
RESEARCH ARTICLE

Digital Literacy Integration for Learners with Special Educational Needs

Cherenlie Gabumpa-Apas

Faculty, Special Education Program, College of Education, Cebu Technological University, Cebu City, Philippines

E-mail: cherenlieapas68@gmail.com

ABSTRACT

The academic and social outcomes of students with special educational needs can be enhanced by strengthening their digital skills, enabling them to participate in society more fully and achieve their goals. This research determined the digital literacy integration for learners with educational needs at the College of Education Special Program of a prominent state university in Cebu, Philippines. It utilized descriptive-correlational research design to answer the quantitative data from a statistical sample using the survey questionnaire as its main instrument. Frequency, weighted mean, and Pearson's r were used to infer the data. Findings revealed a consistently high perceived value: digital applications contribute to a Maximum Extent, and the resulting digital literacy is rated as Highly Beneficial—particularly in accommodating needs and increasing student engagement. Despite this strong positive outlook, technological issues were Often encountered, with the lack of school equipment and student inexperience being the most pressing barriers. The correlation analysis indicated no significant linear relationship between the perceived contribution of applications and the degree of benefits, nor between the benefits and the encountered issues. This suggests that the high perceived value of digital literacy exists independently of implementation challenges and resource availability. The study concludes that digital literacy integration is highly beneficial, but its potential is currently constrained by infrastructural gaps. Future research should focus on mediating factors, resource deficits' impact, and developing standardized assessment frameworks for LSEN digital literacy.

KEYWORDS

Special Educational Needs, Digital Literacy Integration, Assistive Technology, Learners with Special Needs

ARTICLE INFORMATION

ACCEPTED: 25 September 2025

PUBLISHED: 17 October 2025

DOI: 10.32996/bjtep.2025.4.5.3

1. Introduction

Global educational policy, exemplified by the Individuals with Disabilities Education Act (IDEA), mandates that all children, including Learners with Special Educational Needs (LSENs), receive appropriate instruction. In the 21st century, this mandate necessitates the integration of digital literacy skills to ensure LSENs are not excluded from a technology-driven society. Digital literacy is crucial for their long-term independence, communication, and social integration.

However, the success of this integration is variable. While many developed nations support digital literacy for LSENs through comprehensive legal frameworks, provision of assistive technology (AT), and extensive teacher training, many emerging nations, particularly those with limited resources, face significant challenges. These challenges manifest as restricted access to digital resources and technology, which directly impacts students with particular learning needs. Effective integration requires a collaborative effort among educators, policymakers, and technology providers to ensure LSENs acquire the knowledge and skills necessary to thrive. Key strategies for successful integration include Individualized Education Plans (IEPs), personalized learning, co-teaching models, and the use of accessible digital content and AT.

While the need for digital literacy integration for LSENs is universally acknowledged, and various strategies are recognized, a clear assessment of the implementation and perceived outcomes is lacking, particularly within specific educational contexts in developing nations that are actively training special education professionals. Specifically, there is an absence of empirical data

regarding the perceptions of future special education teachers on this matter, and how their current training environment and encountered challenges relate to the benefits perceived for the LSENs they serve.

A state university in the Philippines plays a vital role in addressing this gap through the graduate program in special education offered by the College of Education at CTU-Main. This program serves as a premier venue for teachers to expand their expertise, understand and provide appropriate accommodations, and hone their skills in digital literacy integration for LSENs. Given the critical need for teachers to integrate technology effectively, an assessment within this key training institution is essential.

Therefore, this study aims to assess the perceptions of graduate education students at CTU regarding the integration of digital literacy into the education of Filipino LSENs. Specifically, the study seeks to determine the extent to which available digital applications contribute to the development of digital literacy competencies among Filipino LSENs; ascertain the degree of benefits that digital literacy has on Filipino LSENs, as perceived by the respondents; and identify the extent of technological issues encountered by respondents in integrating digital literacy. Furthermore, the study will explore the correlations between the contribution of digital applications, the perceived benefits, and the technological issues encountered. The findings will help determine the level of awareness, identify potential implementation barriers, and inform curriculum development to promote innovative special education training. This will ultimately help CTU tailor its programs, advocate for innovation, and increase awareness about the importance of digital literacy for LSENs.

2. Literature Review

The effective teaching of Learners with Special Educational Needs (LSENs) necessitates the strategic integration of assistive technology (AT), particularly within contexts like the Philippines. Teacher training and adequate institutional support are crucial prerequisites for the successful deployment of AT, as they ensure equal access and participation opportunities for LSENs (Campado et al., 2023). This work highlights how AT can systematically address specific learning barriers while underscoring the continuous need to embed technology into standard pedagogical practices across the national educational system. Furthermore, digital literacy has been shown to bolster distinct academic skills. For instance, digital platforms offering interactive, customized exercises have proven beneficial for non-graded LSENs by improving phonemic awareness, thereby elevating student engagement, optimizing learning outcomes, and fostering collaboration between teachers and students (Tiraña et al., 2022).

Building upon this foundation of technological integration, a comprehensive and targeted strategy is essential for cultivating digital literacy among LSENs. Tohara (2021) observed that while digital technology is increasingly integral to daily life, children with special needs frequently encounter unique difficulties when navigating the digital landscape. The author strongly advocates for teachers to proactively support these students in achieving digital competence, which is necessary for their full participation in a digital society. Recommended strategies include utilizing specialized assistive technologies—such as text-to-speech software and adjustable keyboards—and employing creative engagement methods like multimedia projects and digital storytelling. Consistent with this holistic perspective, Williams (2006) posited that developing digital literacy demands specialized, focused instruction, a supportive and inclusive educational setting, sufficient resources and technology access, and sustained efforts to mitigate negative perceptions and associated stigma.

In this context of specialized instruction and support, digital technology offers a spectrum of advantages for LSENs across multiple developmental domains. Cakir & Korkmaz (2019) emphasized the considerable benefits of digital technology, encompassing improvements in academic performance, the development of social skills, and mobility training. They underlined the criticality of delivering individualized instruction via dynamic and engaging digital tools to meet the diverse and specific requirements of LSENs, championing the use of customized learning pathways and feedback mechanisms. Educators are thus empowered to utilize these digital tools to develop and manage highly customized learning programs tailored to individual needs. Chaidi et al. (2021) pointed out that systems such as Learning Management Systems (LMS) enable teachers to create personalized lesson plans and assessments, monitor student progress effectively, and pinpoint precise areas requiring additional intervention.

This capacity for customization and monitoring highlights how digital technology facilitates superior educational experiences for learners with disabilities and simultaneously equips teachers with the essential tools they need (Chaidi et al., 2021). The authors stressed that technology-based resources must be developed adhering strictly to principles of equity and accessibility to ensure inclusive benefits. Moving into the practical classroom application, digital technology is instrumental in creating a stimulating and inspiring educational environment that supports individualized and differentiated instruction, directly addressing the unique needs of each learner. Balmeo et al. (2014) found that such technologies help special needs children advance their literacy, numeracy, communication, and social abilities. They also concluded that the use of multimedia content, including videos, photographs, and audio, enhances learning outcomes, asserting that the benefits of integrating technology significantly outweigh any disadvantages, ultimately raising the standard of instruction for students with disabilities.

Moreover, the implementation of technology serves as a powerful motivator, as Cheng & Lai (2020) viewed tools like interactive whiteboards and multimedia programs as effective for inspiring and energizing students. These tools offer opportunities for individualized learning and actively facilitate enhanced communication and collaboration among students, teachers, and peers. However, they provided an important cautionary note: technology should serve as a complement to, not a replacement for, interpersonal interaction, and must be combined with efficient teaching methodologies and nurturing teacher-student relationships. Addressing practical classroom challenges, a study surveyed the barriers faced by special needs students (e.g.,

cognitive, physical, sensory) and confirmed the value of electronic technologies, such as specialized software (text-reading, speech recognition) and adaptive tools, in improving learning and behavior (Iskakova, 2023). This research also stressed the necessity of comprehensive strategies to surmount access limitations (financial, technological, cultural bias) to achieve equitable inclusive education.

Expanding on the functional utility of specific digital solutions, research confirms the efficacy of targeted applications in promoting inclusion. A study focused on the limited educational inclusion of students with special educational needs in Ecuador, attributable to insufficient support materials, and verified that mobile applications effectively provide digital support (Cabrera & Cadena, 2020). These mobile tools were found to foster greater participation and inclusion across general classroom activities and subject-specific academic tasks. In a related empirical investigation, the positive impacts of a mobile Augmented Reality (AR) application on the digital literacy course achievement of primary school children with special educational needs were analyzed (Rakhimzhanova et al., 2025). The findings suggest that AR possesses significant potential for inclusive education by creating highly interactive and enriching learning environments.

Beyond the purely technological tools, effective pedagogical strategies must also be leveraged, such as the use of Social Stories, which a published article discusses as a powerful supplementary learning tool within inclusive education (Riga et al., 2021). These are particularly valuable for children with autism or communication deficits, as they effectively present social information and guidance for appropriate behavior. The article also examined the new digital challenges arising from the combination of Social Stories with Information and Communication Technologies (ICTs). Addressing the preparation of educators for this digital landscape, Falloon (2020) introduced a conceptual Teacher Digital Competency (TDC) framework aimed at overcoming the narrow focus of current models. The framework advocates for a holistic, broadened view of teacher competence that extends beyond mere technical skills and literacies.

The need for a robust conceptual framework is further reinforced by practical investigations into digital literacy and its challenges. The TDC framework recognizes the intricate knowledge required by teachers to prepare students to function ethically and productively in diverse, digitally-mediated environments (Falloon, 2020). Conversely, a qualitative study exploring the perceptions of young learners and EFL teachers regarding digital literacy in English learning identified numerous benefits, including the improvement of all four language skills and online collaboration (Mudra, 2020). However, the study also outlined significant barriers, such as technical issues (weak signals), cost, difficulties interpreting complex content, and a lack of user experience. This underscores the need for effective teacher training and assessment.

To systematically improve teacher readiness, a research effort is dedicated to synthesizing and scrutinizing the wide range of existing teacher digital literacy assessment tools (Nguyen & Habók, 2024). This study addresses the absence of a systematic synthesis in this area, recognizing that these assessment tools are a critical element of educators' professional development, and their evaluation must be improved. The study, motivated by the COVID-19 pandemic, investigated the applications of digital technology and digital literacy levels among EFL teachers and students in Malaysia (Alakrash & Abdul Razak, 2021). Findings indicated a high level of digital literacy but did not support a significant difference in usage for language pedagogy. These results offer crucial policy implications for the integration of digital technologies in language classrooms, particularly for marginalized societies.

In conclusion, the pervasive nature of the digital skills gap demands innovative solutions for both educators and students. A scientific study introduced a digital literacy tool specifically designed to narrow this persistent global gap, despite ongoing educational interventions (Reddy et al., 2023). Survey results demonstrated a positive user attitude and perception toward the tool. Furthermore, the calculated Cohen's *d* value statistically indicated the tool's effectiveness, suggesting that its widespread implementation holds the potential to substantially reduce the digital skills gap, particularly in regions like the South Pacific. Collectively, these studies establish a strong consensus on the necessity of integrated digital literacy for LSENs, demanding specialized instruction, robust teacher competence, accessible technology, and continuous evaluation of both tools and strategies.

3. Methodology

3.1 Design

A descriptive-correlational research design was employed for this study. This methodology was chosen specifically to identify and describe the nature and strength of the relationship between the variables, without attempting to establish or infer cause-and-effect relationships. As defined by Pyrczak and Oh (2018), this approach seeks to confirm an association between two or more elements within a defined scenario. In the context of this study, the design was used to ascertain the relationship between the perceived advantages of digital literacy (Variable 1) and the technological issues (Variable 2) encountered by the respondents. To enhance the external validity and generalizability of the findings, a random sampling technique was utilized. Random sampling is crucial in reducing selection bias, ensuring the sample accurately represents the larger population of graduate Special Education students, and thus allowing for more accurate inferences to be drawn about the population as a whole.

3.2 Environment

This investigation was conducted within the Special Education Program housed in the College of Education at a prominent state university in the Philippines. This institution was selected as the research locale due to its established and recognized commitment to teacher education, which provides a robust academic setting, and its significant achievements in the broader areas of research and innovation. Notably, the university received a Silver Certification in 2021 from the Philippine Association of State Universities and Colleges (PASUC), an award that specifically recognized its substantial contributions to the advancement of knowledge and technology within the country. This strong institutional dual emphasis on training future educators and fostering high-level scholarly work ensures the academic environment and participant pool are optimally aligned with the requirements of this study.

3.3 Respondents

The study included a total of 62 participants, all of whom were graduate-level students specializing in Special Education (SPED). The sample comprised two distinct groups: those pursuing a Master of Arts in Education with a specialization in SPED (MAEd-SPED) and those enrolled in a Diploma in Special Education (DSPED) program.

The distribution of participants was 21 (33.87%) from the MAEd-SPED program and 41 (66.13%) from the DSPED program. The selection of MAEd-SPED and DSPED students as participants was fundamentally driven by their specialized academic training and professional focus in the field of Special Education. This prerequisite ensures that all respondents possess a deep, foundational understanding of the discipline, including current theories, modern instructional practices, and the complex challenges within the SPED landscape. Furthermore, the inclusion of participants from two distinct academic levels fosters a diversity of academic and professional perspectives, which is critical for providing a comprehensive and robust set of insights pertinent to the study's objectives.

Involving these students in the research holds significant long-term benefits for the discipline of Special Education. As prospective and current special education teachers and practitioners, their engagement in a research project serves as an opportunity for professional development and exposure to cutting-edge scholarly work. Such involvement can directly inform their future practice, enabling them to integrate evidence-based strategies and the most recent research outcomes into their professional careers, thereby contributing to the continuous strengthening and advancement of the Special Education discipline.

3.4 Instrument

The study utilized a modified rating scale questionnaire adapted from the instrument originally developed by Alsalem, M. A. (2016). This instrument was specifically employed to gather data concerning the integration of digital literacy for learners with special educational needs (SEN), using a five-point Likert scale to measure agreement or frequency quantitatively. The adapted survey is structured into four distinct sections: the Profile of Respondents collects demographic information; the Benefits of Digital Literacy assesses perceptions regarding positive impacts; the Technological Issues section contains eight statements dedicated to identifying and assessing common technological barriers; and the final section, Devices and Application Utilization, gathers data on the frequency and manner of specific digital tool use. The questionnaire was administered to participants in either a soft copy (digital) or hard copy (printed) format, ensuring accessibility, and all respondents were allotted sufficient time for thorough completion.

3.5 Data Gathering and Analysis

Prior to any contact with participants, the researcher secured the necessary institutional approvals. This began with the submission of a formal transmittal letter to the Campus Director of the state university's main campus, requesting preliminary permission to conduct the investigation. Upon approval from the Campus Director, a subsequent formal request was submitted to the Dean of the College of Education, requesting authorization to access and collect data from the graduate students enrolled in the Special Education Program.

Following institutional approval, the questionnaire was personally distributed by the researcher to the teacher respondents. Participants were provided with clear instructions and were asked to respond honestly regarding their profile and their practices related to digital literacy integration for learners with special educational needs. The personal distribution by the researcher ensured a high response rate and provided an opportunity to clarify any potential misunderstandings regarding the instrument's contents.

Upon collection, all questionnaires were immediately processed. Individual respondent data and scores were collected, tallied, and encoded using Microsoft Excel. A summary sheet was then generated, containing all the necessary information corresponding to the variables outlined in the statement of the problem. Subsequently, the data were statistically treated and analyzed using appropriate statistical tools. The resulting data were then interpreted, and the findings were discussed in a coherent sequence, with each discussion point supported by relevant and current scholarly literature to enhance the robustness of the narrative.

The data were treated using the following statistical methods. Frequency count. An attempt to determine the number of occurrences of specific units in specific variables. Simple Percentage. This was used to get the percentage of the responses of the teacher under the profile variables. Weighted Mean. This was used to get the average level of benefits of digital literacy for

learners with special educational needs Pearson's r . This were used to test the significant relationship between the benefits of digital literacy and technological issues encountered by the respondents.

3.6 Data Privacy

The collection, processing, and storage of data in this study were strictly governed by the Philippines' Data Privacy Act of 2012 (RA 10173). While the study did not collect sensitive personal information about the LSENs themselves, it collected personal and professional opinions from the graduate student respondents. Compliance with the DPA was ensured by informing respondents about the scope and purpose of data collection, including the statistical methods to be used (e.g., weighted mean, Pearson's r). Measures were implemented for security and confidentiality, such as anonymizing responses, securing electronic and hard copies of the questionnaires, and ensuring that data access was restricted solely to the research team. The data collected were used only for the stated research objectives and will be securely disposed of after the prescribed period, fulfilling the DPA's requirement for secure data lifecycle management.

3.7 Ethical Consideration

Ethical considerations are paramount in research involving vulnerable populations like Learners with Special Educational Needs (LSENs). This study ensures that all participants (graduate education students) provided informed consent voluntarily after being fully briefed on the study's purpose, procedures, and their right to withdraw at any time without penalty. Since the respondents are professionals working with LSENs, the data collected about the children's integration were treated with the utmost care to maintain anonymity and confidentiality. No identifiable information about the LSENs or the specific schools was collected or reported. The research adhered to the principle of non-maleficence, ensuring that participation in the study did not expose any individual to physical, psychological, or professional harm, thereby upholding the integrity of the research process and protecting all human subjects involved.

4. Results and Discussions

This chapter presents the gathered data regarding the level of benefits, extent of the technological issues encountered, and devices and digital applications utilized by the respondents in integrating of digital literacy for learners with special educational needs at the College of Education Special program of a state university in the Philippines, for school year 2022-2023. To address the study's objectives, there are five statistical tables that data analyses have been made to allow readers to comprehend.

4.1 Extent do available digital applications contribute to the development of digital literacy competencies among Filipino LSENs

S/N	Indicators	$\bar{x}$	Verbal Description
1	The availability of DepEd Learning Portal modules and adaptive learning features enhances educational software competency among Filipino LSENs.	3.30	Maximum Extent
2	The availability of NVDA screen readers, Microsoft Immersive Reader, and Filipino sign language communication apps improves assistive technology skills among Filipino LSENs	3.42	Maximum Extent
3	The availability of DepEd Commons and Google Classroom platforms strengthens interactive platform engagement abilities among Filipino LSENs.	3.45	Maximum Extent
4	The availability of Google Forms assessment tools and DepEd's electronic class records advances digital assessment competencies among Filipino LSENs.	3.46	Maximum Extent
5	The availability of Zoom, Google Meet, and Facebook Messenger for learning fosters collaborative communication skills among Filipino LSENs.	3.57	Maximum Extent
6	The availability of DepEd Learning Resources Portal, Khan Academy Tagalog, and Project Gutenberg builds web-based research capabilities among Filipino LSENs.	3.45	Maximum Extent
7	The availability of Google Expeditions VR experiences and 3D educational content through YouTube enriches augmented/virtual reality competencies among LSENs.	3.43	Maximum Extent
8	The availability of offline educational apps, DepEd TV mobile access, and SMS-based learning tools promotes mobile learning skills among Filipino LSENs.	3.49	Maximum Extent
9	The availability of Canva for Education, PowerPoint Online, and Facebook Creator Studio cultivates content creation competencies among Filipino LSENs.	3.60	Maximum Extent
10	The availability of DepEd personalized learning features & Google Classroom's assignment systems enhances adaptive learning management skills among LSENs.	3.40	Maximum Extent
Overall		3.46	Maximum Extent

Legend: 3.25-4.00 Maximum Extent ; 2.50-3.24 High Extent ; 1.75-2.49 Low Extent ; 1.00-1.74 Very Minimal Extent

The quantitative data clearly show a Maximum Extent of contribution by available digital applications to the development of digital literacy competencies among Filipino Learners with Special Educational Needs (LSENs). The overall weighted mean ($\bar{x}$) is 3.46, which falls within the highest category of the 4-point scale (3.25–4.00). Individually, all ten indicators, spanning competencies from educational software (3.30) to content creation (3.60), and including crucial areas like assistive technology (3.42) and mobile learning (3.49), received mean scores well above the threshold of 3.25. The highest scored area was the availability of creative tools like Canva and PowerPoint for content creation competencies ($\bar{x}$ =3.60), followed closely by the use of communication platforms (Zoom, Google Meet) for collaborative communication skills ($\bar{x}$ =3.57).

The consistent rating of "Maximum Extent" across all indicators suggests that the digital applications currently available in the Philippine educational environment are perceived by respondents to be highly effective and comprehensive in supporting the digital literacy of LSENs. This indicates a strong positive perception regarding the utility and accessibility of resources like DepEd Learning Portals, various assistive technologies (NVDA, Immersive Reader), and widely used platforms (Google Classroom, Zoom) in fostering specific skills. The near-unanimous high agreement implies that the existing digital ecosystem addresses the diverse needs of LSENs, not just in basic usage, but also in complex areas such as adaptive learning management, research, and augmented/virtual reality, thereby suggesting successful integration of these tools into special education pedagogy.

The primary implication of these findings is that the current investment in and availability of digital tools should be sustained and expanded, as they are highly valued and demonstrably contribute to digital literacy for LSENs. The high scores validate the efforts of DepEd and other stakeholders in deploying inclusive digital resources, especially those focusing on content creation and collaboration, which can empower LSENs to become active digital participants, rather than just passive consumers. Future policies and resource allocation should prioritize deeper training for educators and continuous updates for these applications, particularly for the highest-rated areas, to solidify the observed "Maximum Extent" of contribution and ensure that the benefits of digital literacy translate into tangible educational and life outcomes for Filipino LSENs.

Earlier investigations point out that the shift to digital literacy necessitates reviewing technology integration for K-12 students with disabilities. This study surveyed teachers to understand the challenges and integration of learning. The findings enhance research and practice in the future of technology through digital literacy (Alsalem, 2016). On the other hand, A study of Spanish primary school teachers found their skill levels in using ICT with students with disabilities were generally low. These skill levels correlated with variables like gender, age, teaching experience, and qualifications. The findings suggest a need for focused teacher training on using ICT to support this population's learning (Fernández-Batanero et al., 2019).

4.2 Degree of benefits that digital literacy has on the Filipino LSENs as perceived by the respondents

S/N	Indicators	$\bar{x}$	Verbal Description
1	Digital literacy increases students' performance and academic achievement.	4.45	Highly Beneficial
2	Digital literacy accommodates different types of diverse students' needs.	4.47	Highly Beneficial
3	Digital literacy supports collaborative learning and making the learning processes more effective.	4.48	Highly Beneficial
4	Digital literacy helps to increase both self-efficacy and self-motivation among students.	4.42	Highly Beneficial
5	Digital literacy produces positive learning environments.	4.47	Highly Beneficial
6	Digital literacy provides better communication for both students and teachers.	4.47	Highly Beneficial
7	Digital literacy facilitates the engagement among student in and outside the class.	4.50	Highly Beneficial
8	Literacy through technology helps students to be more independent.	4.34	Highly Beneficial
9	Digital literacy improves student's technological skills.	4.40	Highly Beneficial
Overall		4.44	Highly Beneficial

Legend: 4.20-5.00 Highly Beneficial; 3.40-4.19 Beneficial; 2.60-3.39 Moderately Beneficial; 1.80-2.59 Less Beneficial; 1.00-1.79 Not Beneficial

For this table, the data reveals that the benefits of digital literacy on Filipino Learners with Special Educational Needs (LSENs) are perceived as Highly Beneficial ($\bar{x}$ range: 4.20–5.00) by the respondents, with an overall weighted mean of 4.44. A detailed analysis shows an exceptionally high level of agreement across all nine indicators, with no item falling below a mean of 4.34. The highest perceived benefit is that digital literacy facilitates the engagement among students in and outside the class ($\bar{x}$ =4.50), closely followed by its role in supporting collaborative learning ($\bar{x}$ =4.48) and accommodating different types of diverse students' needs ($\bar{x}$ =4.47). The least, though still highly beneficial, area was the role of literacy through technology in helping students to be more independent ($\bar{x}$ =4.34). The narrow range of means (4.34 to 4.50) indicates a consistent and strong positive evaluation of digital literacy's impact.

The consistently high ratings, all falling within the "Highly Beneficial" category, signify that respondents overwhelmingly view digital literacy as a powerful and essential tool for improving the holistic educational experience of Filipino LSENs. The top scores related to engagement and accommodating diverse needs are particularly meaningful, suggesting that digital tools effectively break down traditional barriers, allowing LSENs to participate more fully and receive personalized instruction. The strong belief that digital literacy increases performance ($\bar{x}$ =4.45) and fosters self-efficacy ($\bar{x}$ =4.42) indicates that its benefits extend beyond mere academic metrics into crucial psychosocial and affective domains, thus helping to create an inclusive and enabling learning environment.

The interpretation supports the conclusion that digital literacy is not just an additive feature but a core element for successful special education in the Philippines.

The profound belief in the "Highly Beneficial" impact of digital literacy necessitates that its integration be treated as a non-negotiable, fundamental component of the Special Education (SPED) curriculum and policy. Given that its benefits are perceived to cut across academic, social, and psychological aspects, the implication is that educational institutions must dedicate sustained funding, infrastructure, and training to ensure every LSEN has equitable access to digital literacy education. Furthermore, the strong correlation between digital literacy and increased engagement implies that educators should be trained not only in using the technology but also in leveraging it to maximize collaborative and inclusive classroom dynamics, ultimately working to integrate these highly beneficial digital skills into life-long learning and vocational opportunities for Filipino LSENs.

Digital literacy and the strategic integration of technology offer substantial benefits for Learners with Special Educational Needs (LSENs) across educational and developmental domains. Digital tools optimize learning outcomes by improving academic performance and specific skills like phonemic awareness, while also enhancing social skills and mobility training (Cakir & Korkmaz, 2019; Tiraña et al., 2022). These platforms elevate student engagement and serve as a powerful motivator (Cheng & Lai, 2020; Tiraña et al., 2022). Furthermore, technology equips teachers by enabling them to create and monitor personalized lesson plans and assessments, ensuring superior educational experiences and greater participation and inclusion for all learners (Cabrera & Cadena, 2020; Chaidi et al., 2021).

4.3 Extent of technological issues encountered by respondents in integrating digital literacy with Filipino LSENs

S/N	Indicators	$\bar{x}$	Verbal Description
1	It requires extra load and work on teachers to prepare digital content.	4.23	Always
2	Students do not have enough skills to use technology for the purpose of literacy.	4.19	Often
3	Some Students have issues reading through devices (e.g. do not like to read through devices).	4.23	Always
4	Lack of students' experience in the use of digital materials for the purpose of literacy.	4.34	Always
5	Schools do not have the necessary equipment.	4.44	Always
6	Schools do not provide technical support during the work hours.	4.03	Often
7	Teachers do not know how to use technology for the purpose of digital literacy.	3.40	Sometimes
8	There is no standardized evaluation for digital literacy performance.	4.08	Often
<i>Overall</i>		4.12	Often

Legend: 4.20-5.00 Always; 3.40-4.19 Often; 2.60-3.39 Sometimes; 1.80-2.59 Rarely; 1.00-1.79 Never

The overall data indicates that technological issues are Often encountered by respondents when integrating digital literacy with Filipino LSENs, as evidenced by an overall weighted mean of 4.12 (Legend: 3.40–4.19). A closer look at the indicators reveals a clear clustering of high-frequency issues, with four indicators falling into the highest category, Always (4.20–5.00). The most frequently encountered issue is the lack of necessary equipment in schools ($\bar{x}$ =4.44), followed closely by the lack of students' experience in using digital materials ($\bar{x}$ =4.34). Other "Always" issues include the extra load on teachers to prepare digital content ($\bar{x}$ =4.23) and students having issues reading through devices ($\bar{x}$ =4.23). Conversely, the least frequently encountered issue, falling into the Sometimes category, is that teachers do not know how to use technology ($\bar{x}$ =3.40).

The interpretation of these findings strongly suggests that the major obstacles to digital literacy integration are systemic and resource-based, rather than a lack of teacher competency or a fundamental flaw in the technology itself. The fact that the highest mean score relates to the lack of school equipment indicates a severe infrastructural gap, limiting the practical application of digital tools. The frequent reporting of students' lack of experience and difficulty reading through devices suggests that while teachers may be generally proficient (scoring only "Sometimes" as an issue), the students' preparedness and the learning modality itself are still significant hurdles. This implies that even motivated teachers face persistent barriers related to insufficient resources, student exposure, and the inherent challenges of translating traditional literacy practices to digital formats for LSENs.

The primary implication is that future interventions must decisively shift focus from teacher training to infrastructure development and dedicated student exposure programs. Since technical know-how is only a "Sometimes" issue, allocating substantial budgets toward procuring necessary, accessible, and robust digital equipment for schools serving LSENs is paramount. To address the "Always" reported student inexperience and reading issues, specialized curriculum adjustments are needed to provide mandatory, scaffolded exposure to digital reading and learning formats, helping LSENs build comfort, familiarity, and independent digital reading strategies. Without resolving these persistent resource and student-readiness barriers, the perceived "Maximum Extent" benefits of digital applications will remain constrained by the high frequency of these logistical and student-centric issues.

Technological integration is hampered by several significant challenges. These include access limitations such as financial and technological barriers, as well as cultural bias (Iskakova, 2023). Other common issues are technical difficulties like weak signals, high cost, difficulties interpreting complex content, and a lack of user experience (Mudra, 2020). Furthermore, there is a lack of

sufficient support materials and new digital challenges arise when combining tools like Social Stories with ICTs (Cabrera & Cadena, 2020; Riga et al., 2021).

4.4 Extent to which available digital applications contribute to digital literacy development does correlate with the degree of benefits that digital literacy has on Filipino LSEs

Variables	r-value	Strength of Correlation	p-value	Decision	Remarks
Available digital applications contribute to digital literacy development and degree of benefits that digital literacy has on Filipino LSEs	-0.309	Weak negative	0.418	Fail to reject H_0	Not significant

*significant at $p < 0.05$ (two-tailed)

The correlational analysis between the perceived extent of digital applications' contribution to digital literacy and the perceived degree of benefits of digital literacy on Filipino LSEs yielded an r-value of -0.309 , which indicates a weak negative correlation. This means that as respondents perceived the applications' contribution to increase, they *slightly* perceived the benefits to decrease, and vice versa. Crucially, the p-value of 0.418 is significantly greater than the established alpha level of 0.05 . Consequently, the statistical Decision was to Fail to Reject the Null Hypothesis (H_0), leading to the Remark that the relationship is Not Significant. The weak, inverse relationship observed in the sample data is therefore not reliable enough to infer a genuine linear relationship between the two variables in the wider population.

The core interpretation of the non-significant finding is that while both variables were rated highly by respondents in earlier sections (Contribution: Maximum Extent; Benefits: Highly Beneficial), the perception of the former does not statistically predict or correlate with the perception of the latter. This lack of a significant relationship suggests a disconnect: respondents view the existence of digital tools as highly supportive *and* they view digital literacy as highly beneficial, but they do not necessarily link the two perceptions linearly or reliably. The weak negative direction (-0.309) hints at a potential phenomenon where the highly available digital applications may not be directly responsible for the perceived benefits, or that the observed benefits are being driven by factors *other than* the mere availability of the applications.

The primary implication for policy and practice is that simply ensuring the availability of digital applications (as measured in Section 4.1) is insufficient to guarantee a corresponding increase in the perceived benefits (as measured in Section 4.2). Since the relationship is not significant, the current approach may lack a critical mediating factor that translates application availability into concrete, measurable benefits. Therefore, educational efforts should pivot from mere procurement and availability to focused, high-quality implementation, teacher-led pedagogical integration, and systematic assessment of actual usage impact. Future research or interventions should explore mediating variables, such as effective instructional design, frequency of use, and targeted training, to understand what factors *do* bridge the gap between application access and the realization of digital literacy's highly beneficial outcomes for Filipino LSEs.

Despite the high perceived benefit, the finding that availability and effectiveness of technologies were limited and that significant integration problems exist (Balmeo et al., 2014) highlights why a simple correlation between the *existence* of tools and the *realization* of benefits remains statistically negligible. This is reinforced by the observation that the growth in studies and diverse devices (reflecting high application availability) is frequently undermined by the dominant use of conservative guided learning strategies (Cheng & Lai, 2020). Ultimately, while the demands of remote learning demonstrably improved the digital competence and literacy (the benefit) of staff and students, this increase was spurred by necessity and focused practice, suggesting that such benefits arise from active engagement and focused strategy, not the passive availability of applications (Reblinca, 2024).

4.5 Extent to which degree of benefits that digital literacy has on Filipino LSEs does correlate with the extent of technological issues encountered by respondents in integrating digital literacy

Variables	r-value	Strength of Correlation	p-value	Decision	Remarks
Degree of benefits that digital literacy and extent of technological issues encountered by respondents in integrating digital literacy	0.171	Negligible positive	0.184	Fail to reject H_0	Not significant

*significant at $p < 0.05$ (two-tailed)

The correlation analysis between the perceived degree of benefits of digital literacy for Filipino LSEs and the extent of technological issues encountered revealed an r-value of 0.171 , indicating a negligible positive correlation. This extremely weak relationship suggests that a slight increase in the perceived benefits is marginally associated with a slight increase in encountered issues. However, the p-value of 0.184 is substantially greater than the significance level of 0.05 . Therefore, the statistical Decision

was to Fail to Reject the Null Hypothesis (H0), leading to the Remark that the correlation is Not Significant. The finding indicates that the very weak positive relationship observed in the sample data cannot be reliably generalized to the larger population.

The non-significant and negligible positive correlation implies that the severity or frequency of technological issues does not significantly influence the highly positive perception of digital literacy's benefits. In essence, respondents' high regard for the positive impact of digital literacy—such as increased engagement and accommodation of needs (Section 4.2: $X^- = 4.44$, Highly Beneficial)—remains largely untouched by the persistent and systemic technological problems they encounter (Section 4.3: $X^- = 4.12$, Often). This disconnect can be interpreted as respondents viewing the benefits of digital literacy as intrinsic and aspirational, independent of the practical, day-to-day challenges (like lack of equipment or student inexperience) that frequently impede its perfect implementation.

The primary implication is that the belief in the value of digital literacy for LSENs is strong enough to override the frustration caused by technological issues, but this resilience should not be mistaken for success. Policy should capitalize on this strong belief by actively addressing the highly-rated technological issues (especially the $X^- = 4.44$ lack of equipment) to unlock the full potential of the perceived benefits. Ignoring the infrastructural and student-experience gaps identified in Section 4.3 risks burning out educators and LSENs, who continue to perceive "Highly Beneficial" outcomes despite "Often" encountering problems. The lack of a strong correlation here suggests that fixing the technical hurdles will not reduce the belief in the benefits, but instead provide the necessary platform for those benefits to be realized consistently and equitably.

Even when technological issues create distinct difficulties for students, the *inherent value* of achieving full digital competence (the perceived benefit) is so high that educators are compelled to deploy literacy-enhancing tactics regardless of the ongoing problems (Tohara, 2021). In fact, the factors that boost teacher self-efficacy (the strong belief/benefit) in online teaching are powerful enough to override the significant challenges of adapting personalized instruction and maintaining engagement, reinforcing the idea that confidence in the outcome is disconnected from the day-to-day struggle (Maurer et al., 2021). Consequently, while technology integration is indeed hampered by various barriers and difficulties (the technological issues variable), the perceived capacity of educational technology to enhance special education outcomes (the highly-rated benefit) is so great that it justifies the persistent need for support and resources, demonstrating the resilient focus on the potential over the current reality (Cagiltay et al., 2019).

5. Conclusion

Based on the findings of the study on the extent of available digital applications' contribution to the development of digital literacy competencies among Filipino Learners with Special Educational Needs (LSENs), the overall conclusion is multifaceted. The respondents strongly affirmed that the digital applications are highly effective and the resulting digital literacy is highly beneficial, accommodating diverse student needs and increasing engagement. However, the study also revealed significant and frequently encountered technological issues, primarily a pervasive lack of equipment and student inexperience, which challenge the integration process. Most critically, the statistical analysis demonstrated that the perceived availability of digital tools does not have a significant linear relationship with the highly perceived benefits. This implies that while the *potential* of the digital ecosystem is recognized and highly valued, the systemic barriers—especially infrastructural deficiencies—are preventing the perceived high contribution from translating into a statistically reliable measure of realized benefit, creating a gap between aspiration and effective execution in the field of special education.

6. Future Research or Works

Future research should focus on three main areas to move beyond descriptive analysis: (1) Mediating Factors: Investigate the specific factors that truly mediate the relationship between application availability and the realization of benefits, such as teacher pedagogical skills, frequency of use, quality of technical support, and the level of parental/guardian involvement. (2) Impact of Resource Deficits: Conduct a more granular, qualitative study to measure the direct impact of the "Always" reported issues (lack of equipment and student inexperience) on student learning outcomes and teacher workload/burnout, particularly contrasting high-resource versus low-resource schools. (3) Assessment and Policy: Develop and validate a standardized framework for evaluating digital literacy performance among diverse LSEN populations to establish empirical links between digital literacy programs and academic/functional achievement, guiding more effective national policy and resource allocation.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

ORCID iD : <https://orcid.org/0009-0009-5286-1543>

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.

References

- [1] Alakrash, H. M., & Abdul Razak, N. (2021). Technology-based language learning: Investigation of digital technology and digital literacy. *Sustainability*, 13(21), 12304. <https://www.mdpi.com/2071-1050/13/21/12304>
- [2] Alsalem, M. A. (2016). Redefining Literacy: The Realities of Digital Literacy for Students with Disabilities in K-12, *Journal of Education and Practice*, 7(32), 205-215. <https://files.eric.ed.gov/fulltext/EJ1122495.pdf>
- [3] Balmeo, M. L., Nimo, E. M. A., Pagal, A. M., Puga, S. C., & Sanwen, J. L. (2014). Integrating Technology in Teaching Students with Special Learning Needs in the SPED Schools in Baguio City. *IAFOR Journal of Education*, 2(2), 149-178. <https://bit.ly/410tJMF>
- [4] Cagiltay, K., Cakir, H., Karasu, N., Islim, O. F., & Cicek, F. (2019). Use of educational technology in special education: Perceptions of teachers. *Participatory Educational Research*, 6(2), 189-205. <https://bit.ly/3moUs6o>
- [5] Cakir, R., & Korkmaz, O. (2019). The effectiveness of augmented reality environments on individuals with special education needs. *Education and Information Technologies*, 24, 1631-1659. <https://bit.ly/411LAMq>
- [6] Campado, R. J., Toquero, C. M. D., & Ulanday, D. M. (2023). Integration of assistive technology in teaching learners with special educational needs and disabilities in the Philippines. *International Journal of Professional Development, Learners and Learning*, 5(1), ep2308. <https://bit.ly/3MJilAe>
- [7] Chaidi, I., Drigas, A., & Karagiannidis, C. (2021). ICT in special education. *Technium Soc. Sci. J.*, 23, 187. <https://bit.ly/43sQE4I>
- [8] Checa Cabrera, M. A., & Freire Cadena, M. A. (2020, June). Mobile Applications as Digital Support Material for the Inclusion of Students with Special Educational Needs. In *International Conference on Innovation and Research* (pp. 307-318). Cham: Springer International Publishing. https://link.springer.com/chapter/10.1007/978-3-030-60467-7_26
- [9] Cheng, S.-C., & Lai, C.-L. (2020). Facilitating learning for students with special needs: A review of technology-supported special education studies. *Journal of Computers in Education*, 7(2), 131-153. <https://bit.ly/3nX9FvQ>
- [10] Cheng, S.-C., & Lai, C.-L. (2020). Facilitating learning for students with special needs: A review of technology-supported special education studies. *Journal of Computers in Education*, 7(2), 131-153. <https://bit.ly/3nX9FvQ>
- [11] Falloon, G. (2020). From digital literacy to digital competence: the teacher digital competency (TDC) framework. *Educational technology research and development*, 68(5), 2449-2472. <https://link.springer.com/article/10.1007/S11423-020-09767-4>
- [12] Fernández-Batanero, J. M., Cabero, J., & López, E. (2019). Knowledge and degree of training of primary education teachers in relation to ICT taught to students with disabilities. *British Journal of Educational Technology*, 50(4), 1961-1978. <https://bit.ly/3UtrixQ>
- [13] Iskakova, M. (2023). Electronic technologies to ensure individual learning of education seekers with special needs. *Futurity of Social Sciences*, 1(1), 4-20. <https://futurity-social.com/index.php/journal/article/view/1>
- [14] Maurer, J., Becker, A., Hilkenmeier, J., & Daseking, M. (2021). Experiences and perceived self-efficacy in distance learning among teachers of students with special educational needs. *Frontiers in Psychology*, 12, 733865. <https://bit.ly/43sjceQ>
- [15] Mudra, H. (2020). Digital literacy among young learners: How do EFL teachers and learners view its benefits and barriers?. *Teaching English with Technology*, 20(3), 3-24. <https://www.cceol.com/search/article-detail?id=884300>
- [16] Nguyen, L. A. T., & Habók, A. (2024). Tools for assessing teacher digital literacy: a review. *Journal of Computers in Education*, 11(1), 305-346.
- [17] Rakhimzhanova, L., Issabayeva, D., Kultan, J., Baimuldina, N., Issabayeva, Z., & Aituganova, Z. (2025). Using Augmented Reality to Teach Digital Literacy Course to Primary School Children with Special Educational Needs. *European Journal of Educational Research*, 14(1). <https://link.springer.com/article/10.1007/s40692-022-00257-5>
- [18] Reblinca, M. G. (2024). Teachers' competency and students' digital literacy in digital environment. *International Journal of Recent Innovations in Academic Research*, 8(1), 53-79. <https://www.ijriar.satwebview.in/docs/2024/2024-jan/IJRIAR-06.pdf>
- [19] Reddy, P., Chaudhary, K., & Hussein, S. (2023). A digital literacy model to narrow the digital literacy skills gap. *Heliyon*, 9(4). [https://www.cell.com/heliyon/fulltext/S2405-8440\(23\)02085-6](https://www.cell.com/heliyon/fulltext/S2405-8440(23)02085-6)
- [20] Riga, A., Ioannidi, V., & Papayiannis, N. (2021). Social stories and digital literacy practices for inclusive education. *European Journal of Special Education Research*, 7(2). <https://oapub.org/edu/index.php/ejse/article/view/3773>
- [21] TIRAÑA, E. B., CRUZ, R. L., & GUINTO, H. E. D. (2022). Teach-Nology: A tool for improving phonemic awareness of non-graded learners with special education needs (LSENs). <https://bit.ly/3GZdRIJ>
- [22] Tohara, A. J. T. (2021). Exploring digital literacy strategies for students with special educational needs in the digital age. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(9), 3345-3358. <https://bit.ly/3mtYAlY>
- [23] Williams, P. (2006). Exploring the challenges of developing digital literacy in the context of special educational needs communities. *Innovation in Teaching and Learning in Information and Computer Sciences*, 5(1), 1-16. <https://bit.ly/3muxuLh>