the Philippines, schools and universities had to close in March 2020, which led to a sudden shift to virtual learning, employee displacement, and mass layoffs. Library workers were not spared from these adversities. Compared to most foreign literature discussing the impact of COVID-19 on the well-being of library workers, the topic still needs to be explored in the Philippines.

*Objectives.* This paper intends to explore the experiences of displaced library workers in the Philippines using the CHIME framework to gain insights into how the pandemic affected their relationships with family and colleagues, their hope and optimism for the future, their perception of themselves, the meaning of library work to them, and their sense of workplace empowerment.

*Methods.* This paper adopted a qualitative approach. Snowball sampling was used to identify potential respondents. The researchers conducted a semi-structured interview via the Zoom video conferencing application to gather the required data.

*Results.* It was evident from the interviews that the pandemic affected the psychosocial aspects of the respondents. Faith and family relationships played vital roles in helping the respondents navigate and survive the pandemic's challenges. Workplace injustices and institutional failures such as decreased pay, abandonment, a lack of empathy, and micromanagement were the factors that affected how the respondents saw their future, the purpose of library work, and their sense of control over their personal and professional lives.

*Contributions.* The results of this study provided baseline data on the effects of the pandemic on the psychosocial aspects of library workers in the Philippines. It also added to the limited local literature on the topic above.

**Keywords:** CHIME in LIS, COVID-19, displaced library workers, pandemic effects

### **INTRODUCTION**

The COVID-19 pandemic has significantly impacted the job market in the Philippines. According to a survey by the lobbying and campaigns management firm Publicus Asia released in April 2020, at least one member of the Filipino household lost their job. This translated to a record high of over 7.3 million jobless Filipinos at the onset of the pandemic (Teo, 2020). Studies by the Asian Development Bank and the International Labor Organization in 2021 showed that those most vulnerable to job loss are in the service industry, arts, and entertainment (Lazo & Rodriguez, 2020). However, it is significant to note that job displacement due to COVID-19 was not exclusive to these industries.

The education sector had its fair share of casualties in the unemployment trend. With the closure of four hundred and twenty-five private schools came the displacement of workers (Mateo, 2022). In the United States, thousands of school districts lost hundreds of full-time school librarians. This is a five percent (5%) drop from before the pandemic. Data has yet to be gathered in the Philippines.

Job displacement causes resource loss and negative psychological concerns such as subjective well-being, depression, and other conditions (Bilal et al., 2022). It impacts individuals differently. Several studies have pointed to the lasting psychological impact of job displacement on an individual. The duration of the psychological effects of job displacement can vary depending on the individual's circumstances and coping mechanisms (Navarro-Abal et al., 2018). Displaced workers may experience a decline in their sense of purpose, identity, and social interactions, which can lead to feelings of loneliness and isolation (Marie, 2021).

Many workers worldwide, librarians included, had to settle for alternative jobs that were not right up their alley. Others were even laid off and forced to substitute emergency occupations for which they were unprepared or unqualified (Jensen, 2020). Philippine libraries were crucial in delivering information services amidst the COVID-19 health crisis. Filipino academic librarians have adapted to the changing demands of their communities as quickly as any other industry by transitioning to the virtual realm (Fresnido & Esposo-Betan, 2022). Libraries became information centers with on-site and online resources. During the pandemic, they provided social services and combated misleading news. Librarians analyzed resources and spearheaded information literacy initiatives (Grana, 2022).

Several foreign studies adequately discuss the impact of the pandemic on library workers. However, there needs to be more local literature on the earlier topic, especially on the well-being of workers who lost their library jobs. To address this research gap, these researchers gathered baseline data on the experiences of displaced library workers in the Philippines during the pandemic.

While the findings may not represent the experiences of all displaced library workers, they can provide insights into how the COVID-19 pandemic affected their relationships with family and colleagues, their hope and optimism for the future, their perception of themselves, the meaning of library work to them, and their sense of workplace empowerment. Moreover, the study highlights the importance of further shedding light on the topic.

## **LITERATURE REVIEW**

The pandemic underscored the need for systemic reform as librarians, staff, students, and community members faced personal losses and problems that flexible and empathetic policies and procedures should have structurally supported. For most libraries, this will imply at least a deliberate, continuous strategy to work from home and a bigger re-evaluation of where resources are focused. Genuine care in libraries necessitates considering the community's needs, including those of library workers (McLay et al., 2022).

The review of related literature focused on resources that discuss the impact of job loss during the pandemic on workers and the state of well-being of library workers during COVID-19.

### **Connectedness**

Connectedness pertains to relationships with peers, social groups, and the community (Leamy et al., 2011). Nunis (2023) reported that several library staff felt isolated from their patrons and colleagues due to working remotely from home. In recording the experiences of United Kingdom public library staff during the pandemic, Robinson, Ruthben, and McMenemy (2022) stated that several library staff felt frustrated that they could not properly communicate with and engage their patrons, older people in particular, due to a lack of knowledge of using social media, which was one of the platforms that helped people stay connected at the height of COVID-19.

As its leading support network, library workers relied heavily on their organizations for guidance and clarity. A study on the care and meaning of work in academic libraries during the COVID-19 pandemic found that positive work experiences were associated with flexibility, reliable infrastructure, and practices

prioritizing the safety of workers. On the other hand, adverse experiences were associated with a lack of institutional support, a loss of clear delineation between working from home and being at home, and even ambiguous assignments (McLay et al., 2022).

A supportive administration was also critical to an effective work experience during COVID-19 regarding infrastructure and communication (Al-Habaibeh et al., 2021). However, libraries often need to adequately connect during significant crises, leaving many needing clarification or adrift. The lack of connection led to relationships breaking down and some library workers giving in to the extreme stress and urgency under which decisions must be made (McLay et al., 2021). Findings from a study on library crisis communication showing that a lack of open communication can breed mistrust support this notion (O'Neill & Kelley, 2021). The pandemic could start a cultural shift in academic libraries, permitting long-overdue changes. While many professionals yearn for the past and are concerned about the future, they are also eager for a better working environment (Todorinova, 2021).

Another critical factor in connectedness is social support from family. According to a study by Gayatri and Puspitasari in 2023, during the pandemic, many families experienced financial struggles, job loss, and mental health issues. Early efforts to contain the virus, such as social withdrawal and quarantine, impacted family dynamics. To ensure family well-being during this time, it was crucial to prioritize communication, handle conflicts, and spend quality time together.

### **Hope and Optimism for the Future**

Hope is the belief that things can improve over time (Recovery College, 2020). Nunis (2023) revealed that the sudden and forced change in user demands and library processes made library workers uncertain about the future. Robinson, Ruthben, and McMenemy (2022) stated that many of their respondents were challenged to stay motivated during COVID-19 due to worries about safety in the workplace, concerns not being taken seriously, and uncertainty about the future. Prioritizing mental health is crucial, given that individuals who endure prolonged separation from their family, friends, and colleagues may experience heightened anxiety upon returning to everyday life. (Chrastka, 2021). In a field where mental illness is prevalent at high rates, the additional demands placed on libraries during the pandemic have led to burnout among librarians (Breunig, 2022).

### **Identity as a Library Worker**

Identity encompasses rebuilding or redefining a positive identity and overcoming stigma (Leamy et al., 2011). It was found that librarians faced a significant threat of layoffs during the COVID-19 pandemic, with no reports of librarian roles. Seniority was found to be the leading cause of these layoffs, disproportionately affecting equity-deserving groups (McLay et al., 2021). An increasing number of libraries laid off employees or forced them into substitute emergency occupations for which they were unprepared or unqualified due to the continuing pandemic (Jensen, 2020). Libraries and their staff are traditionally seen as providers of valuable and entertaining reading materials. During the pandemic, however, library workers took on varying roles.

### **The meaning of library work**

Several library workers were forced to shift or expand their roles during the pandemic. Public librarians, in particular, worked as contact tracers, homeless shelter staffers, and disaster service workers. (Ford, 2020). While these fell outside the bounds of traditional library tasks, they helped library workers reflect on the capacity of libraries to change their communities for the better (Jardine, 2021).

The pandemic has exacerbated issues with the morale and welfare of academic librarians, with many librarians reporting adverse effects on their overall well-being due to stress, a lack of support, and external factors (Glusker et al., 2022). Other librarians considered working from home disruptive, while others found it productive (Galanti, 2021). Library workers worldwide have demonstrated exceptional



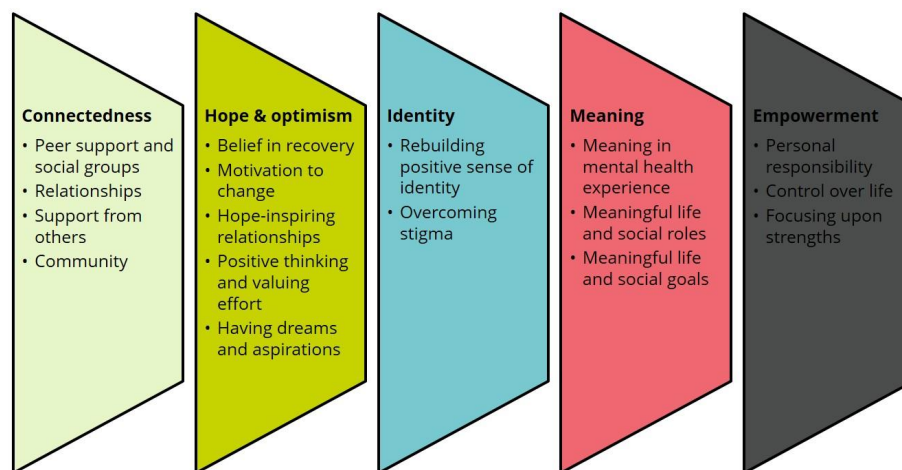
efforts in providing various forms of service, such as digital, virtual, online, and curbside assistance. Arguably, a solely digital library may not align with our nation's future demands once the pandemic subsides (Chrastka, 2021). Thus, it is important to continue supporting and looking after library employees as we move forward into the new normal (Adetayo, 2023).

### Empowerment in the Workplace

Empowerment is people's sense of control over their lives (Leamy et al., 2011). Workplace empowerment, in particular, refers to empowerment in decision-making, financial matters, time, and shared information (McQuerrey, 2021). Breunig (2022) briefly discussed the impact of the increasing and rapidly changing user demands on library workers in Milwaukee during the pandemic. Librarians were treated like frontline workers without being labeled as such. They were expected to be at work a month after everything shut down in 2020 and were forced to work in an unsafe environment where patrons refused to wear masks. Because of this, the workers felt that the administrators did not care about their needs, and morale was low.

### Theoretical Framework

## The CHIME framework for personal recovery



Leamy et al. 2011

*Figure 1. The CHIME framework for personal recovery*

CHIME is a recovery framework. It has five factors: connectedness, hope and optimism, identity, meaning, and empowerment. While rarely used in LIS, the researchers argued that it could be used to understand how the pandemic affected the psychosocial aspects of displaced library workers since the five CHIME factors were considered things that all people need in their lives, no matter who and how old they are or where they are from (Recovery College, 2022). These factors served as themes from which the researchers derived patterns and meanings that formed the narrative about the lived experiences of displaced library workers in the Philippines during the pandemic.

### METHODOLOGY

This paper adopted a qualitative approach to explore the lived experiences of displaced library workers in the Philippines during the pandemic. The researchers decided to use snowball sampling because respondents might be limited. The Human Research Protection Program of the Oregon State University (2010) and Julia Simkus (2023) explained that snowball sampling is best used when the sample

population is hard-to-reach or hidden and/or if the topic is sensitive. The researchers perceived job loss during the pandemic as a sensitive matter. Brillantes (n.d.) said that job loss affected people's mental health and that it led to widespread trauma, depression, and suicides.

The first respondent was identified with the help of a fellow librarian who worked at the same university as the researchers. He recommended that one of his staff, who gave her consent, participate in the study. The first respondent referred the researchers to colleagues who experienced job losses due to the pandemic. A semi-structured online interview and a thematic data analysis using a deductive approach allowed the researchers to delve deeper into the respondents' personal experiences. Thematic analysis was beneficial as it allowed the researchers to categorize large amounts of data and look for patterns of meaning that addressed the research questions. The researchers used a deductive approach because a set of themes (CHIME) were already expected in the resulting data.

### **Population and Sample**

Library workers who were displaced during the pandemic were the target respondents of the study. The researchers first identified potential subjects at the institution they currently belong to and then pursued snowball sampling. Snowball sampling is a non-probability method used in qualitative research when the population is hard to reach or hidden (Dovetail Editorial Team, 2023). Five librarians agreed to participate in the study. The researchers reasoned that this sample was enough, as the goal was to gather baseline data about the impact of the pandemic on the psychosocial aspects of displaced library workers.

### **Research Instrument**

The study used semi-structured online interviews to gather relevant data. The researchers categorized the questions into five themes based on the CHIME framework (Connectedness, Hope and optimism, Identity, Meaning, and Empowerment) while focusing on the experiences of displaced library workers. A consent sheet, lifted from the Nanyang Technological University website, was included to inform the respondents about the nature of their participation.

## **FINDINGS**

### **Profile of the respondents**

This study involved five participants, all working librarians, at the height of the COVID-19 pandemic. They were either laid off, forced to resign, or simply decided to leave their jobs for various reasons. The participants' ages range from 25 to 35 years old.

Tadhana is a young man in his mid-twenties. He is independent and goal-oriented. During the pandemic, he worked in two libraries: a private school in Manila and a state college in Occidental Mindoro.

Ligaya is a school librarian at a private school in Caloocan, where she has been working for nine years. During the pandemic, their school administration closed the library, viewing it as non-essential, and moved the library staff to the Student Records Department.

Mutya is a cheerful, soft-spoken young woman in her twenties. She was a teacher-librarian at a private school in Quezon City at the height of the COVID-19 pandemic. Mutya was assigned a different responsibility at school during the pandemic, outside her job description. Amid the pandemic, she was compelled to leave her job.

Soledad is a K-drama-loving introvert who worked as a librarian at a private university in Nueva Ecija, where she was up for regularization. When the pandemic hit, Soledad was told that her services were no longer needed. She is now working at a state university in Quezon City.

Hiraya worked as a librarian in a government-run library hub in Calapan, Oriental Mindoro. She was pregnant with her second child during the early months of the pandemic. After giving birth, she decided to quit her job, citing family problems as the main reason. She is now employed at a state university in Quezon City.

### **(a) Connectedness**

Connectedness is widely recognized as a vital component of human well-being, contributing to positive mental and physical health and social and emotional adjustment (Thayer & Anderson, 2023). Essential themes in this domain include social relationships with family and peers.

#### *i. Social relationships*

The respondents showed a level of similarity in terms of their connectedness. Social support, an essential factor of the connectedness construct, was apparent in the experiences of the respondents. Strengthened family bonds as a result of spending more time together at home during the lockdown and constant communication with friends and colleagues are essential themes in this domain.

##### *(i) Social support from family*

During the COVID-19 pandemic, families became more central to respondents' lives than ever. The challenges of the pandemic, such as social isolation, job loss, and illness, made people more reliant on their families for support and companionship. Many families also spent more time together at home due to school and workplace closures, which allowed them to deepen their relationships and create new memories.

In March 2020, when the government declared the lockdown, Tadhana's parents suggested that he leave his job and return to their province of Mindoro. Tadhana was among many who chose to stick with their jobs, fearing unemployment.

When the Philippine government announced that there would be a lockdown, my parents told me to quit my job. I just brushed it off because it was my first job, and needed the money.

Despite living away from his family, Tadhana remained connected with his folks. His parents frequently called to check on him, as he has several autoimmune diseases. Tadhana also acknowledges that it was the support of his family and friends that kept him going.

My family and friends helped me feel more at ease during the pandemic. I talked to them often, and it felt like I could not go a day without speaking to someone I loved.

In 2021, Tadhana finally heeded his father's advice and returned to the province. While at home, he mustered the courage to come to his parents. He shared that coming out to his parents was the best decision he had as he never felt more loved and accepted by his family.

I came out to my parents during the pandemic. It dawned on me that it was the right time to tell them because I did not want it to add to my worries anymore. It felt like a weight had been lifted off my shoulders after I did it.

He added that work felt lighter and more manageable because he had a new lease on life.

Despite the set-up, I did not mind the hard work before because the weight on my shoulders was gone. I was just happy I was finally out.

Ligaya felt her ties with her family grow stronger than ever. Spending time with them made her reconnect and grow closer to her folks.

I went home to Bulacan to be with my family during the pandemic. My family supported and took care of me when I contracted COVID-19. We grew closer than ever because of that.

Many people have experienced greater workloads and increased burnout and stress during the pandemic. Mutya's case, however, was not only a simple case of burnout.

There came a point when work just became dragging. The night before I quit my job, I could not sleep because I worried about being jobless during the pandemic. The following morning, my mom found me in tears when she opened my bedroom door. I could tell she was heartbroken when I confided in her about my problems at work and about my thoughts of ending my life.

Soledad grew closer to her family during the lockdown. She added:

My family has become closer because of the pandemic. Before the pandemic, we only spent time together on long weekends when my siblings were around. Because of the pandemic, we had more time to be there for each other.

For Hiraya, being pregnant and raising a young kid meant being strong was her only option. In return, she drew strength from her children.

As a mother, I knew I could not give up. My two young children needed me to be strong. So, I stayed positive and believed things would eventually improve.

While she was uncomfortable working from home, she eventually realized the significant positive change it brought to their family.

One of the upsides of staying at home is that I got to spend more time with my child. I am unsure if my husband was always there, but he was around. As a result, we all bonded closer as a family. Everyday activities, such as preparing food, became opportunities for us to connect.

#### *(ii) Peer support*

A significant aspect for the respondents was the constant presence of colleagues and friends, even though they were physically distant. This suggests that proximity is not the only factor determining the importance of social support. Even when colleagues and friends are not physically present, their presence can provide a sense of comfort, security, and belonging. This can be especially important for people facing challenges or transitions.

The pandemic strengthened Tadhana's bonds with his friends and colleagues. He revealed that they frequently called each other to check their health. His friends repeatedly reminded him that he could rely on them for help because they knew he lived alone.

Just having them there helped me get through the day. They would keep me company and talk to me, even when we were all preoccupied. Knowing they were just a call or message away made the situation bearable.

Ligaya's relationship with her co-workers also changed. They discovered similar challenges during the pandemic and eased one another's burden by communicating their feelings.

My colleagues and I bonded over our shared experiences during the pandemic. We were all worried about our salary cuts, but we supported each other and hoped our employer would keep their promise to reinstate our salary.

While going through hard times, Mutya needed to be strong for her younger colleagues. In a way, they became each other's support system at work. She continued to share:

I had suicidal tendencies before the pandemic, so I did not expect to survive 2020 without thinking about suicide again. The pandemic greatly impacted me because my two colleagues were from a younger batch at [name of Alma Mater], so I had to be strong [for them] at the time. Every day, we would stay behind after office hours to discuss our concerns.

Soledad and Hiraya shared that they connected well with their colleagues during the pandemic but agreed that interaction has become limited.

## **(ii) Hope and optimism about the future**

Feeling powerless during the pandemic is a recurring theme in this domain. The respondents primarily lacked autonomy over several aspects of their lives. Despite the odds, however, some developed simple coping mechanisms to deal with the stressful times, while others set clear goals for themselves in the aftermath of the pandemic. Thus, essential themes in this domain include agency, particularly a sense of control and autonomy, goal-setting, and coping strategies.

### **(i) Sense of control and autonomy**

The respondents felt overwhelmed and powerless in the face of the pandemic. They reported losing autonomy over their work, personal lives, and futures. They found it challenging to plan for the future as they focused on surviving each day. They also worried deeply about their job security and their financial well-being. The respondents' cases demonstrated a lack of agency in all aspects of their lives, from their workload and salary to their family relationships. This experience has had a lasting impact on their disposition as library workers.

Tadhana recalled feeling dejected as his academic and professional aspirations had to be put on hold due to the pandemic.

The pandemic reset everything. I lost sight of my goals. I found it challenging to plan for the future as I was focused on getting through each day.

Despite being a tenured employee, Tadhana suffered low pay. When asked why that was the case, he shared:

There was no other choice but to cut the budget for our salary. The school said this was done to avoid laying off more employees.

Mutya was devastated when her administration abruptly removed her teaching load and reassigned her to tasks outside her job description.

Teaching is what I love most about being a school librarian. However, the last-in, first-out policy was implemented for teachers and staff when the pandemic hit. What bothered me the most was that we were only allowed to work three days a week, so our pay was cut accordingly. To make matters worse, they removed our IL classes, saying that Guidance [referring to guidance counselors] could handle it.

She also endured micromanagement when compelled to work overtime despite the stringent curfew hours imposed during the pandemic.

Our supervisor would force us to work overtime, even though it was against the protocol. It just felt demoralizing to the point that I felt lost and unhappy.

Mutya grew more and more frustrated with what was happening at her job.

During the strict lockdown, my boss sent me to the office to retrieve a book invoice, even though I lived far away from the school. I thought it was inconsiderate of her to demand that I report onsite because we could have faced severe consequences if we had been caught.

She continued to share how uncertain she felt about her future.

I felt utterly hopeless and unable to envision my future. Back then, my co-workers would ask if I would consider staying at [name of former organization], and I would openly respond that I intended to stay there until retirement. However, during the pandemic, I started questioning how long we would endure this state of no work and no pay. The situation just seemed highly uncertain.

When asked if she thought of seeking help, she responded quickly:

I never shared my problems with my parents because I did not want them to worry. If I told them about the issues at work, they might inform the school management, and I could lose my job. I could not afford to be a burden to them.

Ligaya was disappointed when their school management closed their library and reassigned the staff to the Student Records Section.

The [school] board announced that the library will be closed because classes have moved online. They had initially asked us to draft a proposal for the library, but they eventually decided to shut it down and move us to the Records Department.

Gutted by the news, she continued to share:

We were licensed professionals, and they treated us that way. It was as if the library was a liability.

In addition, Ligaya and her colleagues were paid less than their regular salary.

The board cut back on our salary to determine how many students would enroll. They promised to reinstate our regular salary if the pandemic would not impact enrollment, but they did not. We were still grateful that we kept our source of income, even if it was less than we expected.

When asked what she was going through amidst the pandemic, she had this to say:

I felt scared because my expenses exceeded my salary during the pandemic, so I depleted my savings.

Furthermore, Ligaya felt disappointed about how their office treated employees who contracted COVID-19 while on duty.

Our office refused to shoulder the cost of my COVID-19 swab test when I tested positive, even though we had been asked to report onsite. I did not have the money to pay for the test, so I had to stand in line at the barangay hall [for a free test].

Soledad was somehow mentally prepared for the possibility of losing her job during the pandemic because the last-in, first-out policy at her old office meant she had no say in what happened.

I have not been there for a year; I joined them only in August 2018—just seven months. I was fortunate because they gave me a new contract before the lockdown, but since they implemented a last-in, first-out policy, the newest hires, including myself, were let go.

When asked how she felt about being forced to work from home, Soledad shared:

Before the pandemic, we had more face-to-face interaction, so it did not feel like work was everything. Now, work is all there is.

Since isolation was familiar during the pandemic, the researchers asked Soledad if she had ever felt isolated. She shared:

Perhaps others felt isolated while on lockdown, but I did not. I talked to the same people before and after the pandemic, so it did not feel different.

While without a job, Soledad focused on cooking and selling food. However, she grew worried that she might end up contracting the virus by going to the market, where she would typically get her ingredients. She added that the pandemic made her realize the importance of a stable job. She further explained that:

When the pandemic hit, I realized the importance of a stable job. You can lose your job anytime in private companies—it is just how things work. This prompted me to start looking for better opportunities in government.

Hiraya revealed that she grew concerned about working from home because she was not confident in balancing her roles as an employee, mother, and wife. While advantageous for many, working from home was different from what Hiraya anticipated she would be doing. She explained:

I started feeling anxious when I realized everyone would work from home. It seemed like a challenge for me, especially with an infant. How would I concentrate on work while caring for my child?

She added that working from home was not exactly good for her mental health.

The routine of working from home is different from working in an office. When working from home, you wake up in the morning and have breakfast, but you do not shower first like you would if you were going to the office. You just open your laptop and start working right away. This leads to a lack of separation between work and home life, which can have adverse effects in the long run.

Hiraya also shared her insights about whether working from home is more complex for women than men. She had this to say:

Women traditionally take care of the household in Filipino families, right? Even though responsibilities are shared more equally now, it is still common for wives to be responsible for cooking, bathing the children, and other household chores. This can be a challenge for working women, as they must balance their time at work and home.

During the interview, restlessness was a word Hiraya often used to describe how she felt while working from home. She continued to share:

While I have a permanent job and am not worried about losing it, I cannot help but feel restless. What if the pandemic never ends? Will we always work from home? What if I ran out of things to do? What am I going to do? These thoughts run through my head when I think about how much the stay-at-home order has changed our lives.

The pandemic has shown that even in difficult times, people can find ways to connect and build relationships. However, it cannot be denied that the health crisis changed people's lives, including their relationships with their loved ones.

After giving birth to her second child, Hiraya returned to work for a few weeks and decided to leave for good. When asked what drove her to quit, she said:



We have been having problems as a family for a while now. As they say, marriage is not easy and has been a roller coaster ride for us. We have resolved our problems in the past, but they keep coming back. The worst part was that it started to affect my job. It was hard, but I could not give up on my husband and our family, so I did the next best thing and let go of my job.

When asked what was most challenging about working from home, Tadhana shared:

That is [referring to augmenting the library's online resources] where we focused our efforts, which became stressful because our online resources were not as extensive. We had to devise other ways to help students cope with the online learning setup, especially given that the onsite workforce was still limited.

Tadhana had to attend several virtual emergency meetings at night in his previous job since the school management would devise new guidelines to communicate to the employees before the next working day. He also worked at home late at night, feeling the need to put in extra effort every time.

We would hold emergency meetings online at 8 p.m. because that was the only time our immediate supervisor could reach the school management to get instructions for the ever-changing learning setup. That was one of the most complex parts.

#### (ii) Goal-setting

Despite facing considerable challenges and obstacles, some of the respondents demonstrated a remarkable degree of clarity and focus on their stated goals. This suggests they had a strong sense of purpose and motivation and were determined to overcome adversity.

Hiraya aspires to advance her career within her current organization. She is eager to set ambitious goals and pursue them with a positive attitude.

I am currently on a [name of organization] contractual status, but I hope to get a permanent position at [name of current organization]. [Name of current organization] has been my dream for a long time, and I am finally here. I plan to stay here permanently so I can work here for many years to come.

Despite being redirected to a path that was not his choice, Tadhana nonetheless feels a sense of pride in his accomplishments.

Even though I still dream of becoming a doctor, the current circumstances do not favor me pursuing medical school, so I am continuing to study library and information science to earn a master's degree. That is where my journey is at now.

### (iii) Coping strategies

Individual coping strategies during the COVID-19 pandemic varied, with each respondent employing unique mechanisms to manage the psychological impact and achieve a sense of normalcy. This reflects the multifaceted nature of the pandemic, which has profoundly and widely impacted people's lives. Some common coping strategies include social support (e.g., spending time with friends and family), a change of scenery, a strong religious faith, and even turning to TV shows for comfort.

Hiraya shared that she was able to establish a routine with her child. This routine has helped keep her restlessness at bay while living in the middle of the COVID-19 pandemic.

We feel secure at home because it is in a gated subdivision where only residents can enter. In the morning or evening, my kid and I would go for a walk. I was pregnant then, so my stomach was big, but I did not mind because the walk helped relieve my restlessness.

She added that doing field service for their church kept her afloat.

Bible reading and study kept me going, and of course, my family, who is always there for me. I also enjoyed field service when we would go door-to-door to talk to people about [name of religious group]. After doing these things, I always felt better.

When she left her job, Hiraya knew she needed a change of scenery.

I knew I needed a change of scenery, so I decided to take some time to relax and recharge. I focused on my family and did not have to think about work. It was the best decision I could have made at the time.

Ligaya also held on to her faith when times got tough. She believes the driving force kept her going during such an uncertain period.

My faith in God was my rock when I struggled — when I felt like giving up.

As someone who found solace in watching Korean dramas, Soledad naturally turned to watching her favorite shows to get by. When asked how K-dramas helped her cope during the pandemic, she quickly said: The show's protagonists are usually positive thinkers, so if I keep watching the shows, I will eventually imbibe the same mindset.

### **(iii) Identity as a person and a library worker:**

While there are many components under the Identity domain, personal growth was the most apparent construct when the respondents were asked to share their insights. Personal growth is a process of developing and maturing that involves acquiring new talents, pursuing new interests, and fostering positive relationships with others. It is an essential aspect of the road to recovery, as it helps individuals develop a sense of purpose and meaning in their lives. The Identity domain of the CHIME Framework includes personal growth as one of its components (Yung et al., 2021).

#### (i) Personal growth

The respondents reported a significant shift in their personal growth during the pandemic, reflecting its profound impact on their personal and professional lives. This shift was characterized by a heightened sense of vulnerability, a reassessment of priorities, and a renewed appreciation for the interconnectedness of all life.

Before the pandemic, Tadhana overanalyzed everything. His goals were mainly centered on bettering himself. Because of events beyond his control, his overthinking intensified during the pandemic. After attending a state university, Tadhana developed progressive ideas and got involved in social movements. The government's callous handling of the COVID-19 pandemic and other social injustices sparked his moral compass.

A lot has changed with the way I view things. I used to think only about myself, but the pandemic somehow made me kinder, and I started thinking of others, too.

Ligaya saw herself as a dedicated person and worker. Despite the injustices she suffered in her institution, she continued to do her best at work.

After the pandemic, I put more effort into my job. Our library was swamped with three academic years worth of subscription deliveries that needed to be processed. I had to manage them alone, as my colleague had left the job for good.

Mutya thought of herself as a loyal employee. She often heeded instructions and kept silent, even when she had ideas she knew could improve things in the workplace. Her setbacks during the pandemic helped her discover her voice and inner strength.

Before the pandemic, I hesitated to speak up and fight for what I believed in, even though I knew I should. I would just keep it to myself. That changed during the pandemic; I broke out of my shell and stood up for myself. When I tendered my resignation and the school principal told me that my boss was just like that [referring to her attitude towards her staff], I stood up to him and told him that he enabled her—that he was not hearing our side because he was fortunate not to be in our shoes. It felt great to be able to finally speak my mind.

#### (iv) Meaning of library work

In its most practical sense, the respondents viewed their work as a source of income. This was paramount; they all wanted to keep their jobs afloat during the unprecedented COVID-19 pandemic. Additionally, the respondents could not deny that working during this global health crisis gave them a sense of purpose and some semblance of normalcy.

The main themes under this domain are a sense of purpose and making sense of experiences.

##### (i) a sense of purpose

The COVID-19 pandemic has significantly impacted library workers, both personally and professionally.

While some respondents found their sense of purpose, others struggled to find their footing amid the pandemic.

When asked how she felt about her work today, Hiraya excitedly shared:

I am so happy to be back in an academic library! I worked in an academic library for six years after college, and it felt like coming home. I need to remember all about the library hub. It is like going back in time. I am an academic librarian again. It has been a bumpy road, but I am finally back on track.

On the other hand, Mutya was starting to lose sight of why she was a librarian in the first place. She immensely enjoyed teaching information literacy classes as a teacher-librarian before the pandemic. However, when the lockdown began, and her teaching load was taken away, it left her feeling undervalued. She shared:

I was unsure if I was still a librarian at that point. I had not been doing library work since the pandemic started, even though we were still required to come in. The teachers taught online, but the library staff had to report to work without hazard pay. We made learning packets for the teachers and stacked pages by subject and grade level.

Mutya went on to say:

I loved my job as a librarian, so I never questioned my purpose. However, when the IL classes were removed, I felt like I had lost my way. With them, I could fulfill my role as a librarian as I wanted to.

## (ii) Making sense of experiences

Each experience, whether good or bad, left an indelible mark on the respondents, shaping their perspectives about their jobs and informing their future decisions. Through reflection and analysis, they have learned to make sense of their experiences during the pandemic and extract valuable lessons from them.

The loss of lives due to the COVID-19 pandemic prompted Hiraya to respect life more than ever before. When asked how the pandemic affected her self-perception, she replied,

During the pandemic, I realized that losing a loved one can happen suddenly. That is why my time with my family was invaluable—we were creating lasting memories. It challenged my resilience and ultimately led me to quit my job.

In the beginning, Ligaya was hesitant to leave her library work behind. However, when she took on a different role as a student records clerk, she realized something about being a librarian. She further shared:

My job in the Records Section was much easier [than my work at the library]. I did not have to catalog books, do inventory, or create

reports, invoices, and book requests anymore. All I had to do was encode student information and grades. I liked it better in records because the work was more manageable.

Soledad knew her job like the back of her hand. She described her work environment in the province as “*laid-back*.” She saw herself retiring in the private sector and no longer entertained the idea of looking for better job opportunities elsewhere.

I was content being in the private sector. When I was in Nueva Ecija at [name of former organization], I considered retiring there because their benefits were better than those of other private institutions.

When the contract was not renewed, however, Soledad had time to consider her friends’ advice to seek better opportunities in government.

While her family was blessed not to be affected by the COVID-19 crisis, she felt the loss of her friends and colleagues. She wanted to be there for them but also knew how important it was to keep going.

After the death of a loved one, what do we do next? Do we dwell on the loss, wondering what we could have done differently? What can we do to make ourselves feel better? I was worried that, because I had never experienced it, I may not be equipped to comfort my grieving friends. That is why I would constantly read about how to deal with loss, hoping to find some wisdom or guidance that could help me support others who were grieving.

### **(c) Empowerment in the workplace**

Despite the initial lack of empowerment, the respondents persevered and regained their autonomy. Their reflections revealed that most of them have become more attuned to their inner selves, enabling them to make informed decisions about moving forward. They have also developed a stronger sense of self-efficacy, having survived the COVID-19 health crisis through resilience and resourcefulness. Autonomy and self-efficacy are essential components of empowerment, and the respondents' experiences demonstrate the transformative potential of these qualities in the face of adversity.

#### **(i) Autonomy**

The regained confidence of some respondents enabled them to develop a clearer vision for their future, including their non-negotiables and compromises. This newfound clarity empowered them to move forward with greater purpose and determination.

Tadhana initially kept his job because he wanted to maintain his source of income. Naturally, he felt attached to it, as it was his first professional work. However, he later needed to decide when the management suddenly shifted its priorities.

At one point, the administration would also reduce the number of library staff. Of course, most people disagreed since it would be difficult to find a new librarian. So, they laid off an employee from another department instead. Eventually, I decided it was time for me to go.

Hiraya eventually decided to return to work because she refused to rely on her husband for financial support.

I also have to earn money since my husband provides for our children. I cannot wait for him to give me money to buy things or go out and do things for myself so I can relax or unwind. That is why I realized I needed to earn money.

Ligaya shared that while she continues to do her best at work, she no longer feels pressured to do more than she should.

I am willing to give whatever I can, but I will no longer put myself under too much pressure. I have been honest with them, saying that I cannot simultaneously handle the demands of being a librarian and a teacher.

Before the pandemic, Soledad focused only on work and the household. She spent much of her time between these two and often turned down invitations from friends to go out. She used to feel guilty about turning down these invitations, so she would say yes to some of them even if it exhausted her.

After the pandemic, I became a recluse, but I no longer feel guilty about turning down invitations to go out and socialize. I am now more comfortable putting my needs first. I am still a recluse at heart, but I have to deal with people more now because of work. I feel exhausted when I get home after a long day of socializing. I used to feel the same way at my old job because they always seemed to want more from me, even when it was unreasonable. I was exhausted there, too. Now, I am finally able to balance my negative emotions.

#### (ii) Self-efficacy

Despite experiencing unpleasant challenges during the pandemic, some respondents felt their self-efficacy increase as they rediscovered their profession. They became driven to excel and do more, not just for their organizations but for themselves.

As a newly licensed librarian in 2019, Tadhana felt he missed two crucial years due to the pandemic. However, working at a state university in Quezon City helped him find his career path.

We are happy that we are finally working here [referring to the current organization]. We finally have a clearer vision for our career path. We are now writing research papers. It has been my friend's and my dream since college; now, we are making it happen.

Soledad did not realize that getting a job at a state university meant developing new skills she never knew she needed. She quickly admitted that there was resistance and questioning at the beginning.

At first, I rejected the idea of learning new things. I thought to myself, "Why do I need to learn this? It is so hard!" When something is difficult, I tend to rant and rave. I need to complain about it before I can get started. So, complaining helped me take action.

Furthermore, her mindset shifted from being an introvert to being a go-getter after the pandemic.

As someone who tends to keep to myself, I usually think long and hard before taking on any task. I often wonder if I was up to the challenge. However, when the pandemic hit, I started pushing myself out of my comfort zone. I began to see it as a chance I might not get again, which motivated me to do things I once thought were too hard. This whole experience changed how I see things, and now I believe in making the most of every opportunity.

Mutya shared that finding a job at a state university made her feel empowered again, especially her involvement with work for gender and development. She happily quipped:

My career path became apparent, and I have become more assertive. Now, I am happier than ever.

## CONCLUSION

The findings of the study made it abundantly clear that the pandemic affected the respondents' psychological and social well-being. The respondents' faith and the support they received from their families were significant factors in their ability to overcome the pandemic's challenges and live through them. Workplace injustices and institutional failures, such as decreased pay, sudden and forced changes in work roles, feelings of abandonment, a lack of empathy, and micromanagement, were the most prevalent variables that affected how the respondents saw their future as library workers, the meaning of library work, and their sense of control over their personal and professional lives.

Even though everyone's experience with the pandemic was different, it is clear from the responses that the COVID-19 health emergency affected their perspectives on the workplace and everyday life. The pandemic highlighted how vital it is to safeguard library workers, guarantee that they will continue to have jobs, and ensure that they are aware of and on board with any changes that could impact their jobs. How institutions handle library staff needs to be improved, and when things get complicated, these people should be seen as valuable. Long-term impacts will be felt as a result of the experiences of library staff during the pandemic, particularly their ties with their administrators. These librarians were experiencing confusion, stress, and a shift in priorities, leading them to question the significance of their jobs.

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## **APPENDIX A: Informed Consent**

### **Respondent Details and Nature of Participation**

Respondents will only be asked to provide basic personal details relevant to the study to comply with data privacy concerns. Participating in this study is voluntary, and you are under no obligation to consent to participate. You are free to withdraw at any time without giving a reason. You are free to withdraw from the study at any time and /or refrain from participating in any component of the research, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The interview will be conducted either online via Zoom or in person. The interview might last about one hour and will be recorded for data analysis.

### **Information Confidentiality**

You have the right to insist that your name will not be recorded anywhere and that no one, apart from the researchers, will know about your involvement in this research. Your name will not be recorded anywhere, and no one can connect you to the answers you give. Your answers will be given a pseudonym, and you will be referred to in this way in the data, any publications, or other research reporting methods such as book chapters, conference proceedings, conference presentations, and journal articles. The resulting research reporting methods will protect your privacy and only publish anonymous details. Individual participants will not be identifiable in the presentation of the results.

### **Research Results**

Data collected for the research will be published in research reporting methods such as book chapters, conference proceedings, conference presentations, and journal articles.

### **Data Security**

All of the data collected will be stored on the researchers' password-protected computer. Copies of your answers will be stored for two years. Hard copies will be shredded, and electronic copies will be permanently deleted from the computer's hard drive through a relevant software program after five years.

### **Contact Information**

If you would like to be informed of the final research findings, require any further information, or want to contact the researchers about any aspect of this study, please email [avpalaya@up.edu.ph](mailto:avpalaya@up.edu.ph) or [fflabiano@up.edu.ph](mailto:fflabiano@up.edu.ph). Thank you for taking the time to read this information sheet and for participating in this study.

**(Template lifted from the Nanyang Technological University Website)**

### **APPENDIX B: Interview Schedule**

#### **I. Basic Information about the Interviewee**

Name:

Designation:

Institution Affiliated with During the Pandemic

Institution Affiliated with at Present:

#### **II. Background**

- a. What happened to you during the pandemic?

### **III. Connectedness**

- a. How would you describe your relationship with your colleagues before the pandemic started?
- b. How did the pandemic affect these relationships?

### **IV. Hope & optimism**

- a. Did you ever feel hopeless during the pandemic? If yes, what made you feel this way?
- b. What motivated you to believe that everything will be okay despite the challenges and difficulties brought by the pandemic?

### **V. Identity**

- a. How did you see yourself before the pandemic?
- b. How did the pandemic affect this perception?

### **VI. Meaning**

- a. How did you perceive your work before the pandemic?
- b. How did the pandemic affect this perception?

### **VI. Empowerment**

- a. What were the changes in your life brought about by the pandemic, and how did you feel about it?

## Session 10: LIS Pedagogies

ALIEP 10-1 The Status of Data and the Role of Descriptions in LIS:  
Diagnosing Pseudo-scientific Approaches related to the Use of  
Statistics

(Kyo Kageura)

ALIEP 10-2 Developing Teaching Material on Health Literacy:  
Formative Assessment

(Makiko Miwa, Masae Sato, Yumi Yamashita, Yukie Isobe and  
Yumiko Abe)

ALIEP 10-3 The Handbook as Hardware: An Analysis of the  
Pedagogical Utility of the #MIL4Democracy Handbook in Media  
and Information Literacy Instruction

(Yhna Therese Santos, Irish Jane Talusan and Gerard Martin  
Suarez)

# The Status of Data and the Role of Descriptions in LIS

## Examining Pseudo-scientific Claims on the Use of Statistics

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### ABSTRACT

*Background.* Empirical approaches are widely adopted in LIS, in which quantitative and/or statistical methods are often used. Nevertheless, they often remain a rote and/or misguided application of elementary and sometimes obsolete methods, such as hypothesis testing with P-values. Worse still, sometimes reviewers misguidedly give negative judgment to research work because what they wrongly believe to be necessary, e.g. hypothesis testing, are lacking. Theoretically, this kind of attitude reflects the lack of understanding of science in general and LIS research in particular. Technically, it reflects the ignorance of the status of statistical approaches and of the recent developments of statistical applications in such fields as psychology.

*Objectives.* This paper clarifies the nature of data and the status of measurements and descriptions in LIS. In order to do so, we examine issues observed in LIS, i.e. the rote use of irrelevant statistical framework and methods and their dogmatic and misguided imposition by reviewers of LIS-related journals. In the process, we reconfirm the position of LIS and clarify what need to be taken into account to make LIS research scientific in this respect.

*Methods.* We adopt both case-based and deductive approaches. We examine cases observed in LIS and related fields about the misuse of elementary statistics and its applications, in relation to the framework of sample and population and the relations among descriptive statistics, exploratory data analysis and inferential statistics. We then clarify the nature of questions in LIS research by referring to Bayesian workflow as a generic frame of reference.

*Results.* We show that the issues come mainly from four causes. The first cause is the insensitivity to what LIS deals with. The second and more technical cause is that often LIS researchers do not follow discussions about the use of statistical methods in related fields and recent methodological developments, and believe what they learn from elementary and possibly obsolete textbooks is the standard. The third cause is the general lack of understanding of science itself. The fourth cause is the lack of understanding of what we do not know and thus what we need to address in LIS research.

*Contributions.* This paper has two main contributions. Firstly, it reconfirms the nature of main research target in LIS, which reflects the very *raison d'être* of LIS. Secondly, it raises caution to the pseudo-scientific and dogmatic adherence to obsolete elementary statistics represented by rote use of P-values in hypothesis testing and helps open room for more creative LIS research.

### INTRODUCTION

Empirical approaches are widely adopted in LIS. One of the approaches is quantitative, in which statistical methods are often used. While using statistical methods are important when relevant, we sometimes observe rote, unnecessary, and often misguided application of elementary or even obsolete methods. Worse still,

sometimes reviewers of LIS-related journals misguidedly give negative judgment to work because what they wrongly believe to be necessary, e.g. sample-population framework or hypothesis testing, are lacking.

Theoretically, this issue is related to the lack of understanding of research target in LIS - and of science in general. The lack of understanding of the problem logically leads one to reach to misguided solutions. Technically, this issue is related to the ignorance of the nature of statistical methods and of their recent developments, and with the ignorance of their own ignorance.

In this paper, we examine the misunderstanding about the use of statistical approaches, picking-up misguided statements actually observed in review comments in LIS and in related field, and clarify the issues, in the process consolidating the nature of the core target of LIS research. We pick up two cases related to the sample-population framework and the relationships among descriptive statistics, exploratory data analysis and inferential statistics. We then make clear the nature of research in LIS, by using Bayesian workflow as a point of reference. While the discussion is limited, they should suffice as a head-up to unlearned, misguided, irrelevant and unscientific use of statistical approaches. Note that we are not concerned with statistical misconceptions in their technical sense (e.g. Huck, 2015). In fact, the misguided and rote application of statistical methods in LIS is at least as much to do with the lack of scientific understanding of the nature of the target of LIS research as to do with the lack of understanding of statistics, and there is much work about the latter.

## **THE NATURE OF DATA: SAMPLE AND POPULATION**

In relation to the status of data, sometimes we hear questions like:

- (I) Are these data truly representative of the domains?

The author observed this kind of comments first-hand twice in reviewer comments in LIS and in a related field. This statement is valid if the aim of the research is to obtain some population characteristics based on given data as a sample. In the field of LIS, however, the status of data can be very different. In fact, as long as the core objects of LIS, i.e. books, documents, and knowledge and statements contained in the documents, are concerned, the objects dealt with LIS essentially do not fit the analyses based on the sample and population framework.

Take, for instance, a putative research in which the main text body as a whole of several school textbooks in physics at different grades are quantitatively analysed and some of their quantitative characteristics are reported. Suppose that in that society, different textbooks are used in different schools, and the textbooks analysed are only a part of them, though they are most commonly used. Now, would it be relevant to ask question (I) to this research?

A *prima facie* answer is: it depends on the research objective. On the one hand, the textbooks can be viewed as a sample of the population under a research question: are there general notable differences in textbooks of that subject in different grades? On the other hand, the textbooks can be viewed as unique existence that constitute a part of social reality; these textbooks constitute unchangeable environment for those who used these textbooks at school. Within this perception, the essential question is: what are the characteristics of reality of textbooks that these students experienced? This research question is concerned with revealing the unique reality in this world.

Let us first confirm that LIS research is essentially concerned with the second question by its very nature. Library is concerned with collecting, organising, storing, preserving and providing recorded knowledge (Rubin, 2016). LIS is a research field that aims to contribute to the better understanding of what library is addressing (JSLIS, 2020; Rubin 2016). As such, Libraries and LIS are concerned with documents, which are historically produced items that are not representative samples of some putative population.

*Philosophiæ Naturalis Principia Mathematica*, for instance, is not regarded as a sample of a population which may be knowledge of physics. It contributed to constructing our knowledge of physics. Note that it is not *a part of* our knowledge, for that matter, as this statement puts knowledge before *Philosophiæ Naturalis Principia Mathematica*. From LIS point of view, textbooks of a domain, handbooks, terminologies, and university departments are conditions that enable us to consolidate the abstract concept of the domain. Asking whether textbooks, terminologies or handbooks analysed are truly representative of the domain or not in the face of research work that aims at clarifying the nature of *these* textbooks, terminologies or handbooks that constitute the social reality of the domain is simply a logical fallacy. In general, sample-population framework cannot be applied to the relationship between documents and domain/knowledge. This point is also related to the issue of applying relevant statistical methods. Mechanically applying inferential statistics based on sample-population framework, for instance, can easily distort research questions and may lead to meaningless results (Hayashi, 2011).

As LIS regards documents as unique existence in this world (Kageura, 2019), human activities related to documents are also viewed as unique. This fact is reflected in the principle that libraries should keep circulation records of books confidential. In an oppressive regime, for instance, a particular person who borrowed a certain book would be targeted. It is uncommon even for an oppressive regime to randomly target people after it finds that a book is borrowed by somebody. This contrasts with standard view of a person in psychology. In standard psychology, a person is regarded as an anonymous representative of a certain group of people who have some common attributes of concern.

So LIS, in its core, is concerned with the second type of questions. Nevertheless, questions like (I) are often raised in LIS and related fields for research that has the second objective. This is detrimental to LIS. Those who raise question (I) to the second type of work fail to understand the second type of work and/or its scientific status in the first place – thus do not understand LIS. There are possibly two reasons for that: (a) they may lack competence to understand what is written in the work, and (b) they may believe that the scientific research should aim at generalised understanding of the phenomena. In “science wannabe” domains, the second type of questions is sometimes despised as unscientific, based on the misunderstanding that the aim of science is to obtain generalised understanding of the phenomena of concern. Interestingly, physics – the domain that is widely held to be the model of all sciences – is only concerned with *this* world as a unique existence. Constants are used without hesitations, and the number of elements is finitely enumerated. Accurate description of the movement of Mars is an issue of concern as essential as obtaining generalised law of planetary motion in astrophysics. No seismic scientist downgrades the work that spot concrete potential epicenters in an area as “not generalisable thus useless.” Rote adherence to “generalisation to population characteristics” is an unscientific dogma in general and especially in LIS. Naively believing that science aims at generalisations and adhering to rote application of sample-population scheme can easily lead to self-denial of the *raison d'être* of LIS.

In relation to documents, which constitutes the core of library and LIS research, misguided introduction of sample-population framework may be related to the fact that wider range of units become manipulable in electronic era. We can now directly manipulate not only document units but also smaller units such as a group of propositions or larger units such as a group of documents. As documents are predominantly represented by languages, the immediately accessible objects that constitutes the surface representations of the target of LIS research then overlap with objects that are dealt with in linguistics. Kageura (2019) clarified the differences between documents addressed in LIS and texts addressed in linguistics, and consolidated the LIS point of view and linguistic point of view in studying language expressions (at any units). Essentially, LIS regards a given language expression as a historically unique existence – something that could not have been otherwise in the arrangement of this world, while linguistics regards a given language expression as an example of potentially infinite number of well-formed language



expressions at some level – something that could have been otherwise. Linguistics thus talks about language, language data, texts, corpus, etc. while LIS talks about – or should talk about, logically speaking – language expressions, statements, documents, archive, etc. So the preferential mission of LIS research in, for instance, revealing the characteristics of textbooks, terminologies, handbooks or any other documents, or document collections, is to reveal how these unique existence at a given time constitute the reality that surrounds us. As such, the core of LIS research is – or should be – analogous to the task of detecting potential epicentre in seismic science, or making maps, of the documentational universe. This having said, LIS researchers are of course free to adopt the first type of research. In relation to analysing documents etc., however, the first type of research inevitably becomes close to research in quantitative or computational linguistics and natural language processing. They should then be able to publish their research in these domains.

### **THE CHOICE OF STATISTICAL APPROACHES: DESCRIPTIVE STATISTICS, EXPLORATORY DATA ANALYSIS AND INFERENCE STATISTICS**

In relation to the analysis of data, it is not uncommon to observe the following type of statements in the face of the descriptive clarification of the nature of data:

- (II) Descriptions should accompany the results of statistical hypothesis testing based on such indices as P-values.
- (III) With the absence of the results of statistical testing, the result of experiments reported in this work cannot be judged correctly, which is a big problem.

These are near literal translation of the actual reviewer's comments in Japanese for a paper submitted to a LIS journal. In a separate case, an interesting descriptive result of the nature of collections in different types of public libraries based on a meticulously designed survey was accompanied by mediocre hypothesis and meaningless test results that added no information. According to the authors of that paper, they were fully aware that hypothesis testing was meaningless for their work but still added it in order to satisfy reviewers' comments and to get their paper published on time.

We see multiple problems here. One of the essential problems is whether hypothesis testing is relevant or not in the first place. This is already examined in the previous section, though indirectly. This issue is in fact far reaching than hypothesis testing (see, e.g. Borsboom, 2005). Another problem is concerned with the nature of research in relation to the status of our knowledge about the object of research. We will address this problem in the next section. Putting these problems aside, there still remain multiple problems in these comments.

Firstly, requiring hypothesis testing (and, worse still, P-values) in statement (II) reflects lack of understanding of the status of research. Many elementary statistical textbooks only give “how to” methods and some motivations behind it at best. As a result, *rote* applications (Cleveland, 1993) of hypothesis testing are abundant. The issues manifested in the difference between Karl Pearson and Ronald A. Fisher on the one hand and between Ronald A. Fisher and Jerzy Neyman/Egon Pearson on the other (Fisher, 1959; Hacking, 1990; Lenhard, 2006; Takeuchi, 2018), which are essentially about “the differences between the various concepts of models” (Lenhard, 2006:69), are ignored here. Such claims as (II) fail to understand the most elementary point about the status of probabilistic models, i.e. whether they be understood as a framework to describe a phenomenon or be understood as a reflection of objective structure behind the phenomenon (see Takeuchi, 2018) or whether the probability be attributed to the phenomenon or to the statements (Carnap, 1960). It fails to see whether the research concerns, so to speak, (a) the statement about asymptomatic behaviour of repetitive experiments, (b) the statement about what will happen next, and (c) the statement about what already happened but we do not know (Shibuya and Takeuchi, 1960). The claims

like (II) and (III), which fail to see these issues behind each research, effectively declares that they are not concerned with science.

Secondly, these claims are *technically* decades behind the current understanding of the status of hypothesis testing and especially of P-values in inferential statistics. Cohen's influential work that pointed out the issue of rote application of hypothesis testing with null hypothesis and especially of P-values was published almost thirty years ago (Cohen, 1994). Almost ten years have passed since *Basic and Applied Social Psychology* banned the use of P-values, and caused a heated debate (Woolston, 2015). Publication bias, which tends to be caused by automatic adherence to statistical significance, was already pointed out in the late 1980s (Dickersin, et al. 1987). American Statistical Association issued a statement on P-values in 2016 (Wasserstein and Lazar, 2016).

Thirdly, statement (III) above is based on an technico-epistemological misconception of the role and status of hypothesis testing, which is in part related to the first issue. Statistical testing with a common threshold (mostly 0.05) was used exactly to *replace endeavours towards correct judgment with mechanical cutoff*, which has little foundation, shared by academic communities without thinking whether the judgment is correct or not (Siegfried, 2010). Wrongly believing that hypothesis testing as a condition to make judgment “correctly” and requiring test results hampers the healthy scientific endeavour to reach to the “correct” understanding of the target phenomena (note that we do not deny the practical benefit of reporting P-values or fixing significance level in some situation; as is well-known, the latter has practical importance in quality control setup) in two ways. For one thing, this effectively reduces scientific endeavor to popularity vote. The situation is vividly described in the words by George Cobb cited in Wasserstein and Lazar (2016:129):

Q: Why do so many colleges and grad schools teach  $p = 0.05$ ?

A: Because that's still what the scientific community and journal editors use.

Q: Why do so many people still use  $p = 0.05$ ?

A: Because that's what they were taught in college or grad school.

For another, this kind of attitude will leave the research domain far behind other domains.

Fourth, inferential statistics in general and hypothesis testing in particular has become less important in empirical research. In parallel with the critical reexamination of the validity of inferential statistics, the scope of statistical data analysis was widened, partly with the development of computational power. Turkey's seminal work on exploratory data analysis was published in 1977 (Turkey, 1977). Exploratory data analysis now constitutes an essential part of research methodologies in social sciences (Stebbins, 2001). The foundations of visualisation methods closely related to exploratory data analysis are laid by the 1990s (Cleveland, 1993), many of which are incorporated in statistical software such as R. Around the same time, the recognition of both the essential importance and difficulty of proper measurement and descriptions shed new light on the theory of measurements (Suppes et al., 1981; Yoshino, 1989). With the development of statistical software, application of “advanced” statistical models can be carried out with scripts with a few lines, while proper measurements and descriptions often require much larger intellectual burden and contribute much more to our scientific understanding of the phenomena. The so called “descriptive turn” is observed in a wider range of research fields (e.g. Latour, 2005; Davis, 2016; Birks, 1987; Casadevall and Fang, 2008; Lobo, 2005; Munger et al., 2021; Vitellone, et al. 2020). We recall that Ernst Mach gave due status to descriptions in science (Mach, 1895). Also, in some research area, that the range of engineering manipulations have greatly widened has substantially reduced the importance of understanding collective behaviours.

Logically, application of hypothesis testing presupposes certain amount of descriptions of the data. Descriptive statistics is thus often regarded as merely a preliminary step of data analysis, and introductory textbooks of statistics tend to give only such a status to descriptive statistics. This, however, is not because descriptions and/or measurements of the data are inherently elementary. Quite the contrary, it is because they are more difficult than many statistical methods. Axiomatic measurement theory, for instance, is much less understood by social scientists than a range of statistical methods including Bayesian statistics (Yoshino, 1989). Interestingly, advanced quantitative methods are required to descriptively reveal features embodied in the data. For instance, Kageura (2001; 2012) uses Good-Toulmin binomial extrapolation to reveal potential dynamics that terminologies have (Baayen, 2001; Good and Toulmin, 1957), which could never be addressed by hypothesis testing, but the work is essentially descriptive. Principal component analysis is mostly used for descriptive studies. Interestingly, few people requires hypothesis testing to these studies. This may very well be because the mathematics used in these studies seems somewhat “advanced.” Claims like (II) and (III) can be a reflection of inferiority complex against mathematics.

In summary, the methodological developments for empirical research in general and statistics in particular provide us with much wider and healthier choice of methods and approaches to empirical research. Descriptive and exploratory approaches often give much larger contribution to our scientific knowledge than rote application of inferential statistical methods, and the importance of measurements and descriptions, which has always been held essential in natural sciences but paradoxically has been devalued in “wannabe” pseudo-science, is now widely recognised. Proper choice of appropriate methods depends even more strongly to our theoretical attitude towards the phenomena, which is blatantly lacking in comments (II) and (III). Dogmatic imposition of unscientific standards half a century ago hampers scientific development.

## **THE NATURE OF QUESTIONS: STATISTICAL WORKFLOW AND BEYOND**

In the previous two sections, we examined two problems observed not infrequently in academic communications in LIS and in related fields.

- Reflexively regarding given data as a sample of some population, failing to understand both the nature of research and the nature of data. This is observed in LIS field despite the fact that the main target of LIS research cannot be readily captured within the sample-population framework, unlike in linguistics or in psychology.
- Automatically regarding the absence of limited and often obsolete hypothesis testing process as a defect, ignoring both the theoretical status of statistics in different studies and the developments in statistics and in empirical methods in the past years.

These issues are inherently related to the lack of concern with the nature of questions in the first place. This goes well beyond the issue of formulating research questions in its ordinary sense; it is concerned with the status of research questions in relation to the object/objective of the study and the current state of our knowledge about the object of research. We do not delve here into the position of “theory” we introduced in the previous section.

Let us take as a point of departure Bayesian workflow (Gelman, et al., 2020), which is becoming a standard frame of reference in Bayesian data analysis. Though it assumes Bayesian approach, it can be analogically applied to wider range of empirical research, including qualitative analyses. It provides us with a clear basis upon which the position of questions can be consolidated – the main benefit here, and at the same time with a modern framework of taking statistical approaches in empirical research.

According to Gelman, et al. (2020), “Bayesian workflow, rather than mere Bayesian inference,” is needed for several reasons:

1. Computation can be a challenge, and we often need to work through various steps including fitting simpler or alternative models, approximate computation that is less accurate but faster, and exploration of the fitting process, in order to get to inferences that we trust.
2. In difficult problems, we typically do not know ahead of time what model we want to fit, and even in those rare cases that an acceptable model has been chosen ahead of time, we will generally want to expand it as we gather more data or want to ask more detailed questions of the data we have.
3. Even if our data were static, and we knew what model to fit, and we had no problems fitting it, we still would want to understand the fitted model and its relation to the data, and that understanding can often best be achieved by comparing inferences from a series of related models.
4. Sometimes different models yield different conclusions, without one of them being clearly favourable. In such cases, presenting multiple models is helpful to illustrate the uncertainty in model choice (Gelman, et al. 2020:4; direct citation with a change from itemisation to enumeration).

Among these, point 1 is not relevant here. The other three points are of direct relevance to our discussion (although all are formulated by using the term “model,” within the immediate context of our discussion we can replace it with variables, hypothesis, measurements with corresponding change in related predicates). Point 2 indicates that we typically *do not* know the relevant model (or variables or hypothesis or even points to be measured or described) except for trivial problems. This point effectively states that statistical approaches are for finding or constructing models (or variables or hypothesis or points to be measured or described, for that matter), rather than simply fitting a pre-defined model (or testing a pre-defined hypothesis). Point 3 is based on a recognition that what we believe we know may not be that solid, and statistical workflow helps us diagnose and remove this potentially misguided belief. Point 4 indicates that what is worth reporting is not self-contained research results that claim to have confirmed trivial hypotheses using “mere” “inference,” but range of fluid knowledge that is to be developed further. In more general terms, these three points together suggest that statistical workflow is not for confirming what we already know but for helping exploring new understanding of the phenomena possibly at each step of research including consolidation of research questions to construction and identification of relevant models (though it is indifferent to the position of the models). What is more, this workflow embodies the infinite process of scientific endeavour, in which validating relevant models is not necessarily the ultimate goal but can serve as a means to consolidate questions, extend range of measurements and enhance granularity of descriptions.

Having confirmed this, there remains one issue. As we observed above, LIS is essentially concerned with unique existence, while the Bayesian workflow sees data as something that could have been otherwise. This is represented in such expressions as “we gather more data.” In LIS, we cannot extend 12th grade Japanese physics textbooks used in the 1980s as they are *fixed*. Suffice it at this stage to reconfirm two points. First, just as we stated at the end of the previous paragraph, the scheme formulated in Bayesian workflow can be useful to consolidate questions, extend range of measurements and enhance granularity of descriptions, all of which are also relevant to unique data. Second, uniqueness of data does not necessarily mean that we should only limit our research to static measurements and descriptions of the objects. For instance, Kageura (2001) revealed dynamic features of unique and concrete terminologies, which capture the range of *realistic possibility of existence* of terms to be registered to these terminologies rather than capture the potential forms of terms. Statistical methods are indifferent to how individual application fields map them to the questions about the target phenomena. To what extent taking into the overall workflow

remedies ill-formulation of research questions that give nonsensical results is still an open issue. A recent case in which a nonsensical conclusion which states that masks are not effective for protecting people from COVID-19 and other infectious diseases that spread via airborne transmission was driven by “meta-analysis” indicates that there are cases for which the workflow may not provide a remedy (Jefferson, et al. (2023); for scientific issues involved in it, see, e.g. Brosseau, et al. (2023); *Cochrane* editor confirms the problem in Jefferson, et al. (2023) (Soares-Weiser, 2023)). It is the task of LIS research to find out and share relevant ways to use statistical approaches and workflow under properly formulated and meaningful research questions.

## CONCLUSIONS

Collecting, organising, storing, preserving and providing recorded knowledge are the core of library practice, and LIS research, to the extent that it deserves to be called LIS research at all, should put focal point of concern to this. That an ambitious enterprise started by Paul Otlet and Henri La Fontaine failed in reality does not invalidate this theoretical tenet of LIS. It is true that LIS should address dynamic evolution of knowledge to catch up with the ever-increasing pace of knowledge production and accelerated growth of knowledge, but still everything remains in the sphere of unique existence and events in this world in LIS. The range of formally allowed utterances as linguistics deals with does not constitute knowledge. Research on how people understand languages in psychology does not reach to understanding knowledge. Experimental psychology presupposes that we know what knowledge is.

This nature of LIS and what it imposes on the approaches in LIS research is not readily compatible with mechanical applications of inferential statistics. The concept of “experiment” in probability – which gives the theoretical basis for statistical methods – is defined as a procedure that can be repeated infinitely (Degroot and Schervish, 2010), which is in line with viewing a given phenomenon not as uniquely given but as an accidental result that could have been something else as long as they belong to the same whole or they share essential traits. Thus rote application of statistical methods to phenomena that LIS addresses can easily lead to theoretically invalid results that only answers questions that are irrelevant to LIS research. If it happens without consciousness, such endeavour becomes nothing more than a pseudo-scientific non-research that gives pseudo-scientific non-answers to pseudo-scientific non-questions. If one still decides to carry out this type of research consciously in LIS, then the research should take into account the state-of-the-art methodologies with clearly stated scientific motivations behind them. The former attitude introduces pseudo-science into LIS research, while the latter, if LIS researchers remain in domains, puts LIS as a second class research field.

To keep LIS as an independent scientific research field, therefore, it is necessary to examine methodological issues in relation to epistemological issues. Nevertheless, we observe, not infrequently, not only rote application of naive or even obsolete statistical methods but also dogmatic imposition of this pseudo-scientific approaches to research by reviewers under the total ignorance of even the most elementary debates involved in statistics. It is true that quantitative methods and especially statistical methods provide LIS researchers with powerful means to grasp target phenomena. In terms of granularity of our understanding of phenomena of concern, they are even indispensable. But at the same time, as we observed, they provide us with an easy excuse that enables us to pretend that we are doing something resembling science while actually destroying opportunities for scientific research. Precisely because of this, extreme caution is required especially in two respects. Firstly, we need to understand the nature of LIS research and apply statistical methods in such a way that the application contributes to our scientific understanding of the target phenomena that reflects the *raison d'être* of LIS. Rote application of statistical methods, even if we use cutting-edge methods, may result in transforming research questions and thus answers in an improper way to pseudo-science. Secondly, in order to avoid this happening, we need to catch up with state-

of-the-art of the statistical approaches not only technically but also epistemological. Indeed, statistics and related fields have long been concerned with epistemological issues. Bayesian workflow reflects, though implicitly, technical parts of such efforts in statistics. Though we only mentioned in passing, axiomatic measurement theory is also a culmination of such efforts in relation to measurements. As we saw in relation to the status of descriptive studies, analogous issues are discussed in a wide range of different domains.

Whatever approaches one take and whatever epistemological standpoints one adopt, one thing is clear. In the 2020s, there is absolutely no excuse to justify giving such comments as:

- (I) Are these data truly representative of the domains?
- (II) Descriptions should accompany the results of statistical (hypothesis) testing (such as P-values).
- (III) With the absence of the results of statistical testing, the result of experiments reported in this paper cannot be judged correctly, which is a big problem.

without understanding the status of questions asked in research and the state-of-the-art of statistical methodologies.

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# Developing Learning Material on Health Literacy

## Formative Assessment

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### ABSTRACT

*Background.* The latest medical information is available on the Web, and the acquisition of scientific evidence-based medical information requires health literacy skills to search and evaluate it. We developed teaching materials for health literacy based on findings from interviews of medical professionals and survey of the elderly.

*Objectives.* The purpose of this study was a formative evaluation of the learning materials we developed.

*Methods.* We sent the draft teaching materials to students taking a live Web course, and asked them to report their perceived level of health literacy at the beginning and at the end of the course, using the CCHL(Communicative and Critical Health Literacy) scale. We also asked each student to submit a written assignment evaluating the teaching materials.

*Results.* Only seven students took the live Web course. The students' perceived level of health literacy improved significantly after completing the course. Categories extracted from content analysis of students' written assignment were reflected in the revision of the draft to finalize the teaching materials.

*Contributions.* The health literacy level of Internet users at all ages may be cultivated by utilizing the teaching material developed in this research project.

## INTRODUCTION

Health literacy is defined as “the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others” (Hasbrouc, 2021).

In Japan, where the population is aging, health management for the elderly has become an important issue, and measures to extend healthy life expectancy are being sought (Reich et al., 2011; World Health Organization, 2018).

Traditionally, medical care in Japan has been dominated by those providing medical care, but a new medical concept was introduced in 1997 in which the autonomy of patients receiving medical care was respected and doctors and patients should cooperate in providing medical care. In 1997, the Medical Care Law, which sets out the basic rules for the medical supply system, was revised. The new version of the law introduced “informed consent” which requires medical professionals to provide thorough and easy-to-understand explanations to patients, while requires patients to understand the information they receive and actively participate in treatment. With this revision, all patients, including the elderly, are required to have health literacy.

The latest medical information is available on the Web, and the acquisition of scientific evidence-based medical information requires health literacy skills to search and evaluate it. However, the digital divide means that older people may have more restricted access to medical information on the Web than younger people (Schaffer, 2007). Based on interviews with medical professionals and a survey of elderly people (Miwa et al., 2019), we developed teaching materials to foster the health literacy of the elderly and conducted a formative assessment.

The teaching material “Keys to Healthy Aging: Let’s Extend a Healthy Life Expectancy with Health Literacy” was developed through the following six steps.

- Step 1. Comprehensive review of existing research related to health literacy of the elderly (2019)
- Step 2 Interviews with healthcare professionals on older patients’ health literacy (2019–2020)
- Step 3. Survey of the elderly, based on the findings from interviews with health professionals (2020)
- Step 4. Building a health literacy learning model for the elderly, based on the survey results (2021)
- Step 5. Development of teaching materials based on findings of interviews and survey (2021–2022)
- Step 6. Formative evaluation of teaching materials through online class implementation (2022)

Because the results of Steps 1–4 have been reported elsewhere (Miwa, et al., 2021), this paper focuses on Steps 5 and 6.

## LITERATURE REVIEW

Here, we review the literature on the health literacy education, the measurement of health literacy, and the instructional design methods we applied in the development of teaching materials.

### Health Literacy Education

Health literacy was adopted in the United States in the 1970s as a goal for health education (OECD, 2005). As society’s awareness of the importance of health literacy in maintaining good health has spread, a variety of teaching materials to improve the skills, have been developed. Teaching materials to improve health literacy levels have been developed in many countries, including Japan.

In Japan, health literacy became necessary for patients to understand doctors' explanations and make decisions regarding their own treatment through dialogue with doctors with the revision of the medical law in 1995. In response to this, the curriculum guidelines were revised in 2008 to introduce health literacy education into elementary and secondary education in Japan (Central Education Council Report, 2008). On the other hand, citizens in the age group who had previously received compulsory education had fewer opportunities to receive health education and health literacy education at school. The e-learning materials developed by St. Luke's University were found to be effective in improving the health literacy of the general public, especially middle-aged and elderly women. (Takahashi et al., 2021).

### **Measurement of Health Literacy**

To clarify whether health literacy education or learning material is effective or not, we need scales and tools to measure health literacy levels. The Health Literacy Tool Shed (<http://healthliteracy.bu.edu/>), a portal which includes over 200 health literacy scales developed to date. These range from comprehensive scales that require responses to answer many questions to simple scales that require a few questions. An example of a comprehensive scale is HLS-EU-Q47 developed in 2012 by the European Health Literacy Project launched by eight countries in Europe: Australia, Bulgaria, Germany, Greece, Ireland, the Netherlands, Poland, and Spain, and adopted in national surveys in each country (Sørensen et al., 2013). It consists of 47 questions that measure the four abilities of obtaining, understanding, evaluating, and utilizing health information in three areas: healthcare, disease prevention, and health promotion. A national survey of eight countries using HLS-EU-Q47 reported that the Netherlands had the highest health literacy level, while Bulgaria was the lowest (Sørensen et al, 2015). Using the Japanese-language version of the HLS-EU-Q47, a web survey of Japanese people aged 20–69 years found the health literacy of Japanese people to be lower than that of people in European countries. There was a positive correlation between age and health literacy (Nakayama et al., 2015). By contrast, an example of simple scale, Communicative and Critical Health Literacy (CCHL) scale, which measure functional, communicative and critical health literacy by five Likert-type items, was developed in Japan and has been widely used in Japan in measuring the health literacy level of the general public (Ishikawa, et al., 2008). A study using the CCHL scale identified that people with higher levels of health literacy have healthier lifestyles and significantly fewer subjective symptoms. The e-learning materials developed by St. Luke's University also adopted CCHL scale in evaluation.

We decided to adopt the CCHL scale in the formative evaluation of the teaching materials we developed because it is relatively simple and easy for students to answer questions within the limited time available at the beginning and just after classes.

### **Instructional design**

The instructional design (ID) method was used in the development of the teaching materials.

John Keller's ARCS model is an instructional design approach that focuses on the motivational aspects of the learning environment. The model categories represent the four components of Attention (raising the learner's attention), Relevance (making the learner aware of the relationship between the material), Confidence (making the learner confident that they can do it), and Satisfaction (making them feel satisfied) (Keller, 2020).

The ADDIE model was used initially for U.S. military instruction, and it focuses on the development process of teaching materials. The ADDIE model is an acronym for five stages: Analyze, Design, Develop, Implement, and Evaluate. Analysis of the needs of learners (elderly people in this study) allows learning

goals to be set (Design). Teaching materials are developed according to the learning goals (Develop) and are evaluated through educational practice (Implement), based on the developed teaching materials (Dick and Carey, 1978).

We applied aspects of the ARCS model to design the content of the teaching materials by introducing learning goals, and we used the ADDIE model in the development process by using formative evaluation.

We applied the ARCS model in designing contents of teaching materials by introducing learning goals, and followed the ADDIE model on the development process by using formative evaluation.

## **DEVELOPMENT OF TEACHING MATERIALS**

### **Structure of Teaching Materials**

We developed a draft of teaching materials based on findings from interviews of medical professionals and survey of elderly people.

Interviews with medical professionals revealed that elderly people with a high level of health literacy are able to search for health and medical information on the Internet, research their own illnesses by themselves, exchange opinions with medical professionals, and self-manage things such as going to the hospital and taking medication. They are having goals and having fun, and maintaining good relationships with family and friends.

In response to interview questions on the things that the elderly should keep in mind in order to maintain their health, medical professionals pointed out the importance of exercising regularly, eating a well-balanced diet, maintaining muscle mass, living a regular life, and having goals and having fun. At the social level, it was pointed out that they should go out and meet people, interact with society, and interact with their families. Regarding health management, it was pointed out that people should undergo regular health checkups, have a family doctor, and take good care of their oral health. A questionnaire survey of the elderly revealed that elderly people who use health and medical information on the Internet have a high level of health literacy. (Miwa, et al., 2021).

These indications were incorporated into the teaching materials, consists of the following seven chapters and an appendix.

- Chapter 1. what is health literacy,
- Chapter 2. a safe use of the Internet,
- Chapter 3. searching for healthy medical information in the library,
- Chapter 4. searching for healthy medical information on the Internet.
- Chapter 5. how to evaluate the found healthy medical information,
- Chapter 6. how to interact with society, and
- Chapter 7. maintain your health.
- Appendix. a collection of 42 technical terms used in each chapter.

### **Learning Goals**

The printed version of the teaching material was a 73-page PDF document in A4 size, consisting of seven chapters and 42 item glossary. A presentation video was also created. Table 1 describes the learning goals of each chapter. Up to 10 pages of content per chapter were required to address the learning goals. The vocabulary and comprehension level of the content was equivalent to that required to complete compulsory education (completed 9th grade or graduated from junior high school).

**Table 1. Description of each chapter**

Chapter	Learning Goals	$\mu$ (5 Likert scale)	
		Pre class	Post class
1	(1) I can explain the meaning of the word health literacy.	3.14	4.86
	(2) I can explain why health literacy is necessary to maintain good health,	3.29	4.57
	(3) I can explain how to improve health literacy,	2.71	4.43
	(4) I can search multiple sources when looking for health and medical information.	3.71	4.86
2	(1) I can explain the Internet is useful in the daily life of the elderly.	n.a	n.a
	(2) I can explain the Internet is useful for obtaining information about health and medical care.	n.a	n.a
	(3) I want to learn how to use computers and smartphones correctly.	n.a	n.a
	(4) I want to know how to use the Internet safely.	n.a	n.a
	(5) I can explain why being able to use the Internet is advantageous for maintaining one's health.	n.a	n.a
	(6) I want to teach others how to use computers and the Internet.	n.a	n.a
	(7) I want to use the health management app for daily health maintenance.	n.a	n.a
	(8) I am careful not to invade my privacy on the Internet.	n.a	n.a
	(9) I think SNS is useful to connect with family and friends.	n.a	n.a
3	(1) I can borrow books on health and medical care from public libraries.	4.71	5.00
	(2) I can find out where the medical books are located in public libraries.	4.71	4.83
	(3) I can ask librarians how to find books and magazines in public libraries.	3.67	4.71
	(4) I can find and read magazine articles about health and medical care in public libraries.	4.29	4.71
	(5) I can search for books in public libraries on your computer or smartphone.	3.67	4.71
	(6) I can search medical papers on online databases in public libraries.	3.14	4.43
	(7) I can obtain full text of the papers found by the database search results.	2.21	4.43
	(8) I can borrow books from other libraries that are not owned by neighboring libraries.	3.71	4.86
	(9) I can check the publication date of the book.	4.43	5.00
	(10) I can check the publication date of the journal article.	3.14	4.71
4	(1) I can use the Internet by operating computer, smartphone, or tablet.	4.86	5.00
	(2) I can use search engines such as Google to search for web pages.	4.86	4.86
	(3) I can check who is posting the information on the web page.	4.57	4.86
	(4) I can judge for what purpose the information on the web page is being sent.	3.43	4.29
	(5) I can judge whether the information on the web page has scientific basis.	3.14	4.00
	(6) I can check the reliability of the content of the web page.	3.14	4.43
	(7) I can explain why incorrect information is posted on the Internet.	4.43	4.86
	(8) I know the search engine has a function to select only the information the searcher wants to see.	4.14	4.86
	(9) I check multiple sources when searching the Internet.	4.71	5.00
5	(1) I can explain what it means to say that medical information has a scientific basis.	2.86	4.28
	(2) I can read clinical practice guidelines.	2.14	1.71
	(3) I can explain how clinical practice guidelines are created.	1.57	3.86
	(4) I can search clinical practice guidelines on the Internet.	2.14	4.14
	(5) I can find clinical practice guidelines at public libraries.	2.29	3.29
	(6) If there is something I do not understand about the clinical guidelines, I can ask the medical staff.	2.57	4.29
	(7) I can check the credibility of newspaper/magazine articles on health and medical care.	2.71	4.14
	(8) I can explain the filter bubble problem of the Internet.	2.71	4.57
	(9) I can use the search option of the search engine Google.	2.57	4.29
	(10) I can use Google Scholar to retrieve health and medical papers.	2.00	4.14

6	(1) I value ties with people in the area I live in.	3.00	4.29
	(2) I value ties with my family.	4.71	4.86
	(3) I value socializing with friends outside of workplace.	4.57	4.57
	(4) I (want to) engage in activities such as work and volunteer work	3.71	4.43
	(5) I can search for information on hobbies, club activities, etc.	3.57	4.43
	(6) I have someone I can rely on when I'm in trouble.	4.00	4.71
	(7) I have someone other than medical professionals I can talk to about my illness or health.	4.00	4.57
	(8) I have a familiar physician or medical organization where I can consult about illness and health.	3.29	4.86
7	(1) It is important for me to pay attention to nutrition and eating habits.	5.00	5.00
	(2) It is important for me to move your body.	5.00	5.00
	(3) It is important for me to get enough sleep and rest.	5.00	5.00
	(4) It is important for me to lead a regular life.	4.86	4.86
	(5) I have goals and pleasures that I want to achieve.	4.86	4.86
	(6) I engage in activities such as professional activities and/or volunteer work.	4.43	4.43
	(7) I want to cherish friends who work on my hobbies and pleasures together.	4.86	4.86
	(8) I want to enjoy conversations with my family and/or friends.	4.86	4.86
	(9) It is important for me to have regular health checkups.	4.71	4.86
	(10) It is important for me to have a family doctor.	4.57	4.86
	(11) It is important for me to work on dental treatment and oral care.	4.86	5.00

## FORMATIVE ASSESSMENT

The teaching materials were used experimentally as texts for a live Web course at the Open University of Japan (OUJ), beginning in 2021, and a formative evaluation was conducted. The PDF version of the teaching materials was sent to the students registered in the course one week before the start of the course to encourage pre-learning. Table 2 shows the schedule of live Web classes.

**Table 2. Schedule of the Live Web Course**

Class	Day & Time	Delivery Method	Chapter of Teaching Material
1	June 30 2022 9:50–11:20	Lecture and Videos	1
2	June 30, 2022 11:35–13:05	Lecture and Videos	2
3	July 2, 2022 9:50–11:20	Lecture and Videos	3
4	July 2, 2022 11:35–13:05	Lecture and Videos	4
5	July 4, 2022 9:50–11:20	Lecture and Videos	5
6	July 4, 2022 11:35–13:05	Lecture and Videos	6
7	July 6, 2022 9:50–11:20	Lecture and Videos	7
8	July 6, 2022 11:35–12:25	Course Review & Discussion	n.a.

Classes 1–7 consisted of lectures and watching videos that followed the teaching material we developed. Class 8 was a review of the course as a whole and a discussion on assessment of the teaching materials.

## Method

Formative evaluation was conducted using quantitative and qualitative data gathered from the seven students who attended the course.

### *Quantitative Data*

To measure the extent to which the teaching materials contributed to the improvement of the students' health literacy levels, we gathered their perceived level of health literacy according to the CCHL scale at the beginning of the course and immediately after the completion of the course. In addition, to grasp the

degree of achievement of learning goals in each class, students were asked to register their goal achievement levels (5-item scale) at the beginning and immediately after each class.

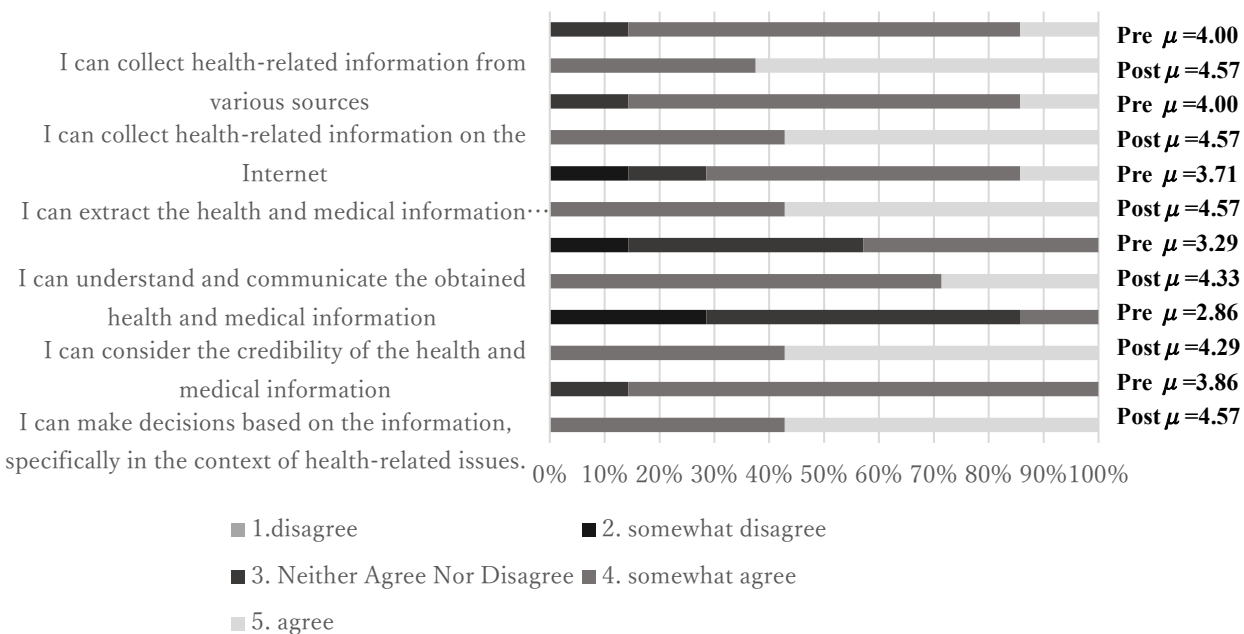
### Qualitative Data

We obtained verbal consent from the students to use their written assignment to conduct formative evaluation of the teaching materials. Students were asked to submit their course assignment paper evaluating the teaching materials within 3 days of completion of the course.

## Results

### Quantitative Assessment

Figure 2 shows a comparison of the health literacy levels of the students before and after taking the course. The health literacy level for all items was higher after students completed the class, indicating that the teaching materials under development were effective in improving the health literacy level of the students. The items with the highest average scores before the course were “I can collect health-related information from a variety of sources” ( $\mu = 4.00$ ) and “I can collect health-related information from the Internet” ( $\mu = 4.00$ ). The item with the lowest score was “I can consider the credibility of the health and medical information” ( $\mu = 2.86$ ), and this item showed the largest difference between the average values before and after the course.



**Figure 1 Students' health literacy level before and after the course**

We could not obtain the data for the second session due to a broken link, so we compared the results before and after the 1st, 3rd, 4th, 5th, 6th, and 7th classes (Table 1, column 3 and 4). There was no difference between pre-class and post-class for “I can search web pages using search engines such as Yahoo and Google” in the 4th class and “I want to keep in touch with my friends outside of work” in the 6th class. For

eight of the 11 learning goals of the 7th lesson, all students scored at the highest levels both before and after the class, and no difference was observed.

### *Qualitative Assessment*

We analyzed students' written assessments following the bottom-up strategy of grounded theory and identified the categories presented in Table 3. We revised the teaching materials by reflecting on students' evaluations. As a result of the formative evaluation, it was shown that the teaching materials developed in this study were effective in improving the health literacy level of the participants. Based on the results of quantitative and qualitative evaluations, teaching materials were added and revised as necessary.

**Table 3. Major categories identified in students' written evaluation**

Category	Example
Require rationale	Report annual medical, nursing care, and welfare expenses
Present links	Provide links to reference sources
Present how to search	How to find out whether a library has a clinical practice guideline Show examples of how to find medical papers
Provide specific examples	Present representative clinical trial examples Differences between facts, considerations, and inferences Normalization bias
Provide effects and adverse effects	Specific results from health maintenance initiatives Examples of the effects of connecting with people Examples of the harmful effects of withdrawal
Provide further explanation	Meta-analysis Randomized controlled trials Each stage of the evidence pyramid Breakdown of nursing care costs
Present a solution	How to avoid accumulation of search history Where to ask help when you get sick How to find a specialist physician
Prevention methods	Specific prevention methods for osteoporosis
Deal with mental health	Deal with mental health literacy as well
Propose title change	Change title to "Aging and healthy life expectancy"

## **IMPLICATIONS**

Although the teaching material was designed to be used by elderly people over 65 years old, the participants of the live Web course were 21–79 years old (3 men and 4 women), and did not correspond to the expected age group. However, since it was confirmed that the teaching materials we developed was effective in improving the health literacy level of these participants in a wide range of age groups, the target of the teaching materials were recognized as a learning effect not only for the elderly but also for a wide range of age groups. It may be difficult to acquire healthy lifestyle habits at an older age. Thus, it is expected that young people will acquire health literacy and improve their lifestyle habits through the teaching materials, thereby contributing to the extension of healthy life expectancy of the elderly of the future.

## **CONCLUSION**

It was shown that the teaching materials under development were effective in improving the health literacy level of the participants. Although the goals objectives in each chapter were generally achieved, there were some learning goals whose achievement could not be measured due to the ceiling effect. This teaching



material has the potential to contribute to the acquisition of health literacy not only for the elderly but also for a wide range of other age groups.

## LIMITATIONS AND FUTURE RESEARCH

The formative evaluation presented here is only applicable to those who can use health and medical information on the Internet. The students who participated in this study were attendees of the live Web course and were, by definition, experienced Internet users with a strong interest in health and medical information. Thus, the results do not apply to those who do not have access to health and medical information on the Internet. We are now collecting additional data by offering a series of health lectures in two public libraries, using the developed teaching materials. Some of the participants of the lecture series had never accessed health and medical information on the Internet. Thus, the effectiveness of the teaching materials for nonusers of health and medical information on the Web should be verified.

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# **An Analysis of the #MIL4Democracy Handbook in Media and Information Literacy Instruction**

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## **ABSTRACT**

*Background.* Media and information literacy (MIL) education is a step toward the empowerment of people. This is reflected in the potential applicability of MIL to various contexts to address media and information-related concerns. In the Philippines, one MIL initiative comes from the Out of the Box Media Literacy Initiative, in their publication of the *#MIL4Democracy: Teaching Media and Information Literacy for Democracy Handbook*.

*Objectives.* The pedagogical utility of the *#MIL4Democracy* handbook in teaching MIL was analyzed, focusing specifically on the resource's strengths and weaknesses.

*Methods.* Through thematic analysis, the three researchers reviewed the contents of the handbook. The analysis included the handbook's eighteen topics along with its learning objectives, activities, and references. This was juxtaposed against literature on MIL and the authors' own MIL expertise and MIL-related advocacies.

*Results.* The handbook exhibited usefulness in its intent to deliver content relating to the value of MIL in democracy. Its inclusion of topics regarding information disorder, freedom of speech, social media, and internet etiquette illustrates this. However, there are areas of improvement for subsequent iterations of the handbook, such as the need to revisit some web-based examples due to accessibility problems, and the need to reevaluate some of the issues used as examples due to relatability concerns.

*Contributions.* This research is useful for those who intend to develop MIL instructional resources, as it offers feedback from practicing MIL educators and advocates which emphasizes the need to develop relevant and accessible instructional content.

## INTRODUCTION

A national commitment to the need to reinforce media and information literacy (MIL) skills was manifested by the inclusion of MIL in the Department of Education (DepEd) K-12 curriculum. At the basic education level, MIL has been added as a required subject in Senior High School within the K-12 curriculum. The website of DepEd has made available the syllabus available for the course (K to 12 basic education curriculum, 2013), and from there it can be gleaned that the emphasis of the course is on familiarizing students with the different media and information formats available to them, and how these formats could be used responsibly.

Santos (2019) discusses the difference between the MIL course in the basic education level to the one offered in the Bachelor of Library and Information Science (BLIS) curriculum in the Philippines. Following Memorandum Order no. 24, series of 2015 issued by the Commission on Higher Education (CHED) (Revised policies, standards, and guidelines for the Bachelor of Library and Information Science (BLIS) program, 2015), the inclusion of a required course on information literacy (IL) in all BLIS programs was implemented. This course on IL is different from the MIL course in the K-12 curriculum because the tertiary course focuses on the development of MIL/IL programs and on the different ways that libraries and information centers can teach it. Considering that there are four main types of libraries and information centers (i.e., academic, school, public, special), the contexts of MIL/IL instruction for these varying institutions also dictate the need for a different approach for each.

The need for a varied approach in teaching IL is echoed in Addison and Meyers (2013) and furthered by Sample (2020). Approaches to instruction may follow three varying perspectives (Sample, 2020). The first approach is grounded in the need to teach skills and competencies related to the effective and efficient search, evaluation, and usage of media and information. This approach highlights the importance of being media and information literate, as it is seen to be beneficial in endeavors relating to research and other academic activities. This approach, while seen as useful in the educational context, seems to lack in its sociological aspect, because of its use of library-related examples, which might be difficult to reinforce in media and information users outside the research and academic setting. The second perspective highlights the use of cognitive models and frameworks in imparting MIL knowledge on MIL. This approach of using models to teach MIL is seen to be more complicated to understand and teach, due to the complexity and theoretical nature of the models. Finally, the third approach, looks at how MIL instruction could be taught with a grounding on social practices. It follows the belief that MIL is embedded in specific spontaneous activities which are unplanned and contextual. This treatment looks at MIL beyond a set of skills but instead, it looks at societal contexts and the current media and information landscape and aligns this with MIL instruction. With an acknowledgement of the current Philippine landscape and how information disorder is prevalent, there arises an opportunity to address related concerns such as misinformation, disinformation, and malinformation in the creation and implementation of MIL/IL programs. Despite the promise of treating MIL as a social practice, there remain some challenges to the viewpoint primarily due to its participatory nature. Addison and Meyers (2013) discuss how some stakeholders in MIL instruction might find the “information literacy as embedded in social practices” approach as undermining the traditional view of “information literacy as a set of skills.” Given this view, that “information literacy is a set of skills” puts the responsibility of teaching information literacy on the hands of librarians, which is the opposite of MIL being participatory.

Nonetheless, considering how the redefinition of information literacy was phrased through the five contexts of information literacy from the Chartered Institute of Library and Information Professionals (CILIP) (2018), it becomes clear that notions of the concept already reflect its evolving utility. From the CILIP (2018) definition of information literacy, five key areas on which it can be applied were highlighted, and education is only one of the contexts, which could be seen as a deviation from the traditional understanding of the concept. The five contexts according to CILIP (2018) are: everyday life; health; citizenship; education; and the workplace. All five are seen to benefit from strong information literacy instruction, and the recognition that the relevance of the concept, and other related literacies contribute to

a more well-rounded individual capable of thriving in the current media and information landscape. It emphasizes as well, the importance of not just being a media and information user, but the responsibility appended to being a creator as well. Circling back to the discussions above, the contributory role that individuals play in the creation, curation, and communication of content is highlighted.

### **Media and Information Literacy Initiatives in the Philippines**

Aside from the inclusion of MIL courses in the curriculum (Santos, 2019), several initiatives coming from the library and information science (LIS) sector have been put in place to reinforce MIL skills. In the pursuit for developing a media and information-literate citizenry, librarians and information professionals have also crafted their own approaches to MIL education. These efforts include the inclusion of a course in information literacy (IL) in the library and information studies curriculum, and the development of IL programs in libraries and information centers. From the media sector, there also exist initiatives focused on practicing and teaching the truthful use of information. In 2008, a group of veteran Filipino journalists founded VERA Files, a non-profit independent media organization engaged in fact-checking initiatives (About VERA Files, n.d.). Another media-initiated fact-checking project is Tsek.PH, which focuses on monitoring events such as Philippine elections and verifying information related to them (About Tsek.ph, n.d.). One of the partners in this initiative is ABS-CBN Fact Check of ABS-CBN News, which contributes articles that debunk false information intended to discredit their news organization (ABS-CBN Fact Check, 2022).

Other groups have also initiated their own MIL programs. Active in this endeavor is the Philippine Association for Media and Information Literacy, Inc. (PAMIL, Inc.). Some of their endeavors include a fellowship program for MIL educators. The *Teach and Innovate Like a Champion* program of the organization emphasizes the importance of having well-trained media and information literacy educators which is seen to contribute to the success of the MIL curriculum. Apart from the fellowship, PAMIL also spearheads the conduct of various lectures and workshops on MIL highlighting the importance of responsible media and information use.

### **Out of the Box Media Literacy Initiative**

The Out of the Box (OOTB) Media Literacy Initiative is an organization that has spearheaded media and information literacy programs. One of their initiatives is the publication of the *#MIL4Democracy Teaching Media & Information Literacy Handbook*.

Developed by the OOTB along with the alumni of International Visitor Leadership Program (IVLP) of the United States Department of State, the handbook is divided into three sections: Unit 1 is dedicated to Free Speech and the Free Press; Unit 2 is dedicated to “Fake News”, Propaganda, and Post-Truth; and Unit 3 is dedicated to Digital Citizenship: Our Responsibilities and Rights Online. The list of authors are as follows: Marlon Julian Nombrado, Sarah Isabelle Torres, Arniel Ping, Gemma Soneja, Joeven Castro, Rechelle Anne Tolinero-Barraquias, and Marco Polo.

The handbook is primarily designed to be used in the Philippines’ Grade 11 or Grade 12 core subject: *Media and Information Literacy* and contains different lessons, along with teaching and learning activities, and case studies designed to achieve specific MIL-related objectives indicated per lesson. The lessons are accompanied by worksheets and handouts.

### **Statement of the Problem**

From the previous section, it is evident that a number of MIL initiatives exist in the Philippines, with each having varying practices. In this light, we argue that there is a need to evaluate and reflect MIL education initiatives.

In limiting the scope our work, we selected the *#MIL4Democracy Handbook* as our corpus and we wish to analyze how it may be used as “hardware,” given that it is being promoted as such, as a reference source. The goal of our research is to:

1. To describe the *#MIL4Democracy: Teaching Media & Information Literacy for Democracy Handbook* in terms of its utility as a teaching and learning resource.

2. To reflect on our own insights from our critical reading of the Handbook, as differentially situated change advocates ourselves, and recommend ways to potentially improve MIL pedagogical approaches.

## LITERATURE REVIEW

### **Media and Information Literacy Instruction in the Philippines**

Several divisions arise upon searching various studies on MIL in the Philippines. First, the term MIL is not consistently used in all studies, as there are also studies specific to IL, digital literacy (DL), and media literacy (ML). Nonetheless, these studies were considered MIL studies in this review under the assumption of MIL as a bigger framework for literacies related to media and information as discussed earlier. Many Philippine MIL studies are targeted at measuring the MIL of students in scattered parts of the country. Meanwhile, fewer studies were found to be focused on teaching MIL in educational settings.

#### *Measuring Media and Information Literacy in the Philippines*

Rusiana and Naparota (2021) examined the MIL level of Grade 12 students at Andres Bonifacio College and conceptualized MIL according to three dimensions of access, evaluation, and use of media and information. Using the Iranian Media and Information Literacy Questionnaire (IMILQ) and after randomly selecting 186 respondents, it was determined that there is no significant MIL difference when it comes to gender, but that there is a significant difference when comparing the means across career strands. Specifically, those in Technical Vocational Livelihood Track were at a relatively lower level compared to those in academic tracks. Still using a quantitative design and UNESCO's framework of access, evaluation, and creation components, Tibaldo (2022) found intermediate MIL among 137 university language and communication students. An intermediate competency level, by UNESCO standards, is equivalent to a good MIL level, but with areas for improvement. For this, the author noted that the respondents have had a hard time with the concept of metadata, arguing about using information, and applying ethical standards in knowledge creation. Notably, a relatively lower understanding of the ethical aspect of using information also showed in the Information Literacy study of Queroda and Quimson (2018), even at the level of graduate students (MA and PhD) of Pangasinan State University – Open University Systems (PSU-OUS). Nonetheless, these studies have found good results on certain MIL standards (Queroda & Quimson, 2018; Tibaldo, 2022), while it may be inferred that there is always something to develop further when it comes to MIL levels. As for research trajectories, Tibaldo (2022) suggested a comparison of the old curriculum and K-12 graduates to see the effectiveness of the MIL subject intervention. The researcher also opened the case of lived experiences of students. So far, there have been no studies reviewed that reflect these recommendations.

On the other hand, Santos (2020) took a pedagogical turn by focusing on the MIL course as an intervention for interpersonal and intrapersonal skills. Through a constructivist framework and a self-assessment post-activity survey, the researcher sought evidence of the development of cognitive, interpersonal, and intrapersonal potentials in an output-based MIL approach. Aside from the study angle, the reflexivity of the researcher is worth noting as the author is an MIL teacher and the participants in the study were his students at the University of Asia and the Pacific (UA&P) in Pasig City. Results showed that the MIL curriculum can develop cognitive, interpersonal, and intrapersonal skills. Santos (2020) found the intrapersonal domain most developed. The author then recommended applying a constructivist, output-based curriculum, to develop cognitive, interpersonal, and intrapersonal skills which are necessary for 21st-century learning.

As for Letigio and Balijon (2022), the focus was digital literacy and how this can manifest beyond the educational settings. Acknowledging the various literacy frameworks, the authors conceptualized DIL as the student's knowledge, abilities, and attitudes in using digital tools for their academic, professional, and personal goals. This framework includes finding, evaluating, managing, and communicating information, among others. As such, Letigio and Balijon traced the digital literacy readiness of a sample of

alumni of Cebu Normal University – Balamban Campus to see how equipped the students were when entering the workforce, specifically in the hotel and tourism industries. For this study, the level of confidence in digital literacy in correlation with digital literacy skills for employability was tested, which was found significant.

In sum, the studies reviewed in this section appeared to approach MIL as an educational intervention. As evident in the term *measuring*, most studies also employed a quantitative research design in determining MIL-related levels. An implication of using such methodology is the reliance on established frameworks, definitions, and measurements, which are mostly produced at the international level. Despite attempts to gather a representative sample for a specific population, most studies have also set the limited sample as one of their study limitations. There are also no found studies that measure MIL on a nationwide level, which can be logistically understandable especially when the population include students as involving them would need an administrative process, as apparent in the ethical considerations of some studies. Nonetheless, the studies altogether reveal some positive results of MIL levels, along with recommendations for areas of improvement.

### *Teaching Media and Information Literacy in the Philippines*

The few studies found about teaching MIL in the Philippines have all incorporated interpretive and phenomenological approaches, approaching MIL as a phenomenon of teaching experience. For example, Bautista (2021) conducted in-depth interviews with seven MIL teachers regarding their experiences teaching MIL. In this study, the informants shared several challenges in teaching the subject which includes confusion about MIL teaching competencies, lack of resources and training, and lack of understanding of the subject itself.

Almost the same problems arose in the study of Labangon and Zabala (2018) as they attempted to gather a more representative sample in assessing the readiness of the Philippines when it comes to teaching MIL. The researchers conducted a UNESCO framework-based survey of MIL teachers and instructors across four regions in the country. Like the themes in Bautista's (2021) interviews, Labangon and Zabala's (2018) survey included questions on training, preparation, and access to MIL training and seminars. Meanwhile, the MIL experience part, specifically on problems encountered, was asked through an open-ended question analyzed through a thematic analysis. Like the earlier reviewed studies, the researchers found that most of the respondents did not go through preparatory training for MIL, which was primarily because of the lack of such. When it comes to resources, the authors also noted that most respondents relied on school library materials.

The historical review of Treceñe (2021) on the digital transformation strategies of the Philippines in the last two decades showed that there have been significant strides in the development of information and communications technology (ICT), especially in developing infrastructures across sectors including the academe. Nonetheless, Letigio and Balijon (2022) realized that developing ICT infrastructures is not enough as ICT training needs to be more accessible. In their study, the student respondents of Cebu Normal University – Balamban Campus reported encountering problems like the first studies reviewed, including a lack of resource materials, training, and understanding of ICT.

Likewise, Santos (2019) found from student evaluation of the pilot implementation of an IL course at the University of the Philippines Diliman, there was a need to delve more into IL concepts and their definitions by providing more reading materials on the topic. It is interesting to note, however, that after addressing this suggestion, the student evaluation in the subsequent semesters seemed to have led to a deeper IL learning involvement as seen in the student recommendations providing critical thinking examples and real-world problems.

Despite the mostly qualitative nature of the studies on teaching MIL, there was an observed consistency in the findings regarding the MIL implementation challenges (i.e., the need for a foundational understanding of the subject and the lack of resources)—both from the perspective of teachers and students. Consequently, studies appeared to concur that teaching MIL in the Philippines is still in its “infancy” stage (Labangon & Zabala, 2018). Nonetheless, the studies have provided evidence of the eagerness on the part

of the teachers, instructors, and course developers on the potential of teaching MIL and MIL-related courses (Bautista, 2021; Santos, 2020; Santos, 2019; Letigio & Balijon, 2022).

## METHODOLOGY

A qualitative approach was adopted to analyze the content of the *#MIL4Democracy: Teaching Media & Information Literacy for Democracy Handbook*. A reflexive thematic analysis was employed, entailing a “subjective, situated, aware, and questioning researcher” as part of the process in the analysis. In simpler terms, we recognize that each of the researchers contributing to this work come from a specific positionality and this will undoubtedly inform how we apprehend and articulate patterns we observe from the handbook (Braun & Clarke, 2022, p. 5).

After seeking permission from the authors of the handbook, which also had a CC-BY-NC 4.0 license making it easily accessible via the OOTB Media Literacy Initiative website, each researcher downloaded their own copy to begin their analysis. Following Braun and Clarke’s process, we (i) familiarized ourselves with the data (i.e., the contents of the handbook) and its surrounding context, (ii) did data coding, (iii) generated initial themes, (iv) developed our themes and review, (v) refined, defined, and named our themes, and (vi) wrote them in our discussion portion (Braun & Clarke, 2022, p. 6).

The three researchers involved in this research all come from diverse backgrounds but maintain related advocacies in media and information literacy and disinformation research. Yhna is an academic, who comes from the field of library and information studies. Gerard is involved in different disinformation research initiatives for the past three years. Irish is also in the academe, and was a former reporter, segment producer, writer, and researcher for a broadcast network in the Philippines.

As this research attempts to uncover the teaching and learning approaches employed in the *#MIL4Democracy Handbook*, the analysis of the series’ content will be heuristically drawn from the researchers’ own expertise and experiences based on this guide question: What is our read of the *#MIL4Democracy Handbook* based on our review of related literature, and an extensive review of the handbook’s contents?

## FINDINGS

### **The #MIL4Democracy Handbook at a Glance**

The *#MIL4Democracy Handbook* is divided into 18 lessons distributed in three units. The first unit focuses on Free Speech and Free Press, the second unit discusses topics on “Fake News”, propaganda, and post-truth, and the third unit talks about digital citizenship. The handbook also has a set of appendices containing its glossary, the OOTB Theory of Change, and the Most Essential Learning Competencies (MELCs) for MIL. The core lessons are outlined in the image below:



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Figure 1. #MIL4Democracy Handbook Table of Contents

### The Handbook as Hardware: Critiquing the Technical and the Physical

#### *The Nature of the Handbook: A One-Stop-Shop?*

It is easily discernible that the handbook employs a lot of student-initiated activities in it. Student-led activities that enable learners to engage with the material (i.e., online tools) could be effective because using this approach could be more apt to the context of the learners: e.g., young people who might be interested in popular culture (Culver & Jacobson, 2012; Pascarella, 2008). However, in the absence of handouts for certain topics, the learners would benefit from a balance of teacher-led and student-led activities, especially since most of the topics are jargon-filled. There is also a need to be clear and consistent with the way that content is explained, as not all learners would be on equal footing when it comes to being exposed to the issues or technologies mentioned in the lessons.

Four out of 18 lessons in the Handbook had accompanying handouts to supplement the lessons, however, there is a need for handouts for all the lessons because the material is being presented as a handbook. Handbooks, following the definition, is a “single-volume reference book of compact size that provides concise factual information on a specific subject, organized systematically for quick and easy access” (Reitz, 2014). It would be beneficial for both teachers and learners to have accessible course guides or handouts for each lesson. At its current state, implementing the Handbook would require teacher-developed resources, which could mean that the teacher’s understanding, personal beliefs, and personal thoughts would be reflected in the materials. This could work either way, as in the developed resources could match the lesson in the handbook or it could not, leading to inconsistencies such as: the objectives may potentially not be met due to the teacher creating a set of learning resources disconnected from the contents of the handbook.

### *Reliance on Digital and Global Resources*

Teaching MIL for democracy seemed to predominantly embrace a digital-based pedagogy as all the lessons rely on online resources. These resources are not only meant for teachers to read but also communicate to the learners as the Activity Overview part encourages students to prepare by seeking specific information online. In Lesson 3 for instance, the Handbook instructs students to access the video materials on the Ampatuan massacre before the meeting. To set the expectations of students in Lesson 6, the handbook also recommends that students investigate the Facebook P2P campaigns. In other words, utilizing the handbook requires independent digital literacy and participation for both teachers and students.

These digital resources are accessible through retrievable links which lead to websites like debate formats (Bennett, 2019) in Lesson 1 and a glossary of newspaper terms (Glossary of newspaper terms, n.d.) in Lesson 4. There are also interactive digital resources such as the presentation of the 2020 World Press Freedom Index (Reporter Without Borders, n.d.) curated in Lesson 2. Here, the user can click on a country in the map and visualize the world's Press Freedom situation through color coding, reproduced in Figure 1 below:



Figure 2. Screenshot of 2020 World Press Freedom Index through the Reporters Without Borders Website

However, the digital nature of the resources makes them unstable as content may become unavailable, updated, or altered, or deleted altogether. For example, the *Wall Street Journal Glossary of Journalism Terms* listed in Lesson 4 leads to a “Service Unavailable” prompt. The same goes for an FBI reference on “violent extremism” in Lesson 6. Another resource in Lesson 6, meanwhile, has been updated and now takes on a different link (i.e., Talabong’s 2019 article on Gretchen Diez). Meanwhile, a resource in Lesson 5 by Tufekci (2020) explores whether protests work. However, as seen in Figure 2, *The Atlantic* website requires the reader to pay for a subscription after reading two paragraphs.

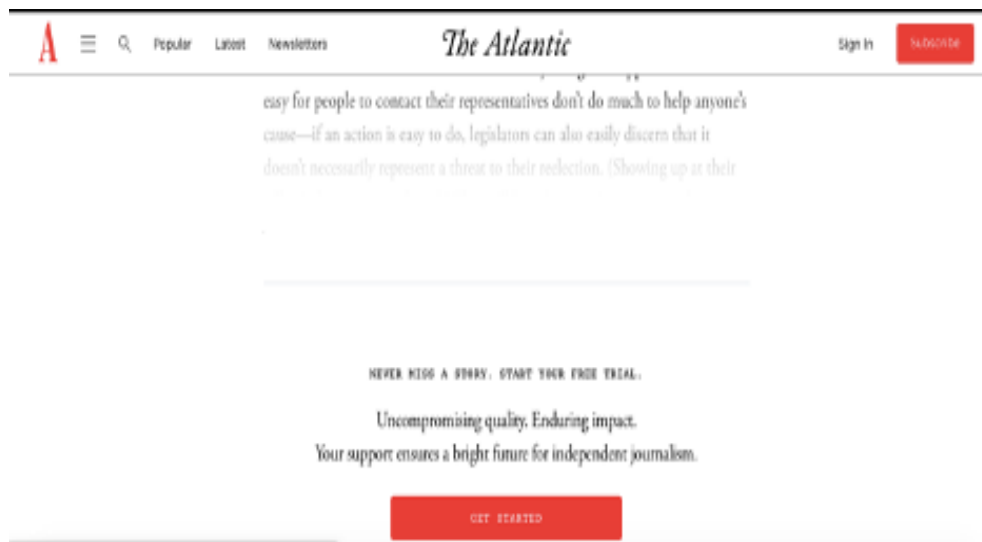


Figure 3. Screenshot of Tufekci's (2020) on the *The Atlantic* website

The case above is typical, especially in the context of independent journalism and developing trends of subscription practices. In the previous institution where Irish taught, the school administration does cover subscription costs for some sites (e.g., Washington Post). All this to say that other users of the Handbook may need to look for alternative means of securing the source or to find alternative references instead. We do not necessarily see this as a negative feature of the Handbook. Being forced to look for other resources may enhance the networking and judgment skills of both teachers and students, in line with the skills that Handbook wants to develop. Paradoxically however, being able to curate digital sources presumes a certain familiarity of doing the work already, calling to question if there is a need to rethink at least the lesson on curating sources to be more analogue. Considering that many teachers in the Philippines still rely on library resources (Labangon & Zabala, 2018), searching through digital resources may prove beneficial to MIL teacher-training which is found to be lacking (Bautista, 2021).

Not only did the resources go digital, but resources in the Handbook are also global too. For example, the resources from Reporters Without Borders in Lesson 2 situated the press freedom situation of the Philippines in comparison with the rest of the world. Meanwhile, the curated reports from UNESCO in Lesson 3 presented impunity in journalists' killings as a global concern. In the same way that the United Nations was used as a resource for the plan of action on hate speech in Lesson 6. Aside from these international organizations, there are also resources curated from relatively smaller networks such as IFEX that is nonetheless composed of over a hundred organizations, "all connected by a shared commitment to defend and promote freedom of expression as a fundamental right" ("Our Network," n.d.).

That said, the logistical concern is that several of these "classic examples" of the Handbook are based on a familiarity with the American situation (e.g., Pizzagate, the Trump vs Clinton election). The number of US-related examples is due to, we believe, the Handbook's production in partnership with the alumni of the International Visitor Leadership Program (IVLP) of the United States Department of State. And while those examples are fine with respect to the topic in a vacuum, we wonder what might happen to the lesson timeline in case the teacher or the class does not know the context of the content? Should the teacher extend initial discussion times, from the ones set to five to ten minutes? Is it reasonable to expect junior and senior high school students to do advanced reading prior to the lesson alongside their other subjects? Further, we wonder, if the teacher/implementer replaces the intended content with alternative, localized examples, does this not add more time for preparation and take away more time from teaching?

### *Lesson Specifics: Convergences and Expansions*

Some lessons contain closely related concepts, necessitating the merging of certain lessons. There is also a need for the authors to revisit some lesson examples they used and incorporate more recent examples to illustrate the issues being discussed. There were also instances of duplicating lesson objectives, for instance Lesson 1, 2, and 3 have the same first MELC and Lesson 14 and 15 does the same. If this is intentional then perhaps the two topics can be merged, after all, some discussion topics such as cyberbullying and online relationships are interrelated as in the case of Lesson 14 and 15.

Lesson 12 emphasized the role of digital tools in teaching MIL, which shows promise. Reading through the lesson, we noticed that the examples used in the lesson focused on freedom of expression by using examples of social media gaffes. These are great examples but considering that these occurred more than three years ago, there might be other more relevant examples that might be considered. Echoing Culver and Jacobson (2012), the need for a timely approach to MIL instruction is crucial to the effectiveness of these initiatives. Same with Addison and Meyers (2013) in their study of evolution of perspectives in information literacy, there is an appropriate approach to teaching it, based on the context and the skill that needs to be developed. In the case of digital citizenship, the use of relatable examples and social media gaffes is promising. The follow-up questions provided were good and answering them required complex but still reflective thought, hence we feel that they are apt for the age of the learners. Overall, the Lesson offered a balanced viewpoint by discussing the rights attributed to an individual, along with the pitfalls of misunderstanding what those rights mean. At first, we thought that it was odd to just highlight social media, but we realized that there is wisdom behind this, access to social media is easier today, it is where many people engage with others online, and sometimes even anonymously, so issues of expression will be more evident there.

Meanwhile, for other lessons, there seems to be an emphasis on introspection. To illustrate, Lesson 13 talks about the online and offline self of individuals. The worksheet activity for this lesson is an interesting one as it is very reflexive and personal in nature. Learners are made to reflect on the differences in their online and offline personas. This approach is meritorious given that this early introduction of the necessary caution in the cultivation of online/offline personas is important as it could impact a person's future such as employment prospects (Hollingshaus, 2019). However, it might be useful for future editions of the book to have an accompanying material where definitions and discussions of the lesson's jargon can be found. Since the lesson focuses more on personal practices and the importance of online safety, paradigm repair, though not easily detectable, is partially felt. The way it was addressed is reflected in the way that learners are given activities leading them to think of the way they behave online. There is, meanwhile, little allusion to other stakeholders, the core of participatory democracy. Along with paradigm repair, disinformation responses were not very evident in this lesson.

Another concern we noticed during our review of the Handbook was the interesting use of objectives in some of the lessons. In Lesson 1 the term 'value' was used as one of the objectives, Lesson 3 used "advocate," and for Lesson 14, 15, 17, and 18, the word "realize" was used repeatedly in the objectives. We worry that using the terms such as "value" or "realize" would translate to the objective being difficult to measure, since the term connotes deep reflection followed by a conscious recognition or change in behavior.

Nonetheless, for lessons using a reflective tone, such as Lesson 14 we found promising the use of the personal safety angle to communicate the value of cybersecurity. This could serve as a good introduction to students who are not yet acquainted with the topic. Potentially helpful as well, was the lesson's mention of relevant laws and legislations concerning cybercrime: The Cybercrime Law and the Safe Spaces Act, both were given as examples. Perhaps, in future editions of the handbook, there could be a brief discussion or overview of these laws so that the learners will already have an idea what it talks about instead of having to go over an external resource discussing these legislations. The activity discussing cybersecurity is interesting too, but, since there were no handouts included for this lesson, we began to wonder how well the learners will be able to perform the listed examples of cybercrime issues, given that the activity is a skit. If the goal for the lesson is to make learners realize the importance of being safe online, then it would have been useful to have a set of handouts discussing specific types of cybersecurity issues. Useful in

contextualizing information literacy issues such as financial literacy, is the document from CILIP (2018). In their redefinition of the topic, CILIP identified five contexts upon which information literacy may be applied too. One of the contexts is daily living which involves financial activities and social media interactions, both activities could be impacted by cybersecurity threats, so the use of these examples in Lesson 14 could be useful.

Still, regarding the issue of adding or expanding core topics, Lesson 17 touches on concepts such as virality, and the way that agents and interpreters create and disseminate information. The activity discussing this in Lesson 17 uses recent examples of hot-button issues: COVID-19 vaccine, NTF-ELCAC, and Red-Tagging. These issues are timely, an important element of MIL instruction (Culver & Jacobson, 2012) making the resources about them easily accessible online. However, Lesson 17 and Lesson 18 could have been classified as one exhaustive lesson so that there would be a clear relationship between the issues presented and how they could factor into a thriving democracy. Since both lessons perfectly encapsulate MIL and democracy, it would also be helpful to have a detailed set of handouts or accompanying reading materials for this topic, to provide a good backgrounder for learners who might know little about the issues identified.

### *Broader Logistical Concerns*

Focusing on the broader logistical concerns, first, the MIL subject is only eighty (80) hours in total, handled in two semesters for around twenty (20) weeks of instruction. Based on the stated amount of time it takes to facilitate all the lessons within the handbook, it takes 22 hours and 20 minutes or just over a fourth of the entire DepEd MIL subject to fully deliver the lessons. That time does not consider the would-be instructor learning the material for themselves, the time possibly extending due to activities which allot presentation time to the students, or possible delays caused by misunderstandings of or extended discussions about the lessons. Several of the lessons also state the need for the instructor to provide their own materials to facilitate the lesson, have internet, or in the case of its lack, print the material and place it on Manila paper. With only around 53% estimated Internet users in the total (World Bank, 2021), and huge gaps in internet access across schools (Navarro, 2022), there are questions as to how ready-to-implement the lessons are.

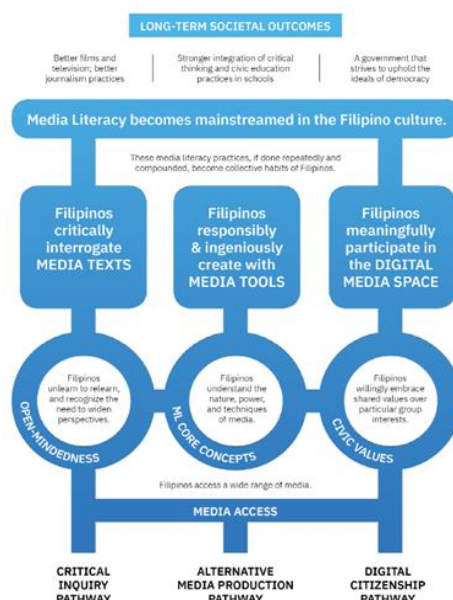


Figure 4. OOTB Media Literacy Initiative's Theory of Change

Moreover, the introduction of ChatGPT has shifted the practices of students (Barreiro Jr., 2023; Agence France-Presse, 2023) and made disinformation tools readily accessible. Teachers at the secondary

and tertiary levels in the Philippines have already experienced some students using such programs in attempts to plagiarize essays and homework. With respect to teaching MIL to counteract fake news and disinformation as a civic duty, there seems to be more time needed to unpack the importance of acting ethically and for the common good, potentially adding weeks of content to the class to do so comprehensively. Another practice, the disappearance of people who participate in perceived activism within the country, also poses a challenge in sustainable implementation if unaddressed. Although the Handbook does have a one-page discussion on how to address difficult topics in the abstract sense within its Appendix, it does not have an in-depth discussion on how to address the logistical precarity associated with the political situation, nor how to collaboratively mitigate it in the broad sense, or how to manage possible fears or student concerns in the micro sense - all problems that need to time be addressed, mitigated, or possibly be used as a learning opportunity.

In recognizing the MIL response within Philippine education, the Handbook also links each lesson onto DepEd's *Most Essential Learning Competencies* (MELCs), directly connecting to some of those found in the Grade 11 and 12 DepEd curriculum. DepEd defines MELCs "as the competencies that a learner needs in order to continue subsequent grades and ultimately have a successful life" (Llego, n.d.). The authors selected MELCs that match the content and activities of the lesson. "This way, teachers of the MIL subject will find it easy to accommodate the #MIL4Democracy Handbook's topics and lessons into their own curriculum design," they explain (OOTB Media Literacy Initiative, 2021, p. 12). Driven by their own 'Theory of Change,' reproduced in Figure 3, the authors of the Handbook advocate for increased MIL instruction and development with the aim of creating long-term societal outcomes in Filipino culture. The three final outcomes they envision point to where they intend these changes must be implemented: media, educational institutions and their teaching materials, and government.

Moreover, the Handbook recognizes that there is already a national program, the Grade 11 and 12 MIL subject of DepEd. In doing so, the Handbook's primary intended student becomes Filipino high school students, and its implementation is understood to happen at around that time. There are attempts to link the Handbook as a directly relevant and contextually informed response and make it accessible to teachers.

The last logistical concern is the "No Memo, No Action" culture specifically observed as a feature of DepEd schools. What this means is that "no policy or practice in the lower levels (i.e., the school) of the hierarchy may change or take place unless there is an explicit DepEd memo that allows it (Bautista et al., 2010, pp. 59–60). Potential differences between a hesitant school administrator and an MIL supportive teacher (or vice versa) may delay or even undermine the adoption of the Handbook within a school. In practice, the point of resistance comes with how the MELCs were selectively linked to the Handbook's lessons. Rather than link Handbook lessons to the group of MELCs expected in the K-12 curriculum (i.e., Lesson 3 of K-12 has three specific competencies tied under it), MELCs from different units were chosen. For instance, Lesson 7 from the Handbook links itself to content 10, 11, and a reworded competency of 12. Does this mean that the Handbook lessons are meant to recur alongside the K-12 ones, but only as supplements because other K-12 MELCs must be covered? We wonder how a teacher could justify that to their supervisor given the hierarchical culture within DepEd schools? These, we think, are conversations that need to be had and addressed prior to implementing the Handbook within a particular school context.

### *Recommendations on The Handbook's Technical and Physical Aspects*

To address some of the logistical and material concerns outlined above, advocates of the Handbook can make the insights behind the creation and design available to the public. Building upon the provision of sources provided in the book, providing the authors thoughts, and detailing which lessons are core while which lessons could be more flexible would allow for the Handbook to be more easily localized to respond to the needs of a particular context. If activities can be simplified to being delivered via writing instruments, then that would lessen the need for the teacher to pre-prepare materials before delivering the lesson. Perhaps a companion booklet, reproducing the articles cited in the work, would also ensure that a copy of all the works is available in cases where the internet is unreliable or unavailable. Creating regular onboarding sessions for the teachers and their school administrators, initially led by OOTB but eventually led by other partnered change advocates, could also make the process of delivering the Handbook more participatory

itself—reflecting OOTB’s vision for change in the Philippines more closely. Perhaps lessons focusing on civic values and democratic practices could also be considered and delivered, especially targeting localities that might be resistant to implementing the Handbook—the places where it will be needed the most.

Should a new edition of the Handbook come to be, perhaps a review of the language used could be done to try and lessen instances where lessons are delivered from a seemingly top-down perspective. If a reprinting of the work is not possible, perhaps the work can be supplemented by citizen-led conversations and discussions surrounding the thoughts and ideas in the Handbook. Perhaps the authors of the Handbook should also explicitly outline how the assumptions they must make about the students intended to read the handbook affected the writing and adopt a language disclosing this in the lessons. As the lessons progress, perhaps how the authors view the imagined students could also change, allowing the students freer rein to engage with the topics as they see fit.

As mentioned in the earlier sections, future iterations of the Handbook might benefit from the merging of some topics. This is not to say that the other lessons are not lacking, they function as good introductions to the specific areas they are addressing, but there is too much emphasis on specific topics that might take away from some more pressing issues concerning MIL and democracy.

## CONCLUSION

The *#MIL4Democracy: Teaching Media and Information Literacy for Democracy* handbook as a teaching and learning resource is promising and serves its purpose as an introductory material to media and information literacy, civic engagement, and democracy. The handbook is filled with topics relevant to democracy, student-led activities, and reflective opportunities strengthened by follow-up questions to key topics. The handbook also employs a combination of digital, social media, and global resources, all of which align with the global need for MIL and civic engagement.

Along with these advantages, however, is the need for supplementary materials such as reproduced articles for digital resources and handouts for all lessons, especially those lessons with jargon and laws. The researchers also saw some opportunities for merging some lessons, localizing examples, and minor technical specifications.

The study recommends that related areas of inquiry focus on investigating the nuanced experiences of the teachers, the evaluation of learners, and the triangulation of this study with other advocates of MIL and civic engagement.

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