

## **Librarians' Digital Competencies: Influence on their Utilization of Emerging Educational Technologies**

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**ABSTRACT:** *Academic and instructional services in academic institutions, particularly in Higher Education Institutions (HEIs), have changed as a result of technological advancement. Library and information search services are being digitized, and librarians must gain digital skills in order to provide library users with more effective and efficient research services. The purpose of this study was to determine the influence of librarians' digital competencies in their utilization of emerging educational technologies. This study used the descriptive correlational research design and analyzed using descriptive and inferential statistics. The participants were eighty (80) registered librarians and active Philippine Librarians Association, Inc. (PLAI) members who are employed in selected libraries in Northern Mindanao. Online survey questionnaires were used for data collection. Findings reveal that the librarians' digital competencies in terms of managing and developing digital libraries were high. while the competencies in protecting digital content were rated to a moderate extent. Moreover, the librarians' extent of utilization of emerging educational technologies in terms of cloud computing, web conferencing, and institutional repositories was rated as generally high. The librarians' assessment of their digital competencies significantly influence their utilization of emerging educational technologies. It is concluded that the digital competencies of librarians are crucial and indispensable as it influences their utilization and application of emerging technologies in managing and developing digital library services. It is recommended that the librarians may acquire knowledge and skills, particularly on these topics related to protecting digital contents: computer and network security, security tools and techniques, digital copyright policy, copyright issues and security and privacy in digital libraries.*

**KEYWORDS:** digital competencies, librarians, emerging educational technologies,

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## **INTRODUCTION**

Technological development has brought changes in the way librarians provide resources and services to their library users. Librarians have a dynamic role in providing digital information to the users through proper development and management of digital technology. Thus, librarians must be well equipped with the skills necessary to work in digital library environments and manage electronic library infrastructures and services. Mendez (2019) accentuated that school librarians' knowledge, skills, attitudes, and digital dexterity are needed in digital information systems. Users' need for e-information services is likewise expanding and becoming increasingly crucial. The pandemic crisis, along with the rise of digital technology, is changing conventional caretakers of physical collections into online information content creators. When physical libraries close, librarians are involved in providing online information services to the general population. The emerging internet technology has constantly linked to better and more accurate digital services to library users and provides concrete outcomes. Subsequently, Mariano, et al (2020) espoused that the change in libraries has tremendously changed the services libraries now render. Librarians now have more roles and responsibilities as a result of the shift from a print to a digital environment. They are now responsible for the research outcomes of their institutions and the community at large, as well as teaching students and faculty information retrieval skills in the digital environment. The digital environment makes information access cheap and endlessly available. Reference tools, automated journals, and digital documentation of historical materials now come in a variety of packages from different online publishers and are readily available.

Recently, it was emphasized that libraries with a less online presence need to reinvent themselves to enroll in an entire program of online services that will move librarianship to a new era of digital transformation. The transition from traditional to digital and electronic information systems has necessitated upgrading of the library services so that students can be provided with services that can be delivered remotely in light of both the temporal restrictions to access to physical buildings of the school's repository of knowledge and information due to Covid-19 Pandemic. During this time of the pandemic, librarians utilized these emerging educational technologies including web-based services, cloud computing, and institutional repositories. These emerging educational technologies have helped Libraries and librarians to freely share resources, connect with users remotely, and promote their services virtually. Nonetheless, Lan and Young (2016) librarians are challenged to identify and understand the relevance of using these technologies which match the expectation of their use. It was also emphasized that librarians with digital skills have the opportunity to provide more effective and efficient information and digital library services through the application of technology in libraries. Besides, the need to develop

digital competencies is to be conversant with systems analysis and design, knowledge of classification and assigning of metadata, digitization processes, and management of digital collections, use of the internet, and knowledge of the web including navigation, search techniques, and virtual reference services.

Consequently, Gregorio, et al (2019) were alarmed that librarians, who are not technically skilled in digital librarianship, should perceive digital libraries as a threat to their employment. Fortunately, observations and preliminary studies proved that state universities in the Philippines have not shown desirable progress that matches up with the digital skills of librarians because they are chartered institutions. However, to keep abreast with the demands of time the school management upskilled their librarians with digital competencies. Hence, it is essential to determine whether the librarians have the necessary competencies in managing and developing digital libraries as well as discover whether their digital competencies influence their utilization of these emerging educational technologies. Thus, the researcher intended to investigate the interplay of digital competencies and the utilization of emerging educational technologies among librarians. The study findings will also enable library and information professionals to understand librarians' digital competencies in order to improve library services throughout the pandemic.

## **THEORETICAL/CONCEPTUAL FRAMEWORK**

This study assumes that librarians' digital competencies significantly influence their utilization of emerging educational technologies. The study is anchored on the Technology Acceptance Model (TAM) which is one of the most widely used research models in investigating the factors that influence the acceptability of information systems and information technology (IS/IT). Acceptance and use of technology are indicating the readiness of an individual, group, organization, or institution to adopt, implement and use technology. Dillon and Morris (as referenced in Adeoye & Olarenwaju, 2019) define it as a user group's evident willingness to employ technology as intended. Scherer, Siddiq, and Tondeur (2019) cited Davis as the creator of the Theory of Technology Acceptance Model, which contends that the perceived usefulness and usability of an information system are key factors in its acceptability. According to him, perceived usefulness is the degree to which a person believes that using a system will improve his job performance.

In this study, the TAM Model was utilized to determine the acceptance and use of emerging technologies in library and information services. In terms of the roles that librarians play in protecting digital content, they have numerous roles including the responsibility of safeguarding digital files against unauthorized access and use. They are also in charge of information security and authority, which have an impact on digital library research and

development. Khan and Bhatti (2017) categorized the competencies in developing and managing digital libraries, these include digital competencies for developing digital libraries; managing digital libraries; and digital competencies to protect digital content. All of these competencies were considered in the study.

***Developing digital libraries.*** School librarians are tasked to develop and organize collections of digital information, which libraries and archives have always done, with the digital representation that computers have made possible. Bhatti et al. (2016) described developing digital libraries as an organization of digital sources of information to make them available to users. The development of digital resources requires planning and utilization of information and communication technologies that provide access to digital collections via algorithms or real-time data feeds. Borgman et al. (2012), and Arms (2017) argued that developing a digital library includes the following processes such as organizing and collecting library information to effectively serve the users through the use of computers or a network of computers. Further, library data and information are converted and stored in a digital form and made accessible through digital means as these data are properly developed and managed.

***Managing digital libraries.*** Subsequently, Machlin, et al (2020) pointed out that managing digital libraries is a process of promoting the delivery of information effectively and efficiently at low cost and providing long-term learning opportunities to the users. Further, it was also emphasized that librarians' working knowledge of information and communication technologies (ICTs) helps them manage and facilitate as well as maintain digital libraries and information searches. Trepanier (2020) purported that librarians' digital management includes controlling digital data from a computer-based system where all the functions of the library are systematic. It helps in keeping a record of books, journals, catalogs, newspapers, compact discs, and other digital files. Chinien and Boutin (2020) argued that digital management skills refer to the ability of librarians to organize, implement, and maintain digital tools and work in computerized environments. Generally, Digital content is managed and shared by storing them in a repository. An institution's repository can support research, learning, and administrative processes as well as purposes. For repositories, standards are followed to ensure that the contents are accessible and can be searched and retrieved for later use. However, one of the major concerns for Internet content providers is access management and control. The confidentiality and integrity of information cannot be guaranteed in the absence of a proper access management mechanism.

***Protecting digital content.*** Librarians are tasked to protect digital files and prevent digital content from inappropriate use and utilization. Additionally, they are responsible for information security and authority which influence research and development in digital

libraries. Furthermore, the misuse that can be put on digital content is far more serious and voluminous than for printed content. Austin and Craft (2019) and Arora (2018) stressed that preventing digital content includes the use of intellectual property and information and library materials should be copyrighted. It was also emphasized that copyright laws protect the illegal use of digital objects and developed technical solutions that protect materials through copy protection or automatic billing mechanism or encryption algorithms. The use of technology today in schools has transfigured libraries into digital library centers which provide more ease and convenience to users. School libraries show an enormous impact on technological innovations and development. These emerging technologies include web-based services, cloud computing, distance learning, and institutional repositories. Further, Brown, et al (2017) reported that the utilization of emerging technologies helps in the long-term survival and support of academic libraries in the technological society depending on the expansion and upgrading of information services. The importance of using intellectual property and copyrighting library materials was emphasized by Austin and Craft (2019) and Arora (2018) in their works on preventing the use of digital content. Also emphasized was the need for technical solutions that use copy protection or encryption algorithms to safeguard materials covered by copyright laws that protect the unauthorized use of digital objects.

Furthermore, it was purported that technological developments have pushed libraries to take comprehensive, accessible, and technology-driven methods of delivery through the utilization of emerging technologies such as web-based services, cloud computing, and Institutional Repositories.

**Cloud computing.** The National Institute of Standards and Technology (NIST) describes cloud computing as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources" (such as networks, servers, storage, applications, and services) that can be quickly provisioned and released with little management work or service provider interaction. To deliver better service to users on time, librarians are thinking about moving away from the conventional system and toward one that is backed by contemporary technology and cloud computing. Cloud computing offers libraries the chance to broaden their reach by changing how systems are created and services are provided. The studies by Barathi (2019) and Rajan (2018) revealed that the use of web-based and cloud computing has enhanced information management and library services. It was also emphasized that integrating and using emerging technologies and innovative practices in libraries help fill the gap in digital library management. It was further emphasized that technology, which is still developing, helps identify, evaluate, and implement the use of existing and new technology in the management and services of libraries.

**Web Conferencing.** Additionally, Web 2.0 and social media technologies have expanded learning opportunities beyond the physical library. Kagan (2019) opined that web conferencing is a technology that allows users in different locations to hold face-to-face meetings without having to move to a single location together. Librarians have always tried to stretch the limits of applicable technologies to create effective connections among researchers and resources.

**Institutional Repositories.** The emergence of Institutional Repositories (IRs) is a new phenomenon that provides an opportunity for researchers. A chance for an institution to share its digitized intellectual wealth with the rest of the world community. According to Jones and McColl (2008), IRs will soon be viewed as an essential component of the infrastructure of every academic institution. The IRs as defined by Crow, (2002, 16p.) can be identified as digital libraries that "capture[s] the original research and other intellectual property generated by an institution's constituent population active in many fields." Palmer, Lauren, and Newton (2008) present a detailed analysis of university libraries in which they compare options, strategies, and conditions for content acquisition, preservation criteria, and service provision for an IR. They also discuss the relationships of IR and show that the libraries are the originators and preservers of the IR to promote the research output of a particular institution in digital form.

Rapid technological development has changed the delivery of quality information and library services, made more effective decisions, and improved the performance of librarians and their staff to significantly contribute to the success of the school organization. The school's technological resiliency has stimulated the institutionalization of knowledge management in libraries which is critical in the development of more efficient and leveraging digital information services. Khan, et. al (2016) argued that the use of digital information tools in libraries and information centers demands the technical competencies of librarians to successfully navigate through digital information. With the theory and concepts above, this study will determine the librarians' digital competencies and their utilization of emerging technologies. Figure 1 shows the interplay of variables in the study, involving the librarians' digital competencies, regarding their utilization of emerging educational technologies.

### **Purpose of the Research**

The study aimed to determine the relationship between librarians' digital competencies on their utilization of emerging educational technologies.

## **METHODOLOGY**

### **Research Design**

This research study utilized a descriptive correlational research design. According to Calderon et al. (2012), descriptive research is a fact-finding inquiry or investigation. It is used to thoroughly understand the underlying causes of the given situations. The researcher considered it a suitable research design since it describes the librarians' digital competencies influence on their utilization of emerging educational technologies.

### **Participants of the Study**

The participants of the study were the eighty (80) registered librarians who are active members in Philippine Librarians Association, Inc. - Northern Mindanao Region Librarians Council (PLAI-NMRLC). Purposive sampling was used in this study, allowing the researcher to select only samples that meet specific criteria for the study (Eze & Elegbe, 2018).

### **Instrument**

There were two (2) instruments that were used in this study. To determine the librarian's digital competencies, the researcher adapted an instrument from Khan (2016). In terms of librarian's utilization of emerging educational technologies, the researcher look into the features of video-conferencing, cloud computing and institutional repositories and crafted a survey questionnaire based on the features gathered.

### **Ethical Considerations**

The researcher distributed a survey questionnaire on the Influence of Librarians' Digital Competencies in their Utilization of Emerging Educational Technologies to the participants via Google Forms. With the panel's recommendations during the research proposal, and with the Certificate approval from the Graduate School Research and Ethics Committee (REC), the researcher floated the questionnaires. Following a formal ethical procedure, a consent form was given to the participants, as well as a letter and the approval of the REC, to ensure that research ethics were adhered to throughout the research process.

### **Statistical Treatment of Data**

In analyzing the data, Problems 1 and 2 were organized using descriptive statistics such as frequency, percentage, means, and standard deviation. Data related to Problem 3 were subjected to regression analysis to determine the influence of digital competencies on their utilization of emerging educational technologies.

### **RESULT AND DISCUSSIONS**

Table 1 below shows the summary librarian's digital competencies. Results reveal that the librarians' digital competencies in terms of managing and developing digital libraries got a high rating, while the competencies in protecting digital contents were rated to a moderate extent.

As to developing digital libraries, this indicates that librarians are knowledgeable in developing digital libraries. Building digital collections necessitates technological skills, particularly in relation to digitization efforts. This entails that with their digital competencies they can transform traditional library services into more inclusive library services through the use of technology. Similarly, Joel and Ibrahim (2021) stated that librarians as information professionals are expected to demonstrate digital competencies in order to thrive in the digital environment and to energetically and vigorously lead in the procurement and acquisition, application, utilization, and implementation of modern technologies to improve library and information services.

Similarly, librarians have the necessary knowledge, skills, and abilities to manage digital libraries, which is a very important task in the modern world. This indicates that they can utilize and provide digital resources as well as virtual library services to their library users. As pointed out by Khan and Bhatti (2020) today's digital library environment requires interdisciplinary skills from librarians as well as practical skills and sound knowledge of IT to develop and manage a digital library.

On the other hand, in terms of protecting digital contents, the study revealed that librarians may have limited knowledge and skills in this area. This is also in consonance with the result findings of Okeji et al. (2019), that the librarians knowledge of network and system security, their proficiency in using security software firewalls and filtering routers, and their proficiency in restricting access to digital content via a password or IP address below average. Findings of the study point to the need for librarians to attend webinars or training sessions with regard to information security measures in digital libraries.



**Table 1. Summary of Librarians' Digital Competencies**

Digital Competencies	Overall Mean	Interpretatio n	SD
Developing Digital Libraries	3.60	High	0.72
Managing Digital Libraries	3.55	High	0.73
Protecting Digital Contents	3.36	Moderate	0.86

Table 2 shows Librarians' Utilization of Emerging Educational Technologies. The librarians' utilization of emerging technologies in terms of cloud computing, web conferencing, and institutional repositories was rated as generally high.

The emerging technologies that got the highest mean was video-conferencing. This finding implies that Web or video conferencing assists the digital library in providing direct access to its digital collections without requiring the user to physically visit the library. The idea behind digital libraries is to find ways to respond to and meet the needs and demands of users. Kagan (2019) opined that web conferencing is a technology that allows users in different locations to hold face-to-face meetings without having to move to a single location together. Librarians have always tried to stretch the limits of applicable technologies

This is then followed by Institutional Repositories, which demonstrates that librarians are making full use of the emerging educational technologies used for institutional repositories. Institutional repositories can be considered digital archives in the context of digital libraries because they are used for collecting, storing, and disseminating information to advance scholarly communication. It is critical that librarians maintain institutional repositories because they serve as the foundation of open science and scholarship, managing, preserving, and providing access to valuable research and educational content. As predicted by Jones and McColl (2008) that IRs will soon be seen as a vital integral part of every academic institution's infrastructure.

Lastly, is cloud computing which is already being used by the majority of libraries that use library software to implement and maintain digital collections. The library uses cloud computing primarily for file and collection backup because it is secure and can be downloaded whenever and wherever they want. They can download files and other documents using devices that have an internet connection. As opined by Onwubiko, et. al. (2021) cloud computing technology helps libraries to maintain record data, private and delicate data. They also adopt this technology for electronic journal access, hosting digital libraries, tracking statistical data, and integrating library hosting.

**Table 2. Summary of Librarians' Utilization of Emerging Educational Technologies**

<b>Emerging Educational Technologies</b>	<b>Overall Mean</b>	<b>Interpretatio n</b>	<b>SD</b>
Cloud Computing	3.54	High	0.94
Web Conferencing	3.77	High	0.92
Institutional Repositories	3.55	High	0.85

Table 3 below presents the regression analysis of the influence of librarians' digital competencies on their utilization of emerging educational technologies. Apparently, librarians who have high digital competencies also utilize emerging educational technologies more frequently. Thus, the null hypothesis can be rejected. Specifically, it is their competency in managing digital libraries that came out as having a significant influence in their utilization of emerging educational technologies. This finding suggests that a librarian's use of emerging technologies is influenced by their level of digital competency. This discovery demonstrated how societal expectations of librarians and information specialists have changed significantly as a result of the current technological advancement. In order to provide user-centric service, librarians are also expected to change the system by adjusting to the cutting-edge technologies that are being used all over the world to provide library services to people. Any librarian who doesn't keep up with current events and uses cutting-edge technologies to serve users will fall behind and become unskilled in the field of information science. Thus, it is crucial for librarians and information professionals to change the system by keeping their knowledge and skills up to date and integrating cutting-edge technologies into the delivery of library services. The result of this study is similar to that of Okwu & Nsirim (2021) that the librarians' Web 2.0 competencies enhance their utilization of emerging technologies in academic libraries.

Moreover, this finding revealed that the results are useful for libraries to estimate the current status of digital competencies among librarians for managing digital libraries. The digital librarian has a good knowledge of IT to manage the overall digital library infrastructure. According to Omehia et al. (2021), digital proficiency is essential for librarians to use emerging technologies in libraries. The ability of librarians to use digital libraries effectively in managing the library's information resources can be inferred from their proficiency in these services. This resulted in improved information resource processing, storage, retrieval, acquisition, dissemination, selection, and ordering. Additionally, there is a significant connection between librarians' use of digital libraries for library and information products and services as well as between their level of digital competency and the adoption of emerging technologies in libraries. This means that competent technological skills will enable librarians to carry out their responsibilities successfully.

**Table 3. Regression Analysis of the Influence of Librarians' Digital Competencies on their Utilization of Emerging Educational Technologies**

	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
(Constant)	1.14	.345			3.30	.001
Developing Libraries	Digital .157	.142	.151		1.11	.273
Managing Libraries	Digital .368	.170	.361		2.16*	.034
Protecting Libraries	Digital .181	.140	.207		1.29	.202
<b>Model Summary</b>						
R = .670	R <sup>2</sup> = .449	Adjusted R <sup>2</sup> = .428	F = 20.68**		p = .000	

\*\* significant at 0.01 level

\* significant at 0.05 level

## CONCLUSION

Librarians' digital competency is necessary for today's digital library working environment. The librarians under study are digitally competent in managing and developing digital libraries. Moreover, they are also utilizing emerging educational technologies in providing resources and services to their library users. Apparently, the digital competencies of librarians are crucial and indispensable as it influences their utilization and application of emerging technologies in managing and developing digital library services. The findings of this study confirm the existing claims that acceptance and use of technology are the readiness of an individual, group, organization, or institution to adopt, implement and use technology (Davis, 1989; Adeoye & Olarenwaju, 2019; Scherer, Siddiq & Tondeur, 2019).

Librarians who have high digital competencies also utilize emerging educational technologies thus, in order to maximize a librarian's digital skills need to be improved because the majority of organizations today are using electronic or digital solutions to enhance their services. Libraries are moving ahead with integrating electronic solutions to effectively manage their organization, staff, and services. Because the modern economy is moving so quickly, librarians must acquire these skills and knowledge.

Additionally, it's critical for librarians and libraries to be digitally competent in order to keep up with changes, improve efficiency, and develop new services and procedures. The new opportunities that the technology offers are unavailable to those who lack the skills to utilize digital media. Studies have shown that training in digital competence improved librarians' knowledge and abilities, particularly when it came to fostering better professional engagement, utilizing digital resources, planning activities, enhancing assessments, and empowering library users. Digital competency is crucial because it enables global and real-time collaboration, content creation and sharing, and communication among librarians. It's important to remember, though, that these skills come in a wide variety and include fundamental abilities like communication and problem-solving in addition to data and IT focus.

## RECOMMENDATIONS

1. That the library administrators enhance the skills and competencies of their librarians by sending them to seminars and training on protecting digital content;
2. That the librarians acquire knowledge and skills, particularly on the following topics related to protecting digital content:
  - 2.1. Computer and Network Security in Libraries
  - 2.2. Library Security Tools and Techniques
  - 2.3. Digital Copyright Policy for Libraries
  - 2.4. Copyright Issues in Digital Library Environment
  - 2.5. Security and Privacy in Digital Libraries
3. That the librarians may consider reviewing the laws and policies governing copyrighted materials in order to better protect digital content in the library.
4. That future researchers may explore other variables such as taking an interest in learning digital skills independently to remain updated.

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