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Assessment of Digital Literacy Skills, Acquisition Methods, and Gender Influence among Librarians in University Libraries in Tanzania

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Abstract

This study examines digital literacy skills among librarians in university libraries in Tanzania, focusing on skill levels, acquisition methods, and gender influence. A descriptive research design, integrating qualitative and quantitative research approaches, was employed. A sample of 212 librarians was selected through simple random sampling, while five library directors were chosen purposively. Data collection involved questionnaires, interviews, and observations; and the data were analysed using SPSS, (version 20). The findings indicate that most librarians demonstrate moderate competence in online searching, library management systems, and word processing; but struggle with video conferencing. Formal training, including structured programmes, workshops, and seminars, are the primary method of skill acquisition; with self-learning playing a supplementary role. Gender does not significantly influence digital skills acquisition, as shown by a correlation coefficient of r=0.007, and a significance level of p=0.923. To bridge the gaps, the study recommends targeted training on video conferencing tools, and expanding structured training through collaboration with professional bodies like the COTUL. Moreover, ensuring equal access to digital literacy programmes and overcoming structural and financial challenges are crucial for sustained digital literacy development in university libraries.

Keywords: *digital literacy, librarians, skills acquisition and university libraries*

1. Introduction

Librarians have traditionally played a crucial role in facilitating access to knowledge by guiding users in locating books, journals, and other information resources. However, the rapid advancement of digital technologies has significantly transformed their responsibilities, requiring proficiency in digital literacy. This competency encompasses the ability to operate digital devices, navigate online databases, and critically evaluate digital content. In Tanzania, university librarians must increasingly manage complex digital systems to support a diverse academic community; including students, lecturers, and researchers. Despite this growing demand, evidence suggests that many

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librarians lack the requisite digital literacy skills to perform these functions effectively (Fidelis, 2018; Mkolo, 2019; Safahieh & Asemi, 2010).

The necessity for digital literacy among librarians became even more pronounced during the COVID-19 pandemic, which compelled a shift towards digital platforms as primary channels for accessing academic materials. Librarians were tasked with ensuring uninterrupted access to essential resources, yet studies indicate that their digital proficiency remains inadequate. Research by Fidelis (2018) and Mkolo (2019) highlighted significant deficiencies in the ability of Tanzanian librarians to manage electronic resources, primarily due to insufficient training and inadequate ICT infrastructure. These challenges hinder their capacity to meet the evolving information needs of the academic community, and underscore the need for targeted interventions to enhance digital literacy.

In response to these challenges, several initiatives have been introduced to enhance digital literacy skills among librarians. Institutions such as the University of Dar es Salaam (UDSM) and Sokoine University of Agriculture (SUA) have implemented training programmes aimed at improving these competencies. Additionally, professional bodies like the Tanzania Library Association (TLA), the Consortium of Tanzania University and Research Libraries (COTUL), and the Information Training and Outreach Centre for Africa (ITOCA): these have organized workshops, seminars, and webinars to support skills development. However, progress has been slow and concerns persist regarding the effectiveness of these efforts. Mungwabi (2019) found that while some librarians have benefited from these initiatives, many continue to struggle with the practical application of digital literacy in their daily work. Furthermore, there is a growing interest in understanding whether gender influences the methods librarians use to acquire digital literacy skills. Some studies suggest that male and female librarians may adopt different learning strategies when engaging with digital technologies (Mungwabi, 2019). However, research on this aspect within the Tanzanian context remains limited, leaving a gap in understanding the extent of these gender-based differences in digital literacy acquisition.

A review of existing literature reveals varying levels of digital literacy among university librarians, particularly in developing countries such as Tanzania. Although some progress has been made in enhancing digital competencies, significant gaps remain, with many librarians still struggling to acquire and fully utilize digital tools (Mushi et al., 2024). These gaps are primarily attributed to challenges related to access, training, and infrastructure. Studies conducted in Nigeria, for instance, show that many academic librarians possess low digital literacy levels despite acknowledging its critical importance for modern library services (Christy & Yusuf, 2021; Ogochukwu, 2015; Eke, 2011). Similarly, in Tanzania, while libraries have made strides in adopting digital systems to improve access to scholarly content, librarians continue to face challenges in mastering these tools (Isibika et al., 2021).

The ability to effectively use key digital tools is essential for modern librarianship (Van Laar et al., 2017). Librarians must be proficient in online search strategies, library management systems, video conferencing, and word processing to support research activities, and assist users in utilizing digital technologies. A study by Isibika et al. (2021) emphasizes the need for comprehensive training programmes to improve online search skills as many Tanzanian librarians still struggle with this aspect. Similarly, video conferencing technologies have become indispensable for virtual collaboration, academic support, and information sharing. While Smith and Jones (2017) and Ferdinand (2011) highlighted the increasing demand for university librarians to develop proficiency in these tools, limited access to training, poor internet connectivity, and insufficient technological resources are key barriers to their effective use in Tanzania.

Despite the recognized importance of digital literacy, existing literature highlights a significant gap in assessing the digital skills levels of librarians, and the effectiveness of methods used to enhance these skills. While programmes such as those offered by the COTUL have contributed to improving librarians' information literacy (Mungwabi, 2019), there is a lack of empirical research to evaluate their impacts. This absence of assessment makes it challenging to determine whether these training initiatives have truly equipped librarians with the competencies necessary to manage digital resources, operate library management systems, and integrate social media into their professional roles.

Additionally, gender disparities in the access to training opportunities, mentorship programmes, and digital resources could affect women's ability to develop and apply digital skills (Hargittai & Shafer, 2006). Research suggests that men often report higher confidence levels in their digital skills, even when proficiency levels are similar, indicating that gendered perceptions of technology competency may influence engagement with digital learning opportunities. While a study by Mansour (2017) found a significant relationship between certain demographic characteristics (such as age and education) and digital information literacy, gender did not appear to affect the acquisition of these digital skills. Similarly, research finding by Oyeniyi (2013) did not show whether gender differences existed between male and female information professionals on the basis of the acquisition of digital skills.

In view of the foregoing studies, this study sought to examine the current levels of digital literacy skills among university librarians in Tanzania. It also aimed to assess the effectiveness of various skills acquisition methods, and explore the potential influence of gender on these learning strategies. By gaining insight into these issues, the study provides recommendations for targeted interventions to enhance digital literacy development among librarians in Tanzania.

The article is structured as follows. Section 1 presents the introduction and a review of the relevant literature, while section 2 outlines the methodology

adopted by the study. Section 3 discusses the findings and their implications, followed by section 4, which concludes the study and offers recommendations for future research and policy development.

1.1 Theoretical Framework

The theoretical framework for this study is grounded in the Canadian Digital Competency Framework (CDCF), and the Dreyfus Model of Skill Acquisition (DMSA). The CDCF, developed by the Human Resources and Skills Development Canada, provides a structured approach to defining and enhancing digital competencies by categorizing them into technical skills, information processing fluency, foundational knowledge, and transversal skills. It underscores the necessity of both technical and non-technical skills to navigate the evolving digital landscape effectively. However, while comprehensive, the CDCF has been criticized for its limited focus on cognitive and metacognitive aspects of digital skill acquisition. Complementing this, the DMSA explains skill acquisition as a five-stage process, progressing from novice to expert, where individuals develop competencies through accumulated experience and mastery. This model highlights the role of experiential learning in skill development, particularly in professional growth and leadership readiness. Despite its strengths, the DMSA is primarily structured around formal learning processes, potentially overlooking individual variations in skill acquisition. Together, these theories provide a robust foundation for evaluating digital literacy skills among librarians in selected universities in Tanzania.

1.2 Conceptual Framework

The conceptual framework employed in this study integrates elements from the CDSM, the DMSA, and findings from the literature review. By combining these models, the framework presents a comprehensive approach to understanding digital literacy skills acquisition, recognizing that it is influenced by multiple factors. These factors are categorized into independent variables, intervening variables, and dependent variables, all of which collectively shape the process and outcome of skill development.

Independent variables in the framework represent the methods through which librarians acquire digital literacy skills, classified as informal and formal training. Informal training involves self-directed learning, where librarians independently explore and experiment with digital technologies. This method includes trial and error, peer interactions, and the use of online resources; which allow flexible and self-paced learning. In contrast, formal training involves structured learning experiences such as workshops, seminars, webinars, and professional courses offered by academic institutions or library associations. Formal training ensures that librarians acquire specific and targeted knowledge in a systematic manner, often leading to more comprehensive skill

development. While both informal and formal training contribute to digital literacy, formal training is generally associated with more structured and measurable outcomes. Although gender was an independent variable, it was used for comparison as an attribute variable rather than a predictor, as it is categorical (see Figure 1).

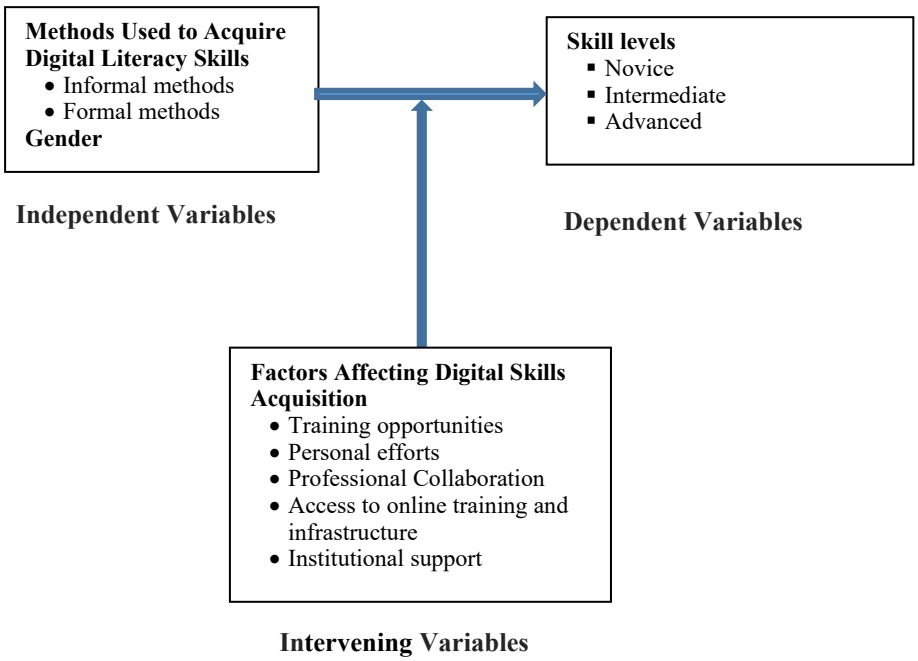

Figure 1: Conceptual Framework for Digital Literacy Skills Acquisition Strategies among Librarians

Source: Adapted from the Canadian Digital Competency Framework (CDCF) and the Dreyfus Model of Skill Acquisition (DMSA)

Intervening variables are factors that influence the effectiveness of digital literacy acquisition methods. These include institutional support, technological infrastructure, personal factors, and training delivery methods. Institutional support encompasses resources and organizational commitment, such as funding, allocated training time, and emphasis by management on professional development. Without strong institutional backing, digital literacy programmes may struggle to achieve their intended impact. Technological infrastructure—including access to up-to-date hardware, software, and reliable internet—is equally critical in facilitating effective learning. Personal factors—such as motivation, attitudes, and prior experience with technology—also shape how librarians engage with digital training opportunities. Additionally, training delivery methods—whether face-to-face, online, or hybrid—can affect the extent to which librarians

absorb and retain digital literacy skills. These intervening variables act as moderating factors that either facilitate or impede the acquisition process.

The dependent variables in the framework represent the outcomes of digital literacy training, specifically the digital literacy skills that librarians acquire. These include the ability to use digital tools to manage digital resources effectively. Another key outcome is the level of digital literacy skills acquisition, which varies based on training methods and the influence of intervening factors. Formal training is expected to yield higher levels of digital literacy, whereas informal training may lead to a more fragmented skillset.

The relationship between the independent and dependent variables is direct, with the methods of acquiring digital literacy skills determining the extent to which librarians develop these competencies. However, this relationship is moderated by intervening variables, which either enhance or limit training effectiveness. For instance, strong institutional support and a well-developed technological infrastructure create an enabling environment that enhances digital literacy acquisition. Conversely, the lack of motivation or inadequate resources may hinder skill development. This interplay of factors underscores the complexity of digital literacy skills acquisition, and the necessity of a holistic approach in designing effective training interventions for librarians in universities in Tanzania.

2. Methodology

This study employed a descriptive research design to examine the current landscape of digital literacy skills acquisition among librarians in selected university libraries across Tanzania. The universities included in this study are the University of Dar es Salaam (UDSM), Muhimbili University of Health and Allied Sciences (MUHAS), Ardhi University (ARU), Sokoine University of Agriculture (SUA), and Tumaini University, Makumira (TUMA). These universities were purposefully selected to ensure diverse representation of institutions offering different academic specializations, thus providing a broader perspective on the status of digital literacy skills among librarians in various fields. The selected universities also represent a mix of public and private institutions that offer a range of digital resources, and library environments that impact librarians' digital competencies.

A mixed-methods research approach was employed to provide a comprehensive understanding of the subject. This approach combined both quantitative and qualitative data collection techniques, allowing for a balanced examination of numerical trends alongside in-depth insights. The population for this study consisted of academic and administrative librarians, along with library directors and departmental heads, who were central to library management and digital literacy initiatives in their respective institutions. Simple random sampling was used to select the academic and administrative librarians, ensuring that every

librarian had an equal opportunity to participate, thus minimizing sampling bias. This sampling technique enabled the study to gather data from a representative group of librarians across the five universities. Additionally, purposive sampling was employed to select key informants, such as library directors and departmental heads, who held significant roles in decision-making and policy implementation related to digital literacy within the libraries.

Two primary data collection methods were used: questionnaires, and semi-structured interviews. A total of 230 questionnaires were distributed among librarians across the selected universities, yielding a high response rate of 94%. The questionnaire was designed to collect quantitative data on the librarians' digital literacy levels, the methods they use to acquire digital skills, and the challenges they face in their professional development. The main advantage of using questionnaires is that they allow for the collection of large amounts of data in a relatively short time, ensuring broad representation of the target population. However, a potential drawback of this method is that it relies on self-reported data, which may be subject to biases or inaccuracies.

In-depth, semi-structured interviews were conducted with 15 key informants, including library directors and departmental heads. These interviews aimed to provide richer and more detailed insights into the strategies employed to foster digital literacy skills, as well as the challenges encountered at the institutional level. The semi-structured nature of the interviews allowed for flexibility in exploring emergent themes that were not captured by the questionnaire. One advantage of this method is that it enables the interviewer to probe for deeper understanding and clarification. However, it is time-consuming and may introduce interviewer bias in interpreting responses.

The data obtained from both the questionnaires and interviews was analysed separately, and then triangulated to provide a comprehensive understanding of the digital literacy landscape. The responses from the questionnaires were analysed using statistical techniques such as descriptive statistics and frequency distributions to identify trends, patterns, and correlations in the data. This provided a numerical overview of the digital literacy skills among librarians, as well as the methods they use to acquire the skills. The interview responses were transcribed and coded using thematic analysis. This approach helped to identify key themes and insights related to the challenges and strategies for improving digital literacy among librarians. The findings from the qualitative analysis were used to complement the quantitative results, providing a more nuanced interpretation of the data. The interviews allowed for a more detailed understanding of the subject matter, and provided context for the quantitative data. Despite the robust data collection methods, this study had several limitations. Firstly, the focus on five universities could have limited the generalizability of the findings to other institutions in Tanzania. Secondly, the reliance on self-reported data in the questionnaires might have introduced biases, as respondents could overstate their digital literacy skills or

underreport challenges. Additionally, the small sample size of interview participants (15 key informants) might not have fully captured the perspectives of all relevant stakeholders. Finally, the study's cross-sectional design could have limited the possibility to establish causal relationships between digital literacy and institutional factors.

3. Results and Discussion

The results are presented according to the key variables of the study; and are based on the data collected from the five university libraries in Tanzania, as mentioned in the introduction. The presentation begins with the results from the questionnaires, followed by those from the interviews.

3.1 Respondents Characteristics

The respondents' characteristics were described by two important indicators: gender, and age. The idea was to establish respondents' representation in the study, based on gender and age distribution from each participating institution. Gender distribution among staff members not only reflects societal trends, but also impacts the dynamics of learning environments and institutional policies. Table 1 provides an insightful overview of gender distribution across the various academic institutions.

Table 1: Respondents' Gender Distribution by Institution

SN	Gender		Institution					Total
			UDSM	MUHAS	SUA	ARU	TUMA	
1	Male	F	69	19	27	9	4	128
		%	59.5%	67.9%	64.3%	40.9 %	44.4%	55.4%
2	Female	F	47	9	15	13	5	89
		%	40.5%	32.1%	35.7%	59.1%	55.5%	44.6%
Total		**F**	**116**	**28**	**42**	**22**	**9**	**217**
		%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Field Data, (2024)

The findings in Table 1 indicate that males constitute the majority at 55.4% (128 respondents); while females make up 44.6% (89 respondents). A closer examination reveals varying gender compositions across different institutions. At institutions such as the ARU and TUMA, female representation is notably higher, comprising 59.1% and 55.5%, respectively; whereas at the UDSM, MUHAS and SUA, male representation is more dominant at 59.5%, 67.9% and 64.3%, respectively. Despite the differences, there was a fair representation of gender in the study.

Understanding the age composition of the librarians was also crucial for assessing workforce dynamics, identifying potential areas for professional development, and devising strategies to ensure a sustainable and well-equipped workforce. The findings presented in Table 2 shed light on the distribution of the respondents' age-groups.

Table 2: Respondents' Age Groups by Institution

SN	Category		Institution				Total	
			UDSM	*MUHAS*	*SUA*	*ARU*	*TUMA*	
1	20 and below	F	0	0	1	0	0	1
		%	0.0%	0.0%	2.4%	0.0%	0.0%	0.48%
2	21–30	F	21	3	7	4	2	37
		%	18.1%	10.7%	16.7%	18.2%	22.2%	17.2%
3	31–40	F	57	11	18	11	7	104
		%	49.1%	39.3%	42.9%	50%	77.8%	51.8%
4	41–50	F	24	8	9	5	0	46
		%	20.7%	28.6%	21.4%	22.7%	0.0%	18.7%
5	51 and above	F	14	6	7	2	0	29
		%	12.1%	21.4%	16.7%	9.1%	0.0%	11.9%
Total		**F**	**116**	**28**	**42**	**22**	**9**	**217**
		%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Field Data, 2024

Table 2 reveals that the majority of respondents (51.8%) fall within the 31–40 age group, indicating a well-established and experienced workforce. Younger age groups (21–30) make up 17.2% of the respondents, with minimal representation from those aged 20 and below, which is normal as most are still in their school age. Variations across institutions show that the TUMA has a higher proportion of younger librarians (22.2% in the 21–30), compared to its counterparts.

3.2 Methods Used by Librarians to Acquire Digital Literacy Skills

The methods used by the university librarians to acquire digital literacy skills can be categorized into formal and informal. Formal methods primarily include structured training programmes and participation in workshops and seminars. In this study, Table 3 presents data on the ways of acquisition of digital skills by librarians in university libraries.

Table 3: Methods Used by Librarians to Acquire Digital Literacy Skills

SN	Category	Institution					Total
		UDSM	*MUHAS*	*SUA*	*ARU*	*TUMA*	
	Formal Methods						
1	Through Training	72	19	30	16	8	145
	%	62.1%	67.9%	71.4%	72.7	88.9%	72.6%
2	Workshops/Seminars	26	4	5	3	0	38
	%	22.4%	14.3%	11.9%	13.6%	0%	12.4%
	Informal Method						
3	Personal Efforts	18	5	7	3	1	34
	%	15.5%	17.8%	16.5%	13.6%	13.6%	15.4%
	Total	**116**	**28**	**42**	**22**	**9**	**217**
	%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Field Data, 2024

Table 3 shows that 72.6% of the respondents acquired digital literacy skills through formal training; indicating a strong reliance on structured learning. Workshops and seminars accounted for 12.4%, and were mainly facilitated by professional organizations such as the COTUL. This aligns with the following interviewee's response:

> *"The primary method for gaining digital skills has been through training, including workshops and seminars organized by institutions and groups like the COTUL."* ***(Interviewee from UDSM).***

While formal training was predominant, informal methods—including personal efforts such as online tutorials and self-study—were cited by 15.4% of the respondents. This underscores the significance of individual initiatives in skill development. The distinction between formal and informal methods highlights the multifaceted nature of digital literacy acquisition. Formal training provides structured learning; whereas informal learning ensures continuous self-paced development. Understanding these methods is crucial for designing effective training programmes tailored to librarians' needs in an increasingly digital environment.

These findings align with those of Khan (2020), who identified training programmes, seminars, and social media as the key avenues for skills acquisition among librarians in Pakistan. Similarly, Safahieh and Asemi (2010) found that structured training at the Ispahan University was crucial for skills development. The reliance on institutional training in university libraries in Tanzania reflects a broader trend in enhancing digital competencies. Additionally, the emphasis on self-directed learning mirrors findings by Eke (2011), who noted that librarians in developed countries enhance skills through workshops, conferences, and self-study. The data suggests a blended approach to digital skills acquisition among librarians in Tanzania, combining institutional support with individual initiatives.

Likewise, Ferdinand (2011) also emphasized on-the-job training and mentorship as effective strategies for skills development. However, Ogochukwu (2015) identified disparities in access to training in Nigeria, where digital literacy levels among librarians remained low. This highlights challenges in developing countries, including Tanzania, where resource limitation may hinder advanced training opportunities. While librarians in Tanzania rely heavily on institutional training, they also take personal initiative to get advanced resources due to limited access to such training. In contrast, librarians in developed regions benefit from robust support systems, including mentorship and continuous professional development. Despite these differences, formal training, personal effort, and continuous learning remains a globally recognized strategy for enhancing digital literacy skills.

Respondents were also asked to assess the effectiveness of the methods used to acquire digital skills. Respondents from the UDSM reported the

highest effectiveness at 55.2%, while the ARU had the lowest at 36.4%. Moderate effectiveness was reported more evenly, with the SUA showing the highest percentage at 57.1%. Librarians at the MUHAS reported a lower effectiveness rate, indicating potential areas for improvement in training programmes. An interviewee from the MUHAS stated:

> *"Trainings are usually conducted for librarians, but they hardly address their most pressing needs. A thorough analysis of their current skill levels is needed to identify areas for improvement. Librarians possess different levels of skills from novices to experts; therefore, training should be tailored accordingly."* ***(MUHAS Respondent).***

These findings indicate that many training programmes lack a comprehensive needs assessment. Without understanding existing skill levels, training initiatives risk being generic, and so less effective. Respondents also indicated preferences for specific digital skills, with basic computer skills being the most sought after (86 respondents, 32.1%–59.1%). Online information searching was identified by 61 respondents (21.4%–30.9%), while digital content creation was identified by 25 respondents (7.8%–22.2%). The findings align with Van Laar et al. (2017), who identified technical skills, information management, and communication as the core competencies for the 21st-century workforce. They also highlight the necessity of designing training programmes that cater to the varying skill levels of librarians to enhance digital competencies effectively. Therefore, while formal training remains the predominant method for digital literacy acquisition among university librarians in Tanzania, self-directed learning plays a significant complementary role. Training effectiveness varies across institutions, with some requiring improvement in needs assessment and programme design. The study underscores the need for a more structured, yet flexible, approach to digital skills training to ensure librarians are well-equipped for the evolving digital landscape.

3.3 Current Level of Digital Literacy Skills

The current level of digital literacy skills among librarians in the studied university libraries was measured using indicators such as skills in using digital tools, and the ability to effectively locate, evaluate and ethically apply information.

The respondents were asked to indicate their general levels of practical application for specified digital tools, categorizing themselves as either novice, intermediate, or advanced. Table 4 presents the results.

The findings in Table 4 show that a significant portion of respondents possess intermediate skills in online searching. Specifically, 69% of the participants rated themselves as intermediate users of online search tools, with the UDSM (72%) and ARU (81%) leading in this category. Only 13% of the respondents considered themselves novices; with the MUHAS having the highest percentage (18%) of novices.

Table 4: Respondents' Skills in the Practical Application of Some Digital Tools

S/N	Category	Institution					Total
		UDSM	*MUHAS*	*SUA*	*ARU*	*TUMA*	
1	**Online Search**						
	Novice	13	5	9	2	0	29
	%	11%	18	21	9	0	13%
	Intermediate	83	15	22	18	7	145
	%	72%	54%	52	81	77	69%
	Advanced	16	8	11	2	2	39
	%	14%	29	26	9	22	18%
	Total	116	28	42	22	9	217
	%	100%	100%	100%	100%	100%	100%
3	**Library Management Systems**						
	Novice	16	4	6	4	3	33
	%	14%	14%	14%	18%	33%	15%
	Intermediate	76	14	30	13	6	139
	%	66%	50%	71%	59%	67%	64%
	Advanced	24	10	6	5	3	48
	%	21%	36%	14%	23%	33%	22%
	Total	116	28	42	22	9	217
	%	100%	100%	100%	100%	100%	100%
4	**Video Conferencing**						
	Novice	112	24	35	20	7	198
	%	97%	86%	83%	91%	77%	91%
	Intermediate	4	3	6	2	2	17
	%	3%	11%	14%	9%	22%	8%
	Advanced	0	1	1	0	0	2
	%	0%	4%	2%	0%	0%	1%
	Total	116	28	42	22	9	217
	%	100%	100%	100%	100%	100%	100%
5	**Word Processing**						
	Novice	6	3	4	3	1	17
	%	5	11	10	14	11	9%
	Intermediate	80	16	30	12	5	153
	%	69%	57%	71%	54%	56%	71%
	Advance	30	9	8	7	3	57
	%	26%	32%	19%	31%	33%	26%
	Total	116	28	42	22	9	217
	%	100%	100%	100%	100%	100%	100%

Source: Field Data (2024)

Advanced users made up 18% of the total respondents, with the MUHAS again showing the highest proportion (29%). These results suggest that most respondents have a moderate level of competence in online search skills, with a notable minority demonstrating more advanced capabilities.

In terms of proficiency with library management systems, 64% of the respondents rated themselves as intermediate users. The SUA had the largest proportion of intermediates at 71%, followed by the TUMA with 67%. A smaller group, 15%, was identified as novices, with the TUMA showing the highest percentage of novices at 33%. Meanwhile, 22% of the respondents considered themselves advanced users, with the MUHAS leading in this category at 36%. These findings indicate that most respondents were comfortable with using library management systems at an intermediate level, with fewer reporting novice or advanced skills.

Video conferencing proved to be an area of significant weakness among the respondents, with 91% identifying themselves as novices. The UDSM had the highest proportion of novices at 97%, highlighting a widespread lack of confidence or familiarity with this tool. Only 8% of the respondents rated themselves as intermediate users, with the ARU showing the highest intermediate level at 9%. Advanced users were virtually non-existent, with just 1% across all institutions; with only the MUHAS showing any advanced proficiency at 4%. These results suggest a critical gap in the respondents' skills in video conferencing, indicating a need for further training in this area.

Word processing skills were more balanced, with 71% of the respondents identifying themselves as intermediate users. The SUA and UDSM had the highest levels of intermediate users, both reaching around 70%. A small percentage, 9%, considered themselves novices; with the ARU (14%) and MUHAS (11%) having the most novices. On the other hand, 26% of the respondents rated themselves as advanced, with the TUMA (33%) and MUHAS (32%) leading in this category. These results reflect a relatively high level of competency in word processing skills among the respondents, with a healthy balance between intermediate and advanced users.

The results from key informants during interviews also show a variation in proficiency levels of digital literacy among university librarians. One of the respondents who cited proficiency in integrated library system, which emerged as one of the most utilized software, gave the following comment:

> *"Proficiency in an integrated library system is indispensable due to its role as a comprehensive software platform overseeing key library operations; including cataloguing, circulation, acquisitions, and patron management. Consequently, every library department relies on it, making proficiency in integrated library system an essential skill across all facets of library management."* ***(TUMA Respondent).***

This admission suggests that proficiency in an integrated library system (ILS) is essential because it is a comprehensive software that handles a range of core library tasks like cataloguing, circulation, acquisitions, and managing patrons. Essentially, ILS is widely used across library sections for these critical functions; hence, some librarians become adept after using it for sometime. This emphasizes the importance of being skilled in using and managing ILS for anyone working in a library setting.

As regards internet skills, one of the respondents at the ARU had this to say:

> *"I use Internet every day to search for information. Only that I am not conversant with techniques for retrieving exact information that I need or broadening and narrowing down search to either increase or decrease volumes of hits retrieved after I have conducted search on Google scholar, which is my favourite, when it comes to scholarly information."* ***(Respondent, ARU).***

The statement suggests that individuals depend on the Internet as a regular tool for gathering information. However, the respondents admit to lacking expertise in effectively refining their search techniques to precisely locate the information they need, or manage the volume of results they receive. Despite this, they expressed preference for using Google Scholar specifically for accessing scholarly information, indicating recognition of its value in this context. Generally, these findings underscore the importance of targeted interventions to bolster digital competencies uniformly across university libraries in Tanzania, ensuring they remain effective in the digital age. The findings indicate variability in digital competencies across institutions. This variability suggests that not all institutions prioritize or offer equal access to digital literacy training or resources.

Librarians at the UDSM demonstrate strong online search skills, likely due to consistent basic digital literacy training within the institution. This finding aligns with the improvement noted from previous studies by Fidelis (2018) and Mushi et al. (2024), which reported moderate internet proficiency among UDSM librarians. The increase in proficiency suggests that on-the-job training, internal sessions organized by the UDSM library, and participation in seminars and workshops have all had positive impacts. Similarly, MUHAS shows higher competence in managing electronic resources, reflecting the institution's focus on health sciences, which requires intensive use of electronic databases. This finding concurs with Mkolo's (2019) research, which indicated that MUHAS librarians excel in managing e-resources. Proficiency in library management systems is notable at both UDSM and SUA, reflecting strong foundational training in core library technologies. This observation is consistent with Mushi et al.'s (2024) findings, which revealed that a moderate percentage of respondents were competent in using library management systems.

The variability in digital literacy skills can be attributed to several factors, including differences in institutional priorities, access to online resources, funding, and the availability of training opportunities. The UDSM's strong position in internet skills suggests possible emphasis on digital literacy training. In contrast, MUHAS's specialization in electronic resources management likely stems from its orientation towards health sciences, which demands more intensive use of such resources.

Furthermore, the findings underscore the importance of targeted capacity-building initiatives. While the discussion recommends these initiatives, more detail on specific strategies would be beneficial. For example, specialized training

programmes focusing on digital asset management, open access repositories, and advanced software usage are necessary. Mentorship programmes, collaboration with experienced professionals, and the development of instructional materials could effectively address the identified gaps. Collaborative efforts between institutions, such as joint training programmes conducted by the COTUL, could also strengthen digital literacy across the board. Policymakers and library administrators can use these findings to allocate resources effectively, prioritizing digital literacy training. Looking ahead, emerging technologies—such as artificial intelligence, digital preservation, and data management tools—will likely require librarians to develop new skills. Addressing these needs proactively will ensure that librarians can adapt to future technological advancements.

3.4 Relationship between Gender and Methods of Digital Skills Acquisition

A correlation analysis was conducted on a sample of 217 respondents to assess the relationship between gender and the method of acquiring digital skills. The results revealed a correlation coefficient of r=0.007; indicating an exceedingly weak positive correlation. This suggests that there is virtually no relationship between gender and the acquisition of digital skills among the participants. Moreover, the significance level was reported as p=0.923, which far exceeds conventional thresholds for significance (such as 0.05 or 0.01). This high p-value indicates that the observed correlation is not statistically significant; implying that the likelihood of any apparent association due to chance is very high. In summary, the findings demonstrate that there is no significant association between gender and the acquisition of digital skills within this sample. The near-zero correlation, coupled with the high p-value, support the conclusion that gender does not meaningfully influence the acquisition of digital skills among the respondents. This finding is in line with Mansour's (2017) study, which revealed a notable correlation between certain demographic factors of the respondents, specifically age and educational background, and their digital information literacy (DIL).

Moreover, gender did not appear to influence the acquisition of digital skills. The statistical significance of this relationship in this study was found to be well above the accepted threshold, suggesting that any observed association was likely to have occurred by random variation rather than reflecting a true underlying pattern. A study by Oyeniyi (2013) also did not indicate any gender-based differences between male and female information professionals regarding the acquisition of information retrieval skills. Furthermore, there was no statistically significant variation in the respondents' usage of electronic resources. Thus, gender appears to have little to no influence on the process of acquiring digital skills among the respondents. The lack of a significant relationship between gender and the acquisition of digital skills could stem from factors such as equal access to training and resources for both men and women. As digital literacy becomes more essential in professional settings, organizations

may offer similar opportunities for skills development to all employees, regardless of gender. This equal access can minimize any potential disparities in how individuals acquire digital skills.

4. Conclusion and Recommendations

The study findings demonstrate the predominance of formal training as the primary method for acquiring digital literacy skills among librarians in Tanzania's university libraries. While structured training programmes, workshops, and seminars play a crucial role in skill development, a notable segment of librarians also rely on personal initiative to enhance their digital competencies. Furthermore, the findings reveal varying levels of digital proficiency among respondents, with most demonstrating moderate competence in online searching, library management systems, and word processing. Significant weaknesses were observed in video conferencing, where a majority of the respondents lacked confidence in its practical application. Lastly, the analysis reveals no significant relationship between gender and the acquisition of digital skills among the respondents, as demonstrated by the extremely weak positive correlation and the high p-value.

Given the predominance of formal training as the primary method of digital literacy acquisition, expanding access to structured training programmes through collaboration with professional bodies like the COTUL will enhance the quality and reach of these initiatives. Regarding the observed weaknesses in video conferencing skills, universities and library managements should integrate targeted training sessions into their digital literacy programmes, with a focus on hands-on experience using video conferencing tools. In light of the lack of a significant relationship between gender and the acquisition of digital skills, ensuring equal access to digital literacy programmes for all librarians will foster an inclusive learning environment and eliminate potential barriers. Additionally, to overcome structural and financial challenges for sustained digital literacy development in university libraries, institutions should prioritize investment in digital infrastructure, secure sustainable funding through strategic partnerships, and explore cost-effective online training solutions.

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