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BARRIERS AND SOLUTIONS FOR DIGITAL LITERACY INTEGRATION IN ELEMENTARY EDUCATION: TEACHERS' PERSPECTIVES IN DOLORES, EASTERN SAMAR

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ABSTRACT

This research surveyed the barriers and possible solutions in integrating digital literacy in elementary education as reported by teachers. Using the descriptive survey method, data were retrieved from a sample of 113 elementary teachers in Dolores, Eastern Samar, who are predominantly females with a mean age of 32.76 years and a mean teaching experience of 6 years, mainly teaching grades 1-3 in upstream communities. The results show that teachers are burdened by students' basic digital skills deficiencies and time constraints, which inhibit effective integration. Other barriers identified include lack of access to technological resources and lack of administrative support. On the other hand, teachers pointed out some doable solutions, including mentorship programs, improvement in professional development, and integration of digital literacy into existing curricula. These findings will serve to enlighten educational policy and practice, hence promoting a more successful integration of digital literacy in elementary schools.

KEYWORDS: *Digital Literacy, Elementary Education, Teacher Barriers, Digital Integration, Educational Solutions.*

INTRODUCTION

In this fast-evolving digital world, there is a need to incorporate digital literacy as part of elementary education. Digital literacy, which may be defined as the ability to effectively and critically navigate, evaluate, and create information using different digital technologies, is critical for students' future success in the current economy [1],[2]. Although the use of digital technology in education has grown dramatically in recent years, the problems and challenges it poses to be incorporated into teaching vary from country to country. To use current technologies in education effectively, you need support, motivation, applicable information, skills, competencies, and access to the main tools [3].

Teachers at the forefront of enacting educational change find barriers to integration in everything from a lack of adequate infrastructure to a lack of training and support [4]. Moreover, teacher's beliefs, access to technology, and institutional support seem to be important determinants influencing the successful integration of technology into classroom settings which underlined the need to deal with external and internal barriers that may prevent the integration of effective digital literacy [5]. Despite these findings, the majority of teachers, especially those in rural settings, still face practical challenges in integrating digital technologies into their practice [6].

The issue of digital literacy is more than an educational concern; it's a social imperative. The digital divide, where there is unequal access to both technology and the skills needed for effective use, exacerbates existing inequalities in education and gives students in less-resourced areas fewer opportunities for social mobility [7]. On a national level, the Philippines has progressed in policy development to support digital learning, though implementation remains spotty across its regions. The inequalities in the technological infrastructure and educational resources between urban and rural areas require focused research to level the playing field [8].

LITERATURE REVIEW

The integration of digital literacy into elementary education has become a critical necessity in the modern educational landscape. As technology continues to shape various aspects of learning, the ability of teachers to incorporate digital tools into their teaching methodologies remains a key determinant of educational success. However, numerous challenges hinder

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this integration, ranging from infrastructural deficiencies and inadequate teacher training to resistance to technology and pedagogical constraints. This chapter consolidates existing literature on digital literacy integration in elementary education, highlighting the demographic factors that influence teachers' engagement, the barriers they face, proposed solutions, and policy recommendations.

Demographic Variables of Elementary Teachers and Digital Literacy Adoption

Several studies have explored the demographic variables influencing teachers' digital literacy adoption, including age, gender, educational attainment, years of teaching experience, grade level taught, and school location. Younger teachers with less than ten years of experience exhibit higher levels of digital literacy compared to their more experienced counterparts. This is largely attributed to their exposure to technology during pre-service training and their willingness to embrace new digital teaching tools [9]. Similarly, public school teachers in island municipalities face significant challenges in digital literacy integration due to limited technological resources and connectivity issues, demonstrating the impact of geographic location on technology access [10].

Gender also plays a role in digital literacy proficiency. While some studies suggest that male teachers tend to exhibit greater confidence in using technology, other research indicates that female teachers actively engage in professional development programs to enhance their digital competence. Moreover, there is no direct relationship between a teacher's gender and digital literacy proficiency, the level of professional development opportunities significantly influences competency [11].

Barriers to Digital Literacy Integration in Elementary Education

Infrastructure and Technological Limitations

One of the most significant barriers to digital literacy integration is the lack of technological infrastructure, particularly in rural and low-income areas. Budgetary constraints prevent schools from acquiring essential digital tools, while poor internet connectivity limits students' and teachers' ability to access online resources [6]. Similarly, [12] stress that disparities in ICT infrastructure across different regions exacerbate the digital divide, leading to unequal learning opportunities.

Insufficient Teacher Training and Professional Development

The lack of structured training programs is another critical barrier to digital literacy adoption. [13] reveal that despite teachers possessing moderate digital literacy knowledge, their ability to integrate technology effectively remains hindered by inadequate professional development. Similarly, [14] argue that many teachers lack the necessary pedagogical skills to incorporate digital tools into their teaching, necessitating targeted training initiatives.

Time Constraints and Increased Workload

Teachers often cite time constraints as a major challenge in integrating digital literacy into their classrooms. [15] identifies lack of time as a fundamental barrier, as teachers are frequently occupied with
administrative responsibilities and lesson planning, leaving little room for exploring new digital tools. This is further exacerbated by the absence of institutional support for technology integration.

Resistance to Change and Technophobia

Many educators remain hesitant to adopt digital tools due to technophobia and a preference for traditional teaching methods. [16]) note that some teachers perceive technology as an additional burden rather than an enhancement to their instructional practices. This resistance is often rooted in a lack of familiarity with digital tools and concerns over the effectiveness of technology-driven teaching methods.

Student-Related Challenges

Apart from teacher-related challenges, student-specific issues also impede digital literacy integration. [17] emphasize that while digital tools enhance student engagement, the lack of foundational digital literacy skills among young learners can hinder their ability to maximize the benefits of technology-assisted learning. Additionally, students from lower-income backgrounds often face barriers such as limited access to personal devices and internet connectivity [18]).

Proposed Solutions for Enhancing Digital Literacy Integration

Improving Technological Infrastructure

Addressing the digital divide requires substantial investments in educational technology infrastructure. [12] recommend the expansion of broadband access and the provision of adequate digital resources to underserved schools. Similarly, [19] stress the importance of government and private sector collaboration in funding technological advancements in education.

Enhancing Teacher Training and Continuous Professional Development

Structured training programs tailored to teachers' specific needs are essential for bridging the digital literacy gap. [20] advocates for integrating digital literacy training into teacher education programs and offering continuous professional development opportunities. By equipping teachers with the necessary skills, they can effectively integrate technology into their pedagogical practices.

Allocating Time for Digital Literacy Implementation

Providing educators with dedicated time to explore and implement digital tools can facilitate smoother technology integration. [15] suggests that educational institutions should restructure teachers' workloads to incorporate technology training and practice sessions. This would ensure that teachers can confidently apply digital tools in their classrooms without feeling overwhelmed.

Encouraging Positive Attitudes Toward Technology

Fostering a culture that embraces digital literacy is crucial in overcoming resistance to change.
[16] highlight the importance of mentorship programs, where

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digitally proficient teachers guide their colleagues in using educational technology. Showcasing successful case studies of digital literacy integration can also motivate hesitant teachers to adopt technology-driven instructional methods.

Developing Digital Literacy Programs for Students

To ensure that students can fully benefit from digital learning tools, structured digital literacy programs should be introduced at an early age. [17] recommend integrating digital literacy into the elementary curriculum, with a focus on problem-solving, critical thinking, and responsible internet usage. By equipping students with foundational digital skills, they can actively participate in technology- enhanced learning experiences.

Policy Recommendations for Digital Literacy Enhancement

In addition to school-level interventions, policymakers must implement strategic measures to support digital literacy integration. [21] Pappa, Georgiou, and Pittich (2023) stress the need for standardized curricula that incorporate digital literacy components, ensuring that all students receive equitable digital education. Furthermore, [22] advocate for government incentives to encourage schools to adopt digital learning initiatives. Establishing policies that promote digital literacy training for both educators and students can create a more inclusive and technology-driven educational system.

Theoretical Framework

The integration of digital literacy in elementary education is supported by several theoretical perspectives that explain both its adoption and the challenges that arise. The Technological Pedagogical Content Knowledge (TPACK) framework [23] underscores the need for teachers to possess technological, pedagogical, and content knowledge to effectively incorporate digital tools into their teaching. This framework emphasizes that successful digital literacy integration is not solely dependent on technological proficiency but also requires pedagogical expertise and content mastery.

Diffusion of Innovations Theory of [24] further explains how teachers adopt new technologies based on relative advantage, compatibility, complexity, trialability, and observability. Teachers' resistance to digital literacy integration often stems from perceived complexity and a lack of alignment with existing teaching practices.

Meanwhile, the Digital Divide Theory of [25] highlights disparities in access, usage, and benefits of technology, particularly in rural areas such as Dolores, Eastern Samar. This theory is crucial in understanding how infrastructural limitations contribute to unequal digital literacy opportunities among educators and students.

Ertmer's model of first-order and second-order barriers provides a lens through which to analyze the external and internal challenges faced by teachers in adopting digital literacy. First-order barriers include inadequate infrastructure, insufficient resources, and limited training, while second-order barriers involve teachers' beliefs, attitudes, and reluctance to embrace technology. Addressing both types of barriers is essential for successful integration [26].

Conceptual Framework

The conceptual framework, (see **Figure 1** below) for this study identifies the barriers to digital literacy integration as independent variables, which include infrastructure limitations, insufficient teacher training, time constraints, resistance to change, and student-related challenges.

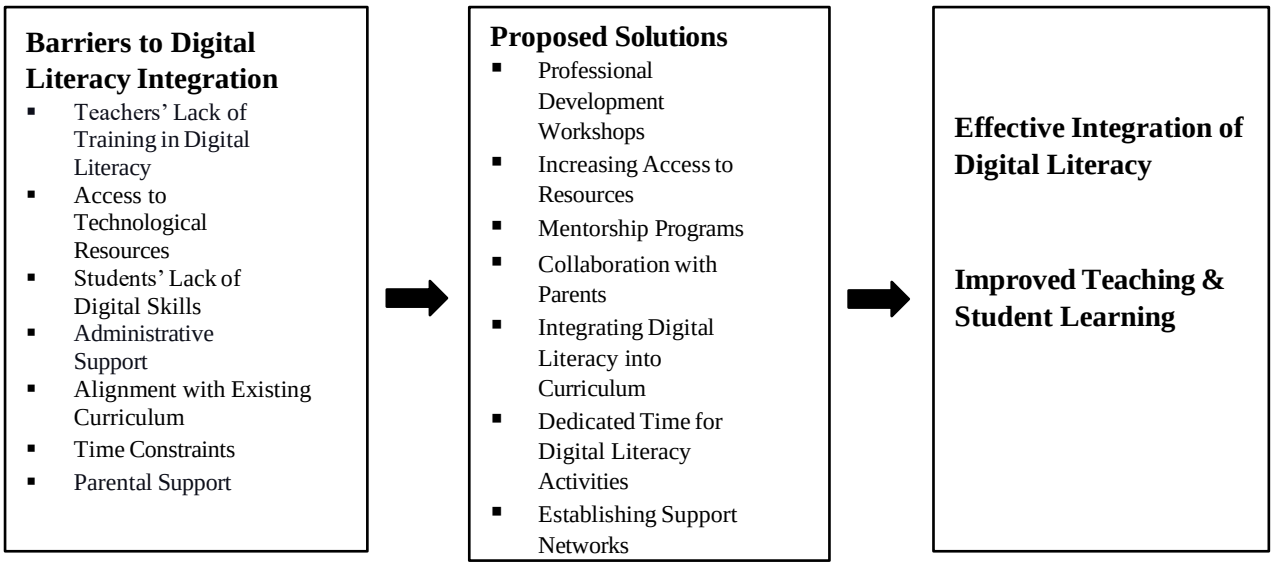


Figure 1. Conceptual Framework

These factors hinder teachers' ability to incorporate digital tools effectively. It also identifies mediating variables in the form of proposed solutions: infrastructure improvement, professional development programs, time allocation for activities relating to digital literacy, fostering a positive attitude toward technology, and developing digital literacy programs that will be tailor-made for the needs of the students. The dependent variable includes effective integration of digital

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literacy, which leads to improved teaching practices and better learning outcomes among students.

Research Gap

Despite the extensive research on digital literacy integration in elementary education, significant gaps remain. Most studies focus on urban and well-funded schools, with limited investigation into the experiences of teachers in rural and marginalized areas such as Dolores, Eastern Samar. Furthermore, while previous research identifies barriers and proposed solutions, few studies capture teachers' firsthand perspectives on the challenges they face in implementing digital literacy. In line with filling this gap, this article narrows the focus to report the perception of teachers that has important implications on policy and practices aimed at improving the quality of education and decreasing the digital divide in Eastern Samar.

OBJECTIVES

The study attempted to determine the perceived barriers to digital literacy integration in elementary education and identify possible solutions as perceived by selected elementary teachers in Dolores, Eastern Samar.

Specifically, this study sought to:

1. describe the demographic profile of the elementary teachers in terms of:
    a. age;
    b. gender;
    c. educational attainment;
    d. years of teaching experience;
    e. grade level taught; and
    f. school location
2. identify the barriers encountered by the teachers in integrating digital literacy into elementary education;
3. explore teachers' proposed solutions to these barriers;
4. offer policymakers and educators with suggestions on how to improve the integration of digital literacy.

METHODOLOGY

Research Design

This study employed the descriptive survey method to determine the barriers and solutions for digital literacy integration in primary education from the teachers' perspective in Dolores, Eastern Samar. The descriptive technique allows for a complete knowledge of the situation since it aimed at getting a detailed information from the respondents.

Sample and Locale

The subjects were 113 primary school teachers from the Dolores I and II districts. The schools were selected as representatives of a range of rural settings to allow the inclusion of diverse perspectives. A purposeful selection of schools representing varying resource levels and geographical locations was chosen from both districts.

Instrument

The objectives of this research were pursued with the aid of a survey questionnaire adapted from established frameworks and proven instruments: the Technology Acceptance Model by Davis (1989), and studies on barriers to integration of digital literacy by [26]. Questionnaire structure included three main sections: demographic data, perceived barriers to integration of digital literacy, and proposed solutions in overcoming these barriers.

Data Collection

The data were collected via in-person surveys, in which the necessary permissions from the school administration were taken before the ethical approval was granted to conduct the survey among the participants and make a collection of responses for a specified period.

Data Analysis

Descriptive statistics, such as frequencies, percentages, mean, and standard deviation, were be used to describe teachers' demographic features, identified barriers, and perceived feasibility of solutions.

Ethical Consideration

Ethical issues were paramount in this research. Informed consent was obtained from all participants, with clear understanding that they could withdraw from the study at any point in time. Participants' anonymity and data confidentiality were maintained at all stages of the research process.

RESULTS AND DISCUSSION

Demographic Profile of Respondents

Table 1 shows the demographic characteristics of the respondents: a total of 113 elementary teachers. Most were in the 30-39 years old bracket (47.79%), followed by the 20-26 years group (36.28%), indicative of a young workforce in teaching, a fact that can predispose them to being more familiar with and adaptive to digital literacy tools. It has also been documented through research that younger teachers are more open to the integration of technology in the classroom, while the older educators face an uphill struggle in acquiring digital competencies [27]. In the Philippine setting, young teachers are more open to the use of digital tools in teaching but lack the support of their institutions in fully deploying these tools [28].

More than half of the teachers have 1-5 years of teaching experience (53.98%), and only 1.77% have more than 15 years of experience in teaching. Most of the teachers in Dolores, Eastern Samar, are young in the teaching profession. Literature has shown that early-career teachers are generally open to the idea of integrating digital literacy but lack the skills and confidence to implement this integration with effectiveness. This is in line with the findings by [9], which found that less experienced teachers have higher digital literacy due to more exposure to modern technologies.

The educational attainment of the respondents shows that 64.60% have a bachelor's degree, while 35.40% have a master's degree, hence showing that a lot of teachers are still

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pursuing higher academic qualifications. [29] showed that teachers with higher digital literacy skills had higher self-efficacy in technology integration. Their study concluded that a teacher's technological profile influences their digital literacy levels significantly, which may suggest that higher educational attainment may lead to more confidence and competence in integrating digital tools into the classroom.

As to the grade level taught, slightly more than half (54.87%) of the respondents teach Grades 1– 3, while 30.97% handle Grades 4–6, and 14.16% teach across both grade levels. Recent studies underline the challenges in integrating digital literacy at the elementary grade level. [30] suggested that some barriers are students' difficulties with digital material and limited internet access, so teachers need training, manuals, and infrastructure. [31] focused on the internal challenges of teachers themselves, including attitude, knowledge, skills, and time management, and recommended in-service training and workshops for effective technology use in literacy instruction.

As for the location of the school, the majority (44.25%) taught in upstream areas and only 7.08% came from schools in the islands. Teachers in these remote locations face other obstacles that further hinder the integration of digital literacy: poor internet connectivity, inadequate access to digital devices, and a general lack of ICT training opportunities. Research has shown that educators in rural areas resort to personal initiatives or informal learning networks to acquire digital skills, thus putting into relief the need for systematic policy interventions. This geographic disparity underscores the digital divide and supports the finding of [6], which indicated that rural schools have less access to digital resources compared with their metropolitan counterparts.

Table 1. Distribution of respondents along demographic variables

Demographic Variables	f	%
Age		
20-26	41	36.28%
30-39	54	47.79%
40-49	15	13.27%
50 & above	3	2.65%
Gender		
Male	21	18.58%
Female	90	79.65%
Preferred not to say	2	1.77%
Years of Teaching		
1-5	61	53.98%
6-10	38	33.63%
11-15	12	10.62%
> 15	2	1.77%
Educational Attainment		
Bachelor's degree	73	64.60%
Master's degree	40	35.40%
Grade Level Taught		
Grades 1-3	62	54.87%
Grades 4-6	35	30.97%
Either	16	14.16%
School Location		
Poblacion (town)	26	23.01%
Carline	29	25.66%
Island	8	7.08%
Upstream	50	44.25%

Barriers to Digital Literacy Integration

Table 2 summarizes the perceived barriers to digital literacy integration among elementary teachers. The highest rated concern was that students are not prepared with necessary digital skills (M=3.55, SD=1.02), followed by having insufficient time (M=3.37, SD=0.99), and problems related to curriculum alignment (M=3.27, SD=0.98).

The finding that teachers perceive students' lack of digital literacy as the biggest challenge is consistent with international studies that reveal differences in digital preparedness among young learners. Further evidence is provided by [17], who stated that the lack of digital literacy among students prevents them from engaging meaningfully in the use of technology to drive learning. Similarly, [15] found time constraints and heavy workloads to be a major barrier to teachers adopting digital tools into their teaching. Recent studies have underlined the challenges of integrating digital literacy into the Philippine education

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system, which has a rigid structure and teachers with heavy workloads. [32] noted the existence of systemic barriers, especially in underserved areas where inadequate technology and internet access impede digital learning. [33] pointed to curriculum resistance, inadequate teacher training, a lack of resources, and outdated assessment methods as other obstacles. These findings underline the need for educational reforms of policies and curricula in order to support digital competency development.

Other notable concerns were insufficient technological resources (M=3.24, SD=0.99) and a lack of administrative support (M=3.14, SD=1.10). These results are in line with [12], who noted that inadequate infrastructure and leadership support are disastrous for the process of digital adoption in schools. Studies of challenges in the education system of the Philippines bring out similar concerns, such as inadequate infrastructure and the need for more effective administrative support. [32] discovered the systemic barriers of local schools, especially in underserved areas where there is limited technology and internet access. Much of the literature identifies administrative support as an important factor in sustaining digital literacy initiatives. [34] concluded that effective technology integration results from the interaction and cooperation among administrators, technology support staff, and teachers. These results reveal the serious need for educational authorities to focus on infrastructure deficiency and strengthen the leadership support to ensure the successful implementation of digital literacy.

Table 2. Teacher respondents' perceived barriers to digital integration in elementary education

Statements	Mean	SD	Description	Rank
1. I lack adequate training in digital literacy	2.81	0.91	Neutral	7
2. There is insufficient access to technological resources in my school	3.24	0.99	Neutral	4
3. My students lack basic digital skills necessary for integration	3.55	1.02	Agree	1
4. There is a lack of administrative support for digital literacy initiatives.	3.14	1.10	Neutral	5
5. I face challenges in aligning digital literacy with the existing curriculum.	3.27	0.98	Neutral	3
6. Time constraints hinder my ability to integrate digital literacy	3.37	0.99	Neutral	2
7. I believe that parents are not supportive of digital literacy initiatives.	2.90	1.03	Neutral	6

Proposed Solutions to Digital Literacy Integration

As shown in Table 3, teachers identified several feasible solutions to enhance digital literacy integration. The highest-ranked strategy was mentorship programs (M=3.22, SD=0.70), followed by establishing teacher support networks (M=3.20, SD=0.68) and integrating digital literacy into the curriculum (M=3.15, SD=0.64). These solutions align with [13], who emphasized the importance of peer learning and structured curriculum adjustments for effective technology use.

Recent researches underline the promise of teacher mentorship programs and support networks in integrating digital literacy. [35] have demonstrated that teachers' intention toward the use of technology increases because of collaborative professional learning—learning communities. Likewise, research takes the position that collegial support and sharing would help to surmount the integration barriers. As such,[34] found a team approach is instrumental in greater technology adoption when administered by both administrators and technical support staff who collaborate with teachers. The findings show that mentorship and collaboration are key elements when integrating digital literacy, especially in resource- scarce settings.

Integration of digital literacy in the curriculum is befitting in developing 21st-century skills. The International Society for Technology in Education (ISTE) advocates embedding digital literacy across subjects to empower citizens in the digital age, as noted by [36], effective integration happens within a pedagogical framework, not as an add-on, to ensure the relevance of context. Here in the Philippines, though the Department of Education has outlined a nationwide aspiration to implement the Digital Rise Program, it still faces challenges, especially in the more remote areas [40].

Other solutions were workshops on professional development (M=3.04, SD=0.61) and increased access to technological resources (M=3.04, SD=0.79). Those results are in line with [37], who underlined the necessity of continuous teachers' training and investment in infrastructure. Continuous professional development in the area of digital pedagogy is a requirement for the meaningful integration of available technologies into an educational setting. [38] note that the enhancement of teachers' digital competencies via CPD increases competence but call for context-specific training. [39] points out that asynchronous or modular programs can support teachers with limited ICT access, ensuring inclusivity. Equitable ICT infrastructure is important for the success of digital literacy. The World Bank reports a direct link between digital investments and improved learning outcomes, mostly in underserved regions. In the Philippines, the Digital Schools Program has been put in place to close the digital divide, but it faces huge challenges in connectivity and shortages of devices [39]. Interestingly, the least preferred interventions were to cooperate with parents (M=2.88, SD=0.81) and to give time specifically for digital literacy (M=2.96, SD=0.74). It could thus be assumed that teachers perceive digital literacy as something primarily school- based, not something co-responsed with parents. On the other hand, [16] pointed out that parental digital literacy is important to support children's online learning and that family should be involved in future interventions more actively.

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Table 3. Teacher respondents' perceived solutions to digital integration in elementary education

Statements	Mean	SD	Description	Rank
1.Providing professional development workshops focused on digital literacy.	3.04	0.61	Feasible	4
2.Increasing access to technological resources (e.g., computers, internet)	3.04	0.79	Feasible	4
3.Implementing a mentorship program for teachers to share best practices.	3.22	0.70	Feasible	1
4.Collaborating with parents to promote digital literacy at home.	2.88	0.81	Feasible	7
5.Integrating digital literacy into the existing curriculum framework.	3.15	0.64	Feasible	3
6.Allocating dedicated time in the school schedule for digital literacy activities.	2.96	0.74	Feasible	6
7.Establishing a support network among teachers for sharing resources and strategies.	3.20	0.68	Feasible	2

CONCLUSIONS AND RECOMMENDATIONS

This study attempted to find out the perceived barriers to digital literacy integration in elementary education and propose potential solutions as identified by select elementary teachers in Eastern Samar. From the results of the survey, the following conclusions could be drawn:

1. The teacher respondents were mostly females with a mean age of 32.76 years and a mean teaching experience of 6 years, mostly teaching grade levels 1 to 3 in upstream communities.
2. Teachers see a variety of barriers to integrating digital literacy into the classroom. The largest barriers identified were students' lack of basic digital skills, time constraints that prevent good integration, and a lack of access to technological resources in schools. These findings point to systemic issues that can prevent the effective incorporation of digital literacy into teaching practices.
3. Teachers also suggested a number of workable solutions to these barriers—the three highest rated were provision of teacher mentorship programs, integration of digital literacy into the existing curriculum framework, and creation of a support network through teachers' helps. These kinds of findings suggest that there is an apparent need—to at least be part of, to work with others, and to feel supported—when promoting digital literacy in class.
4. The findings have placed emphasis on the need for extensive professional development in the area of digital literacy. Teachers expressed a desire for mentoring and collaborative opportunities, which suggests that professional learning communities might be an important strategy in developing the skills necessary for successful technology integration.
5. The findings call for increased institutional support to avail resources and time for teachers to engage in professional development that counts toward digital literacy integration. Addressing these needs is important for creating an environment ripe for the integration of digital literacy.

From the conclusions reached by the study, various recommendations are made to policymakers, educational leaders, and practitioners.

1. The first would be to initiate a comprehensive digital literacy program that aims at developing foundational skills in students, and this will be integrated into the curriculum right from an early age so that there is acquisition of competencies by all. Teachers can infuse technology in class activities that involve students in experiential learning. This may include project-based learning where students research, create and present their work using digital tools.
2. The schools should initiate structured mentorship programs where the experienced teachers are paired with the teachers who need guidance in integrating digital literacy. This kind of peer support can enhance the confidence and competence of the educators in the use of technology. The schools should have frequent professional development workshops on digital literacy. The workshops should address both the technical and pedagogical strategies for effectively integrating technology into education.
3. Establish the professional learning communities (PLC) and allow teachers to come together, collaborate, and even share resources while discussing the best practices of bringing in digital literacy. Regular meetings and online forums can help the cause. Resource sharing must be encouraged within a school where the teachers share their lesson plans, digital tools, and successful strategies relating to teaching digital literacy.
4. It is the duty of the policymakers to fund technological resources in schools, especially in underserved and rural areas. This should be directed toward improving the infrastructure, such as access to the internet and hardware availability. Schools should seek partnerships with local businesses and community organizations to secure additional resources and support for technology initiatives. Such a partnership will help in providing the tools and professional development necessary for the good integration of digital literacy.
5. At the institutional level, restructuring of school schedules will enable teachers to have collaborative planning and professional development focused on integration of digital literacy. In this regard, policymakers and leaders in education will review and streamline curricular demands to give teachers flexibility in integrating digital literacy into practice without overwhelm from competing responsibilities.

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