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Navigating the Digital Shift: Assessing Skills, Training, and Resources for Virtual Reference Librarians

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ABSTRACT

This study aims to identify essential skills and competencies required for VRLs, examine available training and professional development opportunities, and assess the impact of online resources and digital databases on virtual reference services. Employing a qualitative research design through library research, the study reviews relevant literature to map the skillset needed for VRLs in the digital era. The findings revealed a comprehensive range of required competencies, including technological proficiency, effective information retrieval, strong communication abilities, and a customer-service orientation. Furthermore, the study highlighted the importance of ongoing professional development through structured training programs, workshops, and self-directed learning using digital platforms. The use of online databases and digital resources was shown to enhance the effectiveness and responsiveness of virtual reference services. The research concludes that for VRLs to thrive in the digital age, they must cultivate a diverse skill set, engage in continuous professional development, and leverage available digital tools to deliver high-quality library services. These findings offer valuable insights for library institutions in designing training models and support systems that empower VRLs to meet evolving user expectations in virtual environments.

Keywords: Virtual Reference Librarians; Professional Development; Digital Resources; Library Service; Technological Adeptness

1. INTRODUCTION

The digital metamorphosis that characterizes the 21st century has triggered a paradigmatic shift in library services, highlighting the importance of enhancing the skills and competencies of Virtual Reference Librarians (VRLs) (Eneh et al., 2024; Tella et al., 2023). In this digital era, the role of VRLs has grown in importance, embodying a different paradigm in which their competencies relate to improving the quality and efficiency of virtual reference services

(Hernández, 2024). Despite this critical role, a comprehensive exploration of the essential skills, training, and resources required for VRLs to excel remains difficult. This gap underscores the core research issue addressed in this investigation: careful description and integration of critical skills, effective training pathways, and robust digital resources to improve VRLs proficiency significantly and, in turn, the quality of virtual reference services.

The digital era has redefined the contours of library services, putting VRLs at the forefront of this transformation (Oladokun, 2023). Existing literature extensively details the competencies essential for VRLs to navigate this digital shift skillfully. A significant contribution in this domain comes from Chawner and Oliver (2013), who explored the technological proficiency required for virtual library efficacy. Their work illustrates the technical competencies spanning various software and digital platforms that VRL must master to provide exemplary service. Haddow (2012), on the other hand, ventures into the field of information retrieval proficiency, underscoring the essence of proficiency in navigating digital information repositories. Further expanding the discourse, Khan et al. (2017) and Leong (2008) summarize a broader spectrum of indispensable skills, including communication acumen, customer service expertise, and problem-solving aptitude. These scholarly efforts collectively provide a thorough understanding of practical virtual librarianship's diverse competencies, laying a solid foundation for the inquiry in this study.

At the same time, the existing literature is also replete with insights into VRLs' professional development, which is critical to ensuring continued skill enhancement as the digital landscape evolves. Significant contributions to this research include Barrett and Greenberg (2018), Luo (2009), Shahzad et al. (2023), and Dali et al. (2021), whose work reveals a spectrum of training paradigms ranging from formal education programs to on-the-job training and mentoring initiatives. Their findings emphasize the essence of continuous learning and adapting VRLs to keep pace with digital advances. On a related note, the literature also underscores the vital role of online resources and digital databases in improving virtual reference services. Articles written by Frederick (2023) and Gilbert et al. (2006), who explain the impact of digital resources, discuss improving the quality of service and reach of virtual reference services. These two articles underscore the importance of digital databases and online resources as indispensable tools for supporting virtual reference services. Through scientific discussions, this research seeks to discuss librarian skills, professional development for librarians, and digital resources to provide a different understanding of how librarians can navigate the digital shift well, thus significantly improving the quality of virtual reference services. While there is a wealth of research on VRLs competencies and training, there remains a gap regarding a holistic examination of how these competencies, combined with practical digital training and resources, can foster an optimal virtual reference service environment. This research seeks to bridge scientific gaps by analyzing skills, training, and resources. Analyzing and finding answers will strengthen librarians' capacity to provide virtual reference services.

This research was to identify and articulate essential skills for virtual reference librarians, evaluate training and professional development strategies, and how digital resources can be optimally utilized to improve virtual reference services. Against this background, this research has three main objectives: (1) to understand the skills and competencies essential for VRLs, (2) to explore existing training and professional development in improving VRLs skills, and (3) to understand the potential of online resources and digital databases in the field of VRLs in improving virtual reference services. This study would contribute to providing comprehensive insights that can serve as a guide to strengthening the effectiveness and quality of virtual

reference services in the digital era, thereby significantly contributing to the body of knowledge in this field.

2. METHODS

This research utilized extant literature to investigate Virtual Reference Librarian (VRLs) competencies, training, professional development, and the role of online information sources and digital databases in improving virtual reference services. The articles used for this research were articles by Chawner and Oliver (2013), Haddow (2012), Khan et al. (2017), and Leong (2008) to explore and formulate the skills and competencies of VRL librarians. This research also explores the overall training methodology and professional development strategies available for VRL using articles by Barrett and Greenberg (2018), Luo (2009), Shahzad et al. (2023), and Dali et al. (2021). Meanwhile, the impact of online resources and digital databases on virtual reference services was also evaluated based on the findings of Frederick (2023) and Gilbert et al. (2006). These articles were selected for several reasons, including that all the articles were published in the Scopus, WoS, or Scopus and WoS indexed journals, had moderate to high impact factors (SJR from 0.19 to 3.9), and had high relevance to the current study. In addition, various training and professional development strategies described in the literature were evaluated, along with an assessment of the impact of online resources and digital databases on the quality and reach of virtual reference services. However, the limited number of articles selected may pose unwarranted conclusions applicable to the future study of virtual reference librarians.

The data were analyzed thematically to generate patterns or themes extracted from the articles, using six steps, including familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report (Braun & Clarke, 2006, 2019). The culmination of this investigation involved a discussion explaining the implications of the findings for VRL professional development and the improvement of virtual reference services, aiming to provide a robust framework for understanding and improving VRL competencies, thereby providing a significant contribution to scientific discourse and practical initiatives aimed at improving the quality and reach of library services in the digital era.

In addition, various training and professional development strategies described in the literature were evaluated, along with an assessment of the impact of online resources and digital databases on the quality and reach of virtual reference services. The culmination of this investigation involved a discussion explaining the implications of the findings for VRL professional development and the improvement of virtual reference services, aiming to provide a robust framework for understanding and improving VRL competencies, thereby providing a significant contribution to scientific discourse and practical initiatives aimed at improving the quality and reach of library services in the digital era.

3. RESULTS AND DISCUSSION

Skills for Librarians

Table 1 shows data summarized from four diverse sources, which identifies several skills or competencies deemed crucial in varying contexts, potentially within the realms of information management, librarianship, or information technology. A summary of these skills and the frequency of their mentions across the sources is provided. Under Communication Abilities,

effective verbal and written communication was noted twice (Chawner & Oliver, 2013; Khan & Bhatti, 2017), interpersonal communication once (Khan & Bhatti, 2017), and communication skills once (Leong, 2008).

In the domain of Information Technology Abilities, general information technology skills were cited once, as were web design and maintenance skills (Chawner & Oliver 2013), Information and Communication Technology (ICT) skills, digital library management skills (Khan et al. 2017), web skills, internet communication knowledge, and digital reference skills (Leong 2008). The Teaching and Instruction Abilities section also highlighted teaching and instruction skills twice (Chawner & Oliver 2013; Haddow 2012) and teaching skills once (Leong 2008).

The data further delineates Management Abilities, with project and time management skills mentioned once, alongside mentions of information management skills, project management skills, collection management skills, human resources management skills, financial management skills, and risk and information security management skills each cited once (all by Khan et al. 2017), and project management skills also noted once by Leong (2008). Under Analysis and Evaluation Abilities, both information analysis and evaluation skills, as well as information analysis and synthesis skills, were mentioned once (Chawner & Oliver 2013; Khan et al. 2017). Adaptation and Flexibility Abilities, Customer Service Abilities, and Other Abilities, including good listening skills, online and offline information searching skills, teamwork, problem-solving, and decision-making skills, were also identified, with mentions distributed across the sources. This analysis showcases that communication abilities, information technology abilities, and teaching and instruction abilities are among the frequently occurring skills across the different sources, and these, along with other identified skills, may be highly relevant in both academic and professional contexts.

Table 1. Competencies necessary for VRLs

Topic	Skill Description	Freq.	Sources
Communication Skills	Effective oral and written communication	2	Chawner & Oliver 2013; Khan et al. 2017
	Interpersonal communication	1	Khan et al. 2017
	Communication skills	1	Leong 2008
Information Technology Skills	General information technology skills	1	Chawner & Oliver 2013
	Web design and maintenance capabilities	1	Chawner & Oliver 2013
	Information and communication technology (ICT) skills	1	Khan et al. 2017
	Digital library management skills	1	Khan et al. 2017
	Web skills	1	Leong 2008
	Knowledge about Internet communication	1	Leong 2008
	Digital reference skills	1	Leong 2008
Teaching and Instruction Skills	Teaching and instruction skills	2	Chawner & Oliver 2013; Haddow 2012
	Teaching skills	1	Leong 2008
Management Skills	Project and time management skills	1	Chawner & Oliver 2013
	Information management skills	1	Khan et al. 2017
	Project management skills	1	Khan et al. 2017
	Collection management skills	1	Khan et al. 2017
	Human resource management skills	1	Khan et al. 2017
	Financial management skills	1	Khan et al. 2017
	Risk and information security management skills	1	Khan et al. 2017

Topic	Skill Description	Freq.	Sources
	Project management skills	1	Leong 2008
Analysis and Evaluation Skills	Information analysis and evaluation skills	1	Chawner & Oliver 2013
	Information analysis and synthesis skills	1	Khan et al. 2017
Adaptability and Flexibility	Adaptability and flexibility in facing changes	1	Chawner & Oliver 2013
	Adaptability and flexibility	1	Haddow 2012
	Flexible attitude toward technology	1	Leong, 2008
	Tolerance towards rapid technology changes	1	Leong, 2008
	Skills in preparing for changes	1	Leong, 2008
	Adapting to technological changes	1	Leong, 2008
Customer Service Skills	Good customer service	1	Chawner & Oliver, 2013
	Customer service skills	1	Khan et al., 2017
Others	Good listening skills	2	Chawner & Oliver, 2013; Haddow, 2012
	Skills in searching for information online and offline	1	Chawner & Oliver, 2013
	Teamwork skills	1	Chawner & Oliver, 2013
	Problem-solving and decision-making skills	1	Chawner & Oliver, 2013

Training and Professional Development

Table 2 summarizes the data regarding the significance of technical training in the domain of virtual reference services within libraries. Technical training, as cited by Luo (2009), Shahzad et al. (2023), and Dali et al. (2021), appears three times across the sources, indicating its importance in equipping staff with the necessary skills to operate software and hardware associated with virtual reference services. Such training is pivotal for ensuring that the library staff can proficiently manage and troubleshoot the technological resources employed in delivering these services. Furthermore, training in interpersonal skills is mentioned twice by Luo (2009) and Dali et al. (2021), reflecting the need to foster good relationships with service users and enhance communication, which are vital for improving service quality.

Additionally, the data highlights the need for training in policies and procedures and service evaluation to maintain a consistent quality of service. Training in policies and procedures, mentioned by Barrett and Greenberg (2018) and Luo (2009), is noted twice across the sources. This training aims to improve the understanding of virtual reference services' guidelines, ensuring uniform service quality. Similarly, service evaluation training, as mentioned by Luo (2009) and Dali et al. (2021), is noted twice, emphasizing the importance of evaluating the quality of virtual reference services. This evaluation helps staff enhance the services by understanding the areas of improvement, ensuring that the users are satisfied with the services provided.

The data further highlights other training and professional development aspects essential for effective virtual reference services. As mentioned by Dali et al. (2021), training in collection development, appearing once, is crucial for increasing knowledge about available information resources and aiding users in finding relevant resources. Time management training, mentioned once by Dali et al. (2021), aids staff in managing their time efficiently, thereby providing high-quality service to users. As mentioned twice by Barrett and Greenberg (2018) and Luo (2009), initial and ongoing training is vital for new and experienced staff to stay updated with the latest developments. Performance evaluation, collaboration, professional development, and recognition and rewards are other aspects mentioned, with professional development being cited three times by Barrett and Greenberg (2018), Luo

(2009), and Shahzad et al. (2023), indicating the importance of continuous learning and development opportunities in enhancing the skills and knowledge of staff involved in virtual reference services.

Table 2. Training for VRLs

Topic	Description	Freq.	Sources
Technical Training	Provide technical skills to operate the software and hardware used in virtual reference services.	3	Luo, 2009; Shahzad and Khan, 2022; Dali et al., 2021
Interpersonal Skills Training	Aid in building good relationships with users and enhancing communication.	2	Luo, 2009; Dali et al., 2021
Policy and Procedure Training	Enhance understanding of policies and procedures for consistency in service delivery.	2	Barrett and Greenberg, 2018; Luo, 2009
Service Evaluation Training	Help staff evaluate and improve the quality of virtual reference services.	2	Luo, 2009; Dali et al., 2021
Collection Development Training	Increasing knowledge about available information resources aids users in finding relevant resources.	1	Dali et al., 2021
Time Management Training	Assist staff in effectively and efficiently managing their time.	1	Dali et al., 2021
Initial and Ongoing Training	Provide initial and ongoing training for both new and experienced staff.	2	Barrett and Greenberg, 2018; Luo, 2009
Performance Evaluation	Conduct regular performance evaluations and provide constructive feedback.	1	Barrett and Greenberg, 2018
Collaboration	Encourage collaboration among staff to share experiences and knowledge.	1	Barrett and Greenberg, 2018
Professional Development	Provide opportunities for professional development, like attending conferences or seminars.	3	Barrett and Greenberg, 2018; Luo, 2009; Shahzad and Khan, 2022
Recognition and Rewards	Provide recognition and rewards to well-performing staff.	1	Barrett and Greenberg, 2018

Contribution of Online Resources and Digital Databases

The analysis from the two distinct sources, Frederick (2023) and Gilbert et al. (2006), presents common topics regarding the contribution of online resources and digital databases in enhancing the accessibility of information, efficiency, and the quality of reference services in libraries. A notable point is the emphasis on "Improving Information Access." Both sources acknowledge that online resources and digital databases facilitate users to access information anytime and anywhere. This topic emerges twice, once from each source, highlighting a shift towards virtual platforms to enhance the ease of access to information. A topic uniquely noted by Frederick (2023) is "Accelerating Response Time." The data suggests that virtual reference services, equipped with online resources, can swiftly provide accurate and timely responses to users. This topic is mentioned once, underscoring the importance of prompt responses in virtual reference services. On the other hand, both sources touch on "Enhancing Service Quality." They assert that these digital resources allow library staff to deliver more accurate and complete answers alongside better recommendations, making this topic appear twice, once from each source.

The latter topics, "Improving Service Efficiency" and "Enhancing Librarian Capabilities," are exclusively mentioned by Gilbert et al. (2006). They note that the ease of searching for information online minimizes the time librarians need to find information, thereby improving service efficiency. This topic is mentioned once. Similarly, the enhancement of librarian capabilities through online resources to broaden their knowledge on specific topics and

expand the scope of services is also highlighted once. Lastly, Frederick (2023) mentions the "Challenges" associated with using online resources, such as high costs, user interface navigation difficulties, and issues concerning the reliability and accuracy of information, marking this topic's single appearance in the data. The two sources articulate the transition toward digital platforms and their impact on library services through these topics.

Table 3. Contribution of online resources and digital databases

Topic	Description	Freq.	Sources
Improving Information Access	Online resources and digital databases allow users to access information anytime, anywhere.	2	Frederick, 2023, Gilbert et al., 2006
Accelerating Response Time	Virtual reference services can provide accurate and timely responses with the help of online resources.	1	Frederick, 2023
Enhancing Service Quality	These resources enable library staff to provide more accurate and complete answers and better recommendations.	2	Frederick, 2023, Gilbert et al., 2006
Improving Service Efficiency	Users can easily search for information, minimizing the time librarians need to find information.	1	Gilbert et al., 2006
Enhancing Librarian Capabilities	Librarians can use these resources to increase their knowledge on specific topics and expand the scope of services.	1	Gilbert et al., 2006
Challenges	Challenges include high costs to access online resources, user interface navigation difficulties, and reliability and accuracy issues of the information provided.	1	Frederick, 2023

The array of skills and competencies identified across the four sources presents a robust framework for assessing the proficiency of Virtual Reference Librarians (VRLs). A paramount consideration emerging from the data is Communication Abilities, which are arguably the bedrock of virtual reference services (Islam et al., 2021). Effective verbal and written communication, highlighted by multiple sources, is indispensable for clear, precise interaction in a virtual milieu (Chawner & Oliver, 2013; Khan et al., 2017). Unlike traditional settings, the virtual environment poses unique challenges, requiring impeccable communication skills to discern user's needs and provide cogent responses accurately. Although cited once, interpersonal communication (Khan et al., 2017) underscores the importance of a human-centric approach, reflecting the ability to engage users empathetically and deeply understand their inquiries. This emphasis on communication aligns with the broader academic narrative that posits effective communication as a critical metric in assessing the competence of virtual reference librarians.

Communication skills among VRLs suggest that effective verbal and written communication is indispensable for clear and precise interaction within the virtual reference realm. Articulated messages are vital in asynchronous virtual settings due to delayed feedback and a lack of nonverbal cues (Ogwu et al., 2020). Studies show explicit communication fosters role clarity, reduces misinterpretations, and enhances user satisfaction (Mangla, 2021). Equally important are interpersonal skills—such as active listening, empathy, and dialogue—which help assess user needs and create inclusive environments for diverse populations (Maesaroh et al., 2024). As VRLs increasingly serve users across cultural and digital literacy spectrums, their emotional intelligence becomes as crucial as their

informational role (Ko & Wei, 2021). Continuous professional development is essential to meet these evolving demands. Scenario-based and simulation training programs have proven effective in refining clarity and interpersonal competence in virtual communication (Oh, 2022; Scoular et al., 2021). These integrated approaches strengthen VRLs' capacity to enhance user experience in digital environments.

On the technological front, the Information Technology Abilities domain is replete with skills pivotal for navigating the digital landscape inherent in virtual reference services. The mention of general IT skills, web design and maintenance skills, and, notably, digital reference skills encapsulate the technical acumen requisite for adequate virtual reference service provision (Chawner & Oliver, 2013; Khan et al., 2017; Leong, 2008). The emphasis on digital library management skills and Information and Communication Technology (ICT) skills reflects the digital-native nature of modern virtual reference librarianship. This technological competency, as highlighted in the data, is essential for the adept handling of digital tools and resources, a vital aspect in assessing the readiness and capability of virtual reference librarians in meeting the demands of digitally savvy users.

Moreover, the data unveils other essential skills contributing to a comprehensive assessment framework for virtual reference librarians. Teaching and Instruction Abilities underscore the pedagogical aspect of virtual reference services, reflecting the librarians' role in guiding and educating users (Chawner & Oliver, 2013; Haddow, 2012). The Management Abilities domain, encompassing project and time management skills, reflects the organizational and administrative competency needed for efficient service delivery (Chawner & Oliver, 2013). The mention of Analysis and Evaluation Abilities accentuates the critical thinking and evaluative acumen crucial for discerning and synthesizing information in a virtual setting (Khan et al., 2017). This holistic suite of skills, including Adaptation and Flexibility Abilities and Customer Service Abilities, presents a multidimensional assessment matrix (Haddow, 2012). This matrix, resonating with the broader academic discourse, underscores the necessity of a multifaceted assessment approach to gauge virtual reference librarians' ability and readiness to serve users' diverse needs in a digital age effectively.

Advanced Information Technology (IT) competencies are essential for VRLs as digital platforms increasingly define modern library services. Proficiency in cloud-based tools and integrated library systems enhances efficiency in managing and disseminating information within digital ecosystems (Asimah & Osman, 2021). The integration of cloud computing improves system resiliency and user engagement by minimizing delays and optimizing access (Xie, 2022). However, digital literacy extends beyond tool use, it includes the critical evaluation of digital content, understanding licensing frameworks, and ensuring data privacy. These competencies are vital for secure, informed service delivery (Bolasco, 2023).

The data at hand significantly delineates the pivotal nature of technical training within the domain of virtual reference services in libraries, highlighting a central argument for fostering a technically adept staff. The recurrent citations by Luo (2009), Shahzad et al. (2023), and Dali et al. (2021) corroborate the instrumental role of technical training in empowering library staff with the requisite skills to navigate and troubleshoot the software and hardware exigencies intrinsic to virtual reference services. Concurrently, as cited by Luo (2009) and Dali et al. (2021), the data brings to light the indispensable facet of interpersonal skills training, accentuating a complementary narrative that advocates for a balanced acumen in technical and interpersonal realms. This duality augments the quality of service by bridging the technical communication gap and echoes a comprehensive approach toward building a

robust virtual reference ecosystem that thrives on technical competency and effective user engagement.

Moreover, as the data underscores, the emphasis on training in policies, procedures, and service evaluation crafts a compelling narrative on the operational rigor needed to sustain a high-quality virtual reference service. The mentions by Barrett and Greenberg (2018) and Luo (2009) concerning training in policies and procedures underpin a structured approach towards understanding and adhering to the governing guidelines, thereby fostering a consistent quality of service. In a parallel vein, the significance of service evaluation training, as articulated by Luo (2009) and Dali et al. (2021), underscores an evaluative framework indispensable for gauging and enhancing service quality. This evaluative prism not only catalyzes a culture of continuous improvement but also aligns the virtual reference services with the evolving needs and expectations of the users, thereby nurturing a user-centric service model.

As digital environments grow increasingly complex, VRLs require a broad skillset beyond communication and IT proficiency. Instructional skills are vital as users seek help improving their information literacy. VRLs who can design and deliver effective virtual or in-person instruction empower users to access, evaluate, and use information ethically (Ayobami, 2022; Decker, 2020). These teaching competencies enhance user engagement and promote critical thinking. Continuous professional development plays a central role in advancing these capabilities. Scenario-based and experiential training helps VRLs transition from basic familiarity to digital fluency, equipping them to navigate emerging technologies such as artificial intelligence (Okwu, et al., 2024). This adaptive skillset enhances institutional responsiveness and ensures library services remain practical and relevant across evolving digital platforms.

As the discourse delves deeper into other training and professional development facets, the data unravels a multidimensional narrative essential for improving virtual reference services. The mention of collection development training by Dali et al. (2021) accentuates the necessity of a well-versed staff in the available information resources, thereby enriching the user guidance system. Additionally, the highlight on time management training by Dali et al. (2021) resonates with the imperative of efficient time allocation to ensure prompt and quality service delivery. The recurrent emphasis on both initial and ongoing training, as cited by Barrett and Greenberg (2018) and Luo (2009), alongside the tripartite mention of professional development by Barrett and Greenberg (2018), Luo (2009), and Shahzad et al. (2023), solidifies the argument for a continuum of learning and development. This narrative not only advocates for a longitudinal approach toward nurturing a highly skilled and knowledgeable staff but also underscores the vitality of a collaborative, evaluative, and developmental culture in propelling the efficacy and impact of virtual reference services.

In the evolving digital landscape, VRLs must engage in continuous training that fosters technical and interpersonal competencies. This training is not a one-time endeavor but an ongoing process involving hands-on application, mentorship, and peer learning. The COVID-19 pandemic highlighted the urgency of such development, as VRLs faced increased workloads and new technological demands (Hernández, 2024). Structured professional development programs incorporating scenario-based learning and peer-led knowledge exchange are essential (Nakaziba & Ngulube, 2024). Peer support models further enrich this process by fostering collaboration and sharing of best practices (Pham & Muralles, 2023).

Management skills are important as libraries adopt hybrid models. Effective leadership and project management enable VRLs to coordinate dispersed teams and foster interdepartmental collaboration, enhancing service delivery (Gusvita & Alon, 2021; Khan et al., 2023). Analytical and evaluative abilities also allow VRLs to assess user needs, track service outcomes, and adapt practices accordingly. Using bibliometrics and feedback tools, they demonstrate service value and support evidence-based improvements (Ahmed & Sheikh, 2021; Chen et al., 2024). Leadership support is also pivotal. Institutional investment in professional development enhances librarian skillsets and builds a resilient, adaptive culture (Sulyman et al., 2023). Encouraging participation in professional associations, conferences, and certifications ensures VRLs remain current with evolving service models. Continuous learning becomes central to delivering high-quality virtual reference services when integrated with feedback and targeted training.

The discourse surrounding the advancement of virtual reference services through integrating online resources and digital databases is meticulously explored by Frederick (2023) and Gilbert et al. (2006). A salient topic underscored by both sources is the "Improvement of Information Access," delineating the pivotal role of digital mediums in bridging geographical and temporal gaps. The recurrent emphasis on this topic amplifies the transformative potential of digital infrastructures in redefining how information is accessed and disseminated in the library landscape. The unanimous recognition from both sources elucidates a change in basic assumptions toward virtual platforms, heralding a new epoch of enhanced information accessibility, quintessential in the contemporary digital era.

Delving into the domain of response efficacy, Frederick (2023) uniquely broaches the topic of "Accelerating Response Time." These elucidate the instrumental value of online resources in bolstering the responsiveness of virtual reference services, a facet that is indispensable for fostering user satisfaction and engagement. Concurrently, "Enhancing Service Quality" resonates through both sources, articulating the augmentation of service quality engendered by digital resources. The consensus on this topic underscores the capability of digital databases to give library staff the requisite tools to deliver precise and comprehensive responses alongside astute recommendations. The constructive interaction of accelerated response time and enhanced service quality elevates the user experience, embodying the tangible benefits ushered in by the digital evolution of library services.

Conversely, the topics of "Improving Service Efficiency" and "Enhancing Librarian Capabilities" are exclusively expounded by Gilbert et al. (2006). These topics are emblematic of the operational enhancements and capacity-building opportunities online resources offer. The discourse unveils the efficiency gains in service delivery, courtesy of the streamlined information retrieval processes eased by digital databases. Moreover, the augmentation of librarian capabilities, as underscored by Gilbert et al. (2006), portrays the potential for professional development and service diversification engendered by the wealth of knowledge and resources accessible online. However, the narrative by Frederick (2023) on the "Challenges" associated with online resources presents a nuanced perspective, illuminating the exigent challenges, such as cost barriers and navigational intricacies that could potentially temper the efficacy and adoption of digital resources in virtual reference services. This nuanced exploration fosters a holistic understanding of the multifaceted impact of digital resources, paving the way for informed strategies to improve the benefits while mitigating the challenges in the digital transformation journey of library services.

Integrating digital resources into virtual reference services enhances librarians' ability to deliver personalized, timely support while introducing complex challenges in resource

management and user engagement. Effective integration promotes user-centered service models and aligns with technological trends (Feng, 2024). However, it also raises issues such as digital collection maintenance, security, and interoperability, which require advanced competencies in digital licensing, subscription management, and authentication processes (Mengping, 2023). Targeted training equips VRLs to navigate ethical and legal frameworks while ensuring equitable access to resources.

Professional development further supports evaluating user behavior and the customization of services in response to shifting expectations (Bentil et al., 2021). Additionally, collaboration with vendors, tech partners, and stakeholders enhances librarians' capacity to anticipate and adapt to emerging technologies (Rafi et al., 2020). Such partnerships foster continuous innovation and compliance, reinforcing the need for a multidisciplinary skill set that integrates ethical, legal, and strategic perspectives (Olabisi, 2020).

Moreover, integrating artificial intelligence (AI) into library services can reshape the competencies required of VRLs. AI streamlines tasks such as cataloging, query resolution, and resource recommendation, increasing the speed and accuracy of service delivery (Okwu, Oyighan, et al., 2024). As a result, VRLs must understand AI technologies, including natural language processing and machine learning, transitioning from traditional roles to operators of AI-enhanced systems (Jha, 2023). Beyond automation, AI supports digital literacy and raises awareness of data privacy and cybersecurity among librarians and users (Okunlaya et al., 2022). VRLs must also develop data analytics skills to interpret AI-generated insights and inform strategic decision-making (Li, 2024).

AI integration calls for collaborative work with IT teams and vendors, promoting adaptive leadership and ethical awareness. These evolving demands underscore the need for a multifaceted, future-ready skill set (Rahmani, 2023). AI is reshaping the roles of VRLs by automating routine tasks, enhancing digital literacy, and demanding new competencies in data analytics and ethical oversight. This transformative influence compels VRLs to continually update their skills through professional development initiatives focusing on technical mastery and effective collaborative practices.

4. CONCLUSION

This study emphasized the essential role of skills development, continuous training, and strategic digital integration in strengthening virtual reference services. Emphasizing both technical and interpersonal competencies, it highlights professional development as a cornerstone for adapting to digital transformation. While acknowledging challenges, the study offers practical strategies to enhance service quality, responsiveness, and user engagement. Libraries are encouraged to invest in comprehensive training, foster a culture of continuous learning, and adopt emerging digital tools. Future research should examine the long-term effects of digital integration, the effectiveness of training models, and the evolving role of AI in shaping virtual library services and librarian competencies.

This article contributes to the broader discourse on virtual reference services by offering a nuanced analysis of the skills and training required for their successful implementation. It adds value by emphasizing the importance of technical and interpersonal competencies and proposing ongoing professional development as a cornerstone of maintaining service quality in a rapidly evolving digital environment. Additionally, the

discussion on integrating digital resources provides practical insights into how libraries can leverage technology to enhance user engagement and service delivery.

Further research could explore the long-term impact of digital integration on user satisfaction and engagement and investigate the effectiveness of various training methodologies in improving virtual reference service outcomes. Furthermore, in the immersive application of AI, investigating the impact of AI integration into library services on the continuing development of librarians will enhance the understanding of the future better functioning of academic virtual library systems.

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AUTHORS' CONTRIBUTIONS

Imas Maesaroh: Writing oiginal draft preparation. Ideas; formulation or evolution of overarching research goals and aims**.** **Abdul Mujib:** Ideas; formulation or evolution of overarching research goals and aims. **Nur Kholis:** Ideas; formulation or evolution of overarching research goals and aims.

CONFLICT OF INTERESTS

We state that there are no known conflicts of interest linked with this publication, and that there has been no significant financial assistance for this work that could have influenced its outcome.

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