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The challenges facing Omani school teachers in improving their DL (digital literacy) skills.

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ABSTRACT

As technology takes a huge aspect in human lives, its effect is huge on the educational sector. This study examines the challenges faced by Omani teachers in enhancing their digital literacy skills and explores the role of professional development in addressing these challenges. Employing a mixed-methods approach, quantitative data was collected through surveys from more than 200 teachers and teaching faculty all over the sultanate of Oman, while qualitative insights were gathered via semi-structured interviews with teachers and supervisors. The findings reveal that factors such as limited access to technology, inadequate training and institutional support, unequal access to professional development opportunities, resistance to change, and fear of technology significantly hinder teachers' digital literacy. Among these, the duration of professional development programs emerged as the most critical challenge, while content focus and familiarity with digital literacy were identified as the least impactful factors. The study highlights the importance of targeted professional development programs, continuous support, and collaborative learning environments to address these challenges. However, limitations such as the restricted sample size, reliance on self-reported data, and cross-sectional design may affect the generalizability and interpretation of the findings. Recommendations for future research include expanding the sample size, adopting longitudinal approaches, and utilizing objective measures of digital literacy competencies. By addressing these challenges and implementing the proposed solutions, schools and policymakers can enhance teachers' digital literacy, ultimately improving educational outcomes in Oman.

Keywords: Digital literacy, professional development, Omani teachers, educational technology, teacher training, challenges, professional growth.

INTRODUCTION

In recent years, digital literacy (DL) has become a fundamental requirement for effective teaching, as educators increasingly depend on technology to enhance learning experiences. However, despite the global emphasis on technology integration in education, many teachers continue to struggle with developing the necessary digital competencies to support student learning. In Oman, this issue is particularly pronounced due to systemic barriers such as limited funding for educational technology, inadequate administrative support, and restricted access to high-quality professional development (PD) programs tailored to digital literacy [1]. These challenges not only hinder teachers' ability to integrate technology effectively into their teaching practices but also contribute to disparities in student learning experiences and educational outcomes.

The urgency of addressing this issue is underscored by the growing reliance on digital tools for instruction, especially in response to global educational shifts such as online learning and hybrid teaching models. While professional development initiatives are recognized as a key solution for improving teachers' digital literacy competencies (DLC), existing PD opportunities in Oman are often fragmented, outdated, or fail to address the specific needs of educators in different school settings [2]. Studies have shown that well-structured PD programs enhance teachers' confidence in using technology, improve instructional practices, and positively influence student engagement and achievement [3], [4]. However, the lack of tailored and accessible PD programs leaves many Omani teachers unprepared to navigate the challenges of digital teaching effectively.

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Given these persistent gaps, this research aims to explore the key challenges that Omani school teachers face in improving their digital literacy skills. By identifying the specific barriers preventing effective digital literacy development, this study seeks to provide actionable insights that can inform future professional development strategies and policy interventions. The findings are expected to bridge the gap between existing PD frameworks and the evolving digital competencies required in modern classrooms, ultimately contributing to a more technologically proficient teaching workforce in Oman.

This paper is structured as follows: first, a literature review examines the key challenges affecting teachers' digital literacy development. Next, the research methodology is outlined, followed by a detailed analysis and discussion of the findings. Finally, the conclusion summarizes the key insights, and recommendations are provided to support more effective digital literacy initiatives for Omani educators.

LITERATURE REVIEW

Teacher professional development (PD) is a critical component for improving educational outcomes in Oman, especially as the nation strives to align its educational practices with global standards [5]. Over recent years, the Omani Ministry of Education has implemented various initiatives to enhance teacher competencies, particularly in digital literacy and innovative teaching methods [6]. However, despite these efforts, significant challenges persist, including limited access to high-quality PD programs, insufficient resources, and a lack of consistent, tailored training to address teachers' specific needs [7]. Additionally, many PD programs in Oman focus on theoretical knowledge rather than practical, classroom-oriented skills, raising concerns about their overall effectiveness in improving teaching practices [8]. Research underscores the importance of a structured approach to PD, integrating ongoing support and hands-on training to improve teachers' digital skills and confidence in using technology [9]. Addressing these gaps is vital to empowering Omani teachers to meet the demands of modern classrooms and foster digital literacy among students [5].

The quality of education in schools is influenced by various factors, with teacher competence being a central determinant of student achievement. Educators are at the core of the educational process, and enhancing their professional growth is essential for improving instructional quality and student outcomes. Investing in teacher professional development is therefore crucial to improving their qualifications and skills. Teachers lacking digital literacy often lack awareness of how to use technology effectively, primarily due to inadequate training. This aligns with findings by Lay and Kritsonis [10], who emphasized that teachers must master the basics of technology before integrating it into classrooms. However, training alone is insufficient if teachers do not regularly practice using tools like interactive whiteboards (IWBs). According to Slay et al. [11], teachers who undergo training but lack opportunities to apply their skills may lose their competencies over time. Conversely, teachers with strong digital literacy are more self-reliant, demonstrating greater confidence in exploring and utilizing various digital tools, regardless of training adequacy.

Several challenges hinder teachers from becoming digitally literate, including lack of access to technology, inadequate training and support, resistance to change, and limited time. In rural or low-income areas, access to digital tools remains a significant obstacle. The National Center for Education Statistics (NCES) [12] found that public schools in rural areas are less likely to have access to digital learning tools compared to those in cities or suburbs. Furthermore, insufficient training and support exacerbate the issue. A survey by the National Education Association (NEA) revealed that only 44% of teachers felt adequately prepared to use technology in their classrooms [13].

Resistance to adopting new technologies is another challenge. Mekonnen [14] highlighted that resistance to change is one of the most critical barriers to integrating technology in education. Time constraints also pose a significant issue, as teachers often struggle to balance lesson planning, grading, and classroom management with learning new technologies. According to the NEA [13], teachers require more time to explore and experiment with technology.

Moreover, unequal access to training creates disparities among teachers. Educators in low-income schools often lack opportunities to attend workshops or conferences due to financial constraints, further widening the digital divide. Fear of technology is another impediment, as some teachers feel intimidated by the prospect of using unfamiliar tools. Düzgün and Özdamli [15] noted that fear of technology can lead to negative attitudes and reluctance to

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incorporate it into teaching practices. Finally, limited resources, such as inadequate funding and poor internet connectivity, hinder teachers' ability to embrace digital literacy fully.

METHODS

This study employed a mixed-methods approach to investigate the challenges Omani school teachers face in improving their digital literacy skills. A combination of quantitative and qualitative methods was used to ensure a comprehensive analysis of the research objectives.

Phase 1: Quantitative Method

In the first phase, a quantitative questionnaire was designed and distributed to teachers across various schools in Oman. The questionnaire aimed to address three primary research questions:

- What is the impact of professional development on improving teachers' digital literacy skills?
- What internal and external factors influence teachers' participation in professional development programs?
- What challenges do teachers face in attaining digital literacy skills?

The questionnaire was structured to gather data on teachers' perceptions of professional development initiatives, the barriers they face, and the support mechanisms available to them. The data collected provided valuable statistical insights into the relationship between professional development and digital literacy, as well as the factors that influence participation.

Methodological Framework

The mixed-method approach ensured a robust and comprehensive understanding of the research problem. Quantitative data provided a broad perspective on the challenges and factors influencing digital literacy development, while qualitative data offered in-depth insights into the lived experiences and institutional contexts. The combination of these methods enhanced the validity and reliability of the findings, aligning with recommendations from Creswell and Plano Clark [16].

The qualitative phase began with the preparation of an interview guide to facilitate data collection, as recommended by Creswell [16]. A semi-structured interview format was employed as the primary instrument for gathering qualitative data from participants, specifically addressing the third and fourth research objectives. The development of the qualitative tool was informed by the findings from the quantitative phase, aligning with the principles of the explanatory sequential mixed-methods approach.

Table 1 outlines the instruments used to identify the challenges teachers face in professional development (PD). The items were adapted from the study by Choudhary [17] and were structured using a Likert scale ranging from 1 to 5, where 1 represents "Strongly Disagree" and 5 represents "Strongly Agree."

Table 1: Instruments of Challenge

Variable	**Items**
Challenges	Lack of access to technology
	Inadequate training and support in school to become digitally literate
	Unequal access to training in digital literacy
	Resistance to change in issue related to digital literacy
	Fear of technology.

Reaching this stage was essential for identifying potential phrasing challenges and addressing concerns about the complexity and time constraints associated with longer questionnaires used in this research. To ensure reliability, a

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test-retest method was applied with a randomly selected sample of forty participants representing diverse educational settings across Oman's districts. Internal consistency was assessed by analyzing respondents' answers to the measured items using Cronbach's alpha statistic. This approach facilitated a comprehensive evaluation of the instrument's overall dependability while ensuring consistent tracking of itemized responses.

Table 2: Pearson Correlation for Challenges

Item NO	Correlation coefficient	Sig. (2-tailed)
Item NO.1	0.860	0.000
Item NO.2	0.893	0.000
Item NO.3	0.965	0.000
Item NO.4	0.935	0.000
Item NO.5	0.882	0.000

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 demonstrates that all Pearson correlation coefficients between the total score and the individual items related to the discussed challenges were significant at the 0.01 level. The correlation coefficients ranged from 0.860 to 0.965, indicating a strong relationship between the items and the associated axis. These results confirm that all items of the eighth variable are internally consistent, verifying the internal consistency of the first variable.

In conclusion, based on the reliability and internal consistency results presented in the previous tables, it is evident that the study instrument (the questionnaire) exhibits a high degree of stability, making it suitable for application to the entire sample.

To address the research questions, the analysis began by summarizing the data for all variables, including content focus, mindset, coherence, duration, familiarity with digital literacy, digital literacy competencies, influencing factors, and challenges. These summaries provided a comprehensive overview of the collected data, enabling a clearer understanding of the key trends and patterns within the study.

Phase 2: Qualitative Method

To gain deeper insights, a qualitative method was applied in the second phase of the research. Semi-structured interviews were conducted with supervisors from schools in the Sultanate of Oman. These interviews were designed to answer the third and fourth research questions:

- What challenges do teachers face in becoming digitally literate?
- How can educational institutions in Oman support teachers in improving their digital literacy skills?

The interviews allowed the researcher to explore the perspectives of supervisors regarding the institutional support available for teachers, as well as the specific challenges teachers face in achieving digital literacy. By focusing on supervisors, the study sought to identify strategies for overcoming these challenges and promoting digital literacy skills among teachers.

The interview questions were designed based on the findings from the quantitative research phase. The purpose of collecting qualitative data was to gain an in-depth understanding of the challenges teachers face in achieving digital literacy and to explore how educational institutions currently support these efforts. Additionally, the qualitative data aimed to propose strategies for improving and enhancing teachers' digital literacy skills in Oman.

RESULTS

Quantitative Approach

Table 3 presents the means and standard deviations of the challenges teachers face in developing digital literacy skills, which may hinder their progress in becoming digitally literate. This factor includes five key measurements: lack of access to technology, inadequate training and support in schools, unequal access to training, resistance to change,

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and fear of technology. The mean values range from 3.29 to 3.73, while the standard deviations vary between 1.038 and 1.239.

Among these challenges, resistance to change and inadequate training and support in schools were identified as having the most significant impact on teachers' professional development, with mean values of 3.73 and standard deviations of 0.947 and 1.038, respectively. However, the findings suggest that, overall, these challenges do not severely affect teachers' digital literacy skills. This conclusion is supported by the overall mean score of 3.59, indicating a general agreement on the moderate influence of these challenges.

Table 3: Mean and standard. Deviation for Challenges (Sara,2024)

NO	Item	Mean (%)	SD
1	Lack of access to technology.	3.29 (65.7%)	1.239
2	Inadequate training and support in school to become digitally literate.	3.73 (74.5%)	1.038
3	Unequal access to training in digital literacy.	3.68 (73.6%)	1.044
4	Resistance to change in issue related to digital literacy.	3.73 (74.6%)	.947
5	Fear of technology.	3.53 (70.7%)	1.206
	Overall mean	3.5904 (71.8%)	0.85554

Qualitative Approach

Challenge 1: Lack of access to technology and limited resources

The responses reveal mixed opinions regarding the statement on the lack of technology and limited resources as a challenge for teachers' digital literacy. Specifically, the absence of internet connectivity or access to digital devices is highlighted as a major issue by 14 respondents. They emphasize that financial and cognitive barriers prevent many teachers from obtaining the necessary technology, making it difficult for them to stay updated with technological advancements and effectively integrate digital tools into their teaching practices.

Conversely, several respondents (S2, S5, S9, S12, S18, S19, and S20) disagree with this view, suggesting that access to technology is not as significant a challenge as the lack of training on how to use digital devices. They argue that in today's digital era, technology is widely available through smartphones and computers, and the real issue lies in providing teachers with sufficient training to use these tools effectively.

Other respondents (S4, S6, S8, S13, S15, S16, and S17) acknowledge that access to technology and the internet can be a challenge in certain cases. However, they point out that many schools and teachers do have access to these resources. They stress that the more pressing issue is the lack of adequate training and support for teachers to enhance their digital literacy skills.

In summary, while access to technology and resources is recognized as a factor impacting teachers' digital literacy, there is a consensus that other elements, such as training and support, play an equally critical role. This highlights the complexity of the issue and underscores the need for a multifaceted approach to effectively address the challenges of improving teachers' digital literacy.

Challenge 2: Inadequate training and support in school to become digitally literate

The responses reveal a consensus that inadequate training and support in schools present significant challenges for teachers striving to become digitally literate. Key barriers include the absence of practical professional development strategies, heavy workloads, and limited access to external technical trainers. Many respondents emphasize the importance of targeted, hands-on training that focuses on integrating technology into teaching practices and adapting tools for educational purposes.

While some schools are making efforts to provide training, limitations such as short session durations and a lack of ongoing support hinder progress. Continuous professional development, including mentoring programs, regular

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workshops, and feedback mechanisms, is recommended to sustain and enhance teachers' digital skills over time. Collaborative learning and sharing best practices among teachers are also highlighted as valuable strategies.

Additionally, involving external experts in training programs is seen as beneficial for providing specialized expertise and ensuring teachers remain up-to-date with advancements in educational technology. Although some respondents believe schools are adequately fulfilling their roles, most agree there is significant room for improvement. Schools should prioritize practical, hands-on training, provide sustained support, and create opportunities for collaboration to help teachers effectively integrate digital tools into their teaching.

Challenge 3: Unequal access to training

The responses to the question about unequal access to training as a challenge impacting teachers' digital literacy reflect diverse perspectives. Twelve respondents acknowledge the presence of unequal training opportunities, particularly based on specialization, but argue that this should not hinder individuals from independently acquiring digital literacy. They emphasize the importance of personal initiative in staying updated with technological advancements.

Conversely, eight respondents strongly view unequal access to training as a significant challenge. They highlight factors such as teachers' reluctance to attend training, limited availability of training opportunities in certain schools or regions, and the short duration of existing training sessions. These respondents argue that such disparities hinder teachers' ability to adopt new technologies, integrate them into teaching practices effectively, and prepare students with essential digital skills. This perspective suggests that unequal access to training may exacerbate the digital divide within the education sector, ultimately affecting the quality of education students receive.

Some respondents also identify practical barriers, such as the geographical location of schools (e.g., those in remote areas having fewer training opportunities), insufficient resources like reliable internet access, and challenges with transportation to training venues. They advocate for ensuring greater access to training for all teachers, regardless of their location or circumstances, as a critical step in addressing this issue.

However, a few respondents believe that training opportunities are available to everyone and that achieving complete equality in access may not be feasible. They suggest that teachers can overcome these barriers through self-learning or by utilizing multiple training providers.

Overall, the responses highlight the complexity of the issue of unequal access to training and its effects on teachers' digital literacy. While some emphasize the role of individual initiative and alternative learning approaches, others stress the importance of equitable training opportunities to ensure all teachers are equipped with the skills and knowledge to integrate technology into their teaching effectively. These insights underline the need for schools and educational institutions to consider a balanced approach when designing training programs. Offering flexible training options, providing resources for self-learning, and ensuring equitable access to training opportunities can help address this challenge and support teachers in developing their digital literacy competencies.

Challenge 4: Fear of technology

The responses to the question about fear of technology as a challenge to teachers' digital literacy reveal diverse perspectives. Thirteen participants agree that educators who feel unfamiliar or uncomfortable with technology may hesitate to incorporate it into their teaching practices. This reluctance often stems from factors such as insufficient training, fear of making mistakes in front of students, or feeling overwhelmed by the rapid pace of technological advancements. Consequently, such teachers may avoid using technology in the classroom, which can hinder their development of digital literacy. Some respondents further note that this fear is exacerbated by the pressure to meet educational standards and seamlessly integrate technology into teaching.

On the other hand, several respondents suggest that this fear diminishes over time as teachers gain familiarity with technology through hands-on practice and training. They emphasize the importance of encouraging teachers to use technology consistently, experiment with new methods, and stay updated on digital advancements. These respondents believe that with proper support and training, teachers can overcome their apprehension and acquire the digital skills needed to enhance their teaching practices.

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A minority of respondents (three participants) offer differing views, arguing that teachers may not fear technology itself but instead feel burdened by the increasing pressure to adopt it, which they perceive as complicating their work. Others suggest that fear of technology is more common among older teachers, while younger teachers tend to be more open to its use, influenced by their motivation and interest in technology.

Overall, the responses highlight the multifaceted nature of fear of technology as a challenge to teachers' digital literacy. While some respondents believe that practice and training can help teachers overcome this fear, others argue that it may persist due to factors such as age, experience, and external pressures. Addressing this challenge requires a tailored approach that considers the unique needs and circumstances of individual teachers. Recurring support through regular workshops, access to online resources, and fostering a culture of experimentation and continuous learning can help alleviate teachers' fears and build their confidence in using technology. Additionally, educational institutions should strive to create a supportive environment that empowers teachers to explore advanced tools and methods without fear of judgment or failure.

It is also important to recognize that fear of technology is not exclusive to teachers; it can also affect students, parents, and other stakeholders in the education system. By addressing this fear at all levels, schools can foster a more welcoming and technology-friendly environment that benefits everyone involved. Ultimately, overcoming the fear of technology requires a collective effort to promote digital literacy and ensure that teachers possess the skills, confidence, and support needed to effectively integrate technology into their teaching practices.

Challenge 5: Resistance to change

The responses to the question about resistance to change as a challenge impacting teachers' digital literacy reveal a range of perspectives. Many respondents agree that resistance to change can significantly hinder teachers' ability to become digitally literate. They note that some educators may be reluctant to adopt new technologies due to fear of the unknown, lack of confidence in their technological skills, or scepticism about the usefulness of digital tools in the classroom. This reluctance can limit their willingness to explore and integrate digital resources, ultimately impeding their development of digital literacy.

Some respondents emphasize the importance of fostering a culture that embraces openness to change. They suggest that providing adequate training, offering consistent support, and demonstrating the tangible benefits of technology integration in teaching are crucial for overcoming resistance. According to these respondents, addressing resistance to change requires a mindset shift supported by ongoing professional development focused on building digital skills.

However, a subset of respondents disagrees that resistance to change is a primary barrier to teachers' digital literacy. They argue that while some resistance exists, the root cause is often insufficient training, lack of support, and inadequate resources in schools. These respondents believe that many teachers are willing to adopt digital tools if provided with the necessary resources and proper training.

Overall, the responses highlight the complexity of resistance to change and its influence on teachers' digital literacy. While some see it as a significant challenge that must be addressed, others emphasize that tackling underlying issues like training and resource availability may be more effective in promoting digital literacy among educators.

The perspectives provided underscore the importance of understanding the reasons behind teacher resistance and addressing them in meaningful ways. One approach is to offer professional development opportunities tailored to teachers' needs and interests, such as workshops, seminars, and online courses that build their confidence and digital skills in a supportive environment.

Another strategy involves involving teachers in decision-making processes when introducing new technologies. By engaging teachers in these decisions and giving them a sense of ownership and responsibility, schools can foster greater acceptance and adaptation of new tools into their teaching practices.

Providing ongoing support and mentorship is also critical. This could include access to technical support, peer mentoring programs, and regular check-ins to track progress and address any concerns. Encouraging collaboration and open communication among teachers can also help them feel more supported as they adapt to using new technologies.

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Additionally, cultivating a culture of innovation and experimentation within schools can alleviate resistance to change. Creating a safe, supportive environment where teachers feel comfortable trying new tools and methods without fear of judgment can encourage them to step out of their comfort zones and embrace new technologies.

In conclusion, while resistance to change presents a challenge to teachers' digital literacy, addressing the underlying causes is key to overcoming this issue. By equipping teachers with the necessary training, support, and resources, and fostering a culture that values innovation and experimentation, schools can help teachers overcome their reluctance and develop the skills needed to effectively integrate technology into their teaching practices.

Other Challenges

The responses regarding the major challenges hindering teachers from becoming digitally literate reveal diverse perspectives. Some respondents identify the lack of qualifications and regular training opportunities in specialized academic institutions as a significant barrier. They stress the importance of allocating sufficient time for teachers to build foundational digital skills and stay updated with advancements in digital technology. Others highlight that high teaching workloads, excessive administrative tasks, and limited classroom time prevent teachers from dedicating themselves to developing their digital literacy skills. These factors suggest that educators often struggle to find the time and resources needed to enhance their digital competencies.

Additionally, the lack of free or affordable training courses is cited as another major obstacle. Some respondents argue that the high cost of training programs can limit access for many teachers, restricting their ability to acquire the skills necessary to improve their digital literacy. Others note a lack of alignment between curricula and digital integration, as well as insufficient opportunities for daily technology practice, as further barriers to achieving digital literacy.

The willingness of teachers to engage in professional development and their reliance on traditional teaching methods also emerge as critical challenges. Certain educators may resist change, perceiving digital tools as unnecessary or disruptive to their established practices. Respondents emphasize that overcoming these obstacles requires support from school leaders and policymakers. They advocate for educational institutions to prioritize digital literacy as a core competency and provide the resources and support necessary to foster skill development. This could include allocating time for professional growth, offering affordable training programs, and introducing incentives to encourage teachers to integrate digital tools into their teaching.

Another significant challenge highlighted is the rapid pace of technological advancement, which can overwhelm teachers and hinder their ability to keep up with new developments. Respondents recommend that schools provide continuous training and support to help educators stay informed about emerging technologies and learn effective integration strategies.

In summary, the feedback underscores the multifaceted challenges that teachers face in achieving digital literacy. These challenges range from issues related to training and resource availability to those tied to workload pressures and resistance to change. Addressing these barriers effectively requires a comprehensive approach that includes enhanced teacher support systems and the creation of an environment that prioritizes digital literacy while encouraging innovation and the use of new technologies in education.

DISCUSSION

Identifying the specific challenges and presenting a structured framework, this study offers practical insights for policymakers and educators. It emphasizes the importance of implementing targeted professional development programs, providing continuous support, and establishing sustainable partnerships with local institutions and technology providers to ensure the effective integration of digital literacy (Ertmer & Ottenbreit-Leftwich, 2013; Tondeur et al., 2017). This framework serves as a roadmap to address existing gaps while fostering a culture of continuous digital learning and adaptability among teachers (Howard et al., 2021).

Quantitative Results: Discussion

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The findings from the quantitative research on the challenges faced by educators in improving their digital literacy skills reveal several critical factors. These include limited access to technology, insufficient training and support within educational institutions, unequal professional development opportunities, resistance to change, and apprehension toward technology. The mean scores for these barriers range from 3.29 to 3.73, indicating a moderate level of consensus among participants regarding their significance. Standard deviation values between 1.038 and 1.239 reflect some variation in opinions, with respondents generally acknowledging the importance of these challenges, though perspectives vary (Hattie, 2009).

Among the highlighted barriers, resistance to change and inadequate institutional training and support emerged as particularly significant. These factors recorded mean scores of 3.73 with standard deviations of 0.947 and 1.038, respectively, emphasizing their considerable impact on teachers' professional growth and their ability to develop digital literacy skills (Inan & Lowther, 2010).

Overall, the collective mean score of 3.5904 suggests a general agreement among respondents that these challenges influence teachers' digital literacy development. However, the data also indicates that these barriers may not be insurmountable. With adequate support, such as professional development programs and targeted interventions, these obstacles can be effectively managed (Guskey, 2002).

These findings underscore the importance of implementing targeted initiatives to address these challenges. Enhancing access to technology, providing comprehensive and ongoing professional development, and fostering an environment of adaptability and continuous learning are essential strategies (Darling-Hammond et al., 2017). By addressing these barriers, schools can empower teachers to strengthen their digital literacy, ultimately improving the educational experience and positively impacting student outcomes (Voogt et al., 2013).

Qualitative Results: Discussion

The challenges affecting teachers' digital literacy and professional development are multifaceted, encompassing issues related to access, training, workload, mindset, and institutional support. A lack of access to digital devices and financial constraints was highlighted as significant barriers to digital literacy. While some respondents argued that technology is widely available through personal devices like smartphones, others emphasized the importance of addressing financial and cognitive barriers to ensure equitable access to technology (Selwyn, 2016). Moreover, inadequate digital infrastructure in schools, such as low-speed internet, further limits teachers' ability to integrate digital tools into their teaching practices effectively (OECD, 2021).

Insufficient training and support emerged as one of the most prominent challenges. Many teachers lack professional development programs that extend beyond basic digital skills to focus on the practical integration of technology into teaching practices (Mishra & Koehler, 2006). High workloads and administrative responsibilities were also cited as factors preventing teachers from participating in training sessions (Spillane et al., 2002). The absence of external technical trainers and the lack of continuous follow-up support further compound this issue, making it difficult for teachers to sustain their digital skill development (Desimone, 2009).

Unequal access to training opportunities due to geographical, institutional, or financial disparities also plays a critical role in limiting teachers' digital literacy development (Howard et al., 2021). While some teachers can enhance their digital skills through self-directed learning, many struggle to access the necessary training resources. To address this, respondents recommended strategies such as flexible training options, self-learning resources, and ensuring equal opportunities for professional growth, regardless of teachers' circumstances (Zhao et al., 2002).

Another significant barrier is fear of technology, often stemming from a lack of familiarity, anxiety about making mistakes, or feeling overwhelmed by the rapid pace of technological advancements (Scherer et al., 2019). This fear is more pronounced among older teachers and those with limited exposure to technology. Regular training, hands-on practice, and fostering a supportive culture of experimentation and learning were suggested as effective ways to help alleviate this fear and build confidence in using digital tools (Ertmer et al., 2012).

Resistance to change also emerged as a challenge. Some teachers remain reluctant to adopt new technologies, influenced by their mindset and comfort with traditional teaching methods (Rogers, 2003). This reluctance is often tied to a lack of confidence in using digital tools or skepticism about their effectiveness in the classroom. To overcome

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this resistance, respondents emphasized the importance of involving teachers in decision-making processes, offering professional development tailored to their needs, and demonstrating the tangible benefits of integrating technology into their teaching practices (Fullan, 2007).

Institutional and policy-level support is essential for addressing these challenges. Respondents highlighted the role of school leadership and policymakers in prioritizing digital literacy as a core competency for teachers (Hargreaves & Fullan, 2012). Providing affordable training programs, offering incentives, and creating a culture of innovation and experimentation were identified as critical steps to support teachers' professional growth and adaptability in the digital age (Dede, 2010).

The rapid pace of technological advancements poses yet another challenge, making it difficult for teachers to stay updated with the latest tools and methods (Puentedura, 2014). Continuous training and follow-up support were recommended to help teachers adapt to these advancements and integrate them effectively into their classrooms. Additionally, there are other underlying challenges, such as the lack of emphasis on digital literacy in teacher education programs and the insufficient focus on problem-solving and critical thinking in digital competency training (UNESCO, 2018).

Relationship Between Quantitative and Qualitative Results

The study results revealed a direct impact of several professional development factors on the digital literacy of Omani teachers. Both quantitative and qualitative research identified the duration factor as the most significant challenge, exerting the highest influence compared to other factors (Guskey, 2002). On the other hand, content focus and familiarity with digital literacy were found to be the least significant factors in the quantitative analysis, a finding that was corroborated by the qualitative research, where these were also mentioned as the least impactful challenges (Ertmer & Ottenbreit-Leftwich, 2013).

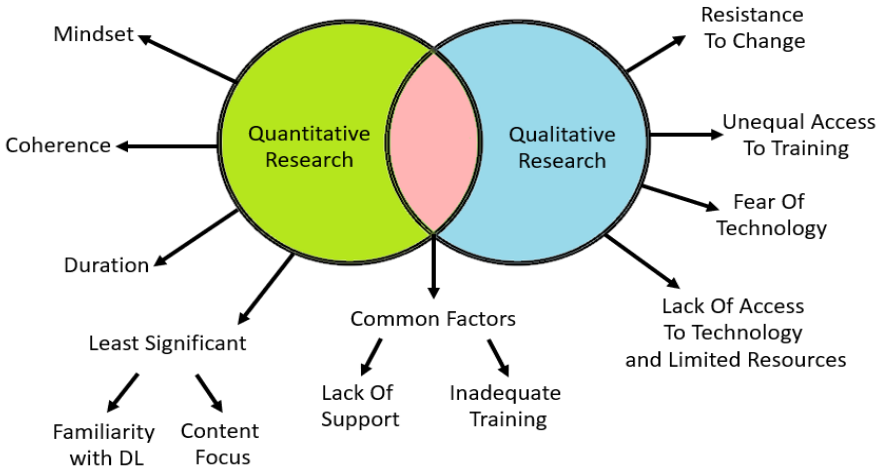

Figure 2 Relationship between Quantitative and Qualitative Results (Sara,2024)

CONCLUSION

This study explored the challenges and factors influencing the digital literacy of Omani teachers, highlighting the role of professional development in enhancing their digital competencies. The findings revealed that several factors, such as inadequate training, limited access to technology, and resistance to change, significantly impact teachers' ability to integrate digital tools effectively into their teaching practices. Duration was identified as the most influential challenge, while content focus and familiarity with digital literacy emerged as less significant factors. These insights emphasize the need for targeted interventions to improve the digital literacy skills of teachers in Oman.

However, the study faced several limitations that may affect the interpretation and applicability of its findings. The sample was restricted to teachers in governmental schools, excluding private and international schools, which may have different experiences, resources, and professional development opportunities. This limitation suggests that the

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findings may not fully represent the broader population of Omani teachers. Future research could address this by including a more diverse sample from various educational settings.

Additionally, the cross-sectional nature of data collection, conducted at a single point in time, may not capture the evolving needs of teachers or the dynamic nature of digital literacy as technologies and policies change. A longitudinal approach in future studies could provide a more comprehensive understanding of how teachers' digital literacy competencies and professional development needs change over time.

The reliance on self-reported data in surveys and interviews also posed challenges in ensuring the accuracy and reliability of the findings. Response biases, such as social desirability bias, may have influenced participants' answers, potentially leading to over- or underestimation of their digital literacy skills. Future research could incorporate objective measures, such as standardized assessments or classroom observations, to supplement self-reported data and improve reliability.

Logistical and resource constraints also impacted the study, including limited participation due to teachers' demanding schedules. This may have reduced the diversity of perspectives within the sample. Addressing these logistical challenges in future studies could enable deeper exploration of professional development and digital literacy issues.

Despite these limitations, this study provides valuable insights into the challenges affecting teachers' digital literacy and proposes actionable recommendations for improvement. Implementing longer-duration professional development programs, offering continuous support, and incorporating hands-on, practical training can significantly enhance teachers' skills. Encouraging collaborative learning, providing tailored content, and fostering a culture of reflection and feedback can further support teachers' professional growth. Recognizing and incentivizing participation in professional development programs can also motivate educators to engage more deeply with these initiatives.

For future research, increasing the sample size and including teachers from diverse educational settings, such as private and international schools, could improve the generalizability of findings. A longitudinal approach could provide a deeper understanding of how professional development impacts teachers' digital literacy over time. Incorporating objective measures and leveraging digital tools for data collection can enhance the accuracy and efficiency of future studies.

By addressing these challenges and implementing the proposed recommendations, schools and policymakers can empower teachers to develop their digital literacy skills. This, in turn, can enhance the quality of education in Oman and better prepare students for success in an increasingly digital world.

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