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UTILIZATION, COMPETENCE, AND DIFFICULTIES OF SPED TEACHERS IN TECHNOLOGY-ASSISTED LEARNING

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Abstract

Globally, the integration of technology-assisted learning in special education has gained momentum as educators seek more inclusive, adaptive, and engaging approaches to meet the diverse needs of learners with disabilities. This study aimed to determine the extent of utilization, levels of competence, and difficulties faced by SPED teachers in implementing technology-assisted learning in special education in selected cities in Central Philippines for the 2025-2026 school year. The study used a self-made instrument that was administered to 64 SPEd teachers. The results of the study showed that the extent of utilization and level of competence of SPEd teachers were all at a high level in terms of Accessibility, engagement, motivation, Personalized Learning, Communication, and Collaboration, as well as digital content and Platforms. The level of difficulties of SPED teachers in the implementation of technology-assisted learning in the aforesaid areas was all at a low level. There was no significant difference in the extent of utilization of SPED teachers in the implementation of technology-assisted learning in special education when grouped and compared according to the aforementioned variables. Additionally, there was no significant difference in the level of competence of SPED teachers in implementing technology-assisted learning in special education when grouped and compared according to the aforementioned variables. Lastly, there was no significant difference in the level of difficulty experienced by SPED teachers in implementing technology-assisted learning in special education when grouped and compared according to the aforementioned variables. There was no significant relationship found between the extent of utilization and the level of competence of SPED teachers in implementing technology-assisted learning in special education. The findings imply a need to prioritize innovative, advanced applications of technology-assisted learning over basic training to further improve instructional impact and learner outcomes.

Keywords: Special Education, Utilization of Technology-assisted, teachers' competence, teachers' difficulties.

Bio-profiles

Dr. Maylin Ordaniel-Olarte graduated with her master's degree in Special Education from the University of Negros Occidental-Recoletos (UNO-R) in 2015 and pursued her doctorate in educational management at STI West Negros University. As a special education teacher in the state of New Mexico, USA, she holds a state teaching license with a TESOL endorsement. In 2019, she was awarded Teacher of the Month at Mesa Alta Junior High in the same state. Prior to her teaching stint in the US, Dr. Ordaniel had twice been named a finalist for the Outstanding SPEd Teacher award in the Schools Division of Negros Occidental.

Dr. Wilfredo O. Hermosura spent nearly 5 decades of his life as an educator, researcher, and academic leader. He graduated with a Bachelor's in Secondary Education from West

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Negros College, Cum Laude. He completed his master's in language at the University of the Philippines System. He was later sent to Lancaster University in England, where he received a government grant to specialize in reading and linguistics. He completed his Doctor of Education at Carlos Hilado Memorial State College. He served as Regional Supervisor for Filipino and Early Childhood Education and later served as Principal IV of Dona Montserrat Lopez Memorial High School in Silay City. He also served as the Vice President for Academic Affairs at STI West Negros University. Currently, he serves as the research director of Silay Institute, Inc. and as the interim President of Silay City College.

Introduction

Rationale

The integration of technology-assisted learning in special education has gained momentum as educators seek more inclusive, adaptive, and engaging approaches to meet the diverse needs of learners with disabilities. In recent studies such as the one conducted by Navas-Bonilla et al. (2025) and Voultsiou & Moussiades (2025), the increasing use of digital platforms, assistive technologies, and AI-driven tools to support individualized instruction, communication, and accessibility in SPED classrooms was highlighted.

However, despite these innovative actions, some disparities in teacher readiness, infrastructure, and contextual relevance persist, particularly for Southeast Asian educators navigating new systems, as noted in the study by Jacob et al. (2024). The success of technology-assisted learning depends not only on access but also on the competence, confidence, and adaptability of teachers in implementing these tools effectively.

In the Philippines, the Department of Education (DepEd) has reinforced its commitment to inclusive digital transformation through the Basic Education Development Plan (BEDP) 2030 and the Digital Rise Program. These initiatives aim to strengthen digital literacy, promote equitable access to learning technologies, and enhance teacher capacity, especially in Special Education (DepEd, 2022). While these policies provide a strategic framework, there remains a gap in empirical research examining how SPED teachers utilize, demonstrate competence in, and experience difficulties with technology-assisted learning.

Key instructional domains such as Accessibility (use of assistive tools and inclusive platforms), Engagement and Motivation (gamified and interactive strategies), Personalized Learning (adaptive instruction based on learner profiles), Communication and Collaboration (digital feedback and parent-teacher interaction), and Digital Content and Platforms (integration of multimedia and learning management systems) require deeper investigation to inform responsive faculty development.

This study is grounded in the researcher’s decades of experience as a SPED teacher committed to inclusive education and digital equity. Having witnessed both the transformative potential and the practical challenges of technology integration in diverse classroom settings, the researcher is motivated to explore how Filipino SPED teachers navigate these realities. The goal is to generate evidence-based insights that can inform a faculty development plan tailored to their needs.

Literature Review

Regardless of physical, cognitive, or developmental differences, inclusive education encourages equal learning opportunities for all students. The strategic use of assistive technology (AT), which enables students with disabilities to access content, communicate effectively, and engage meaningfully in academic tasks, is essential to this objective. In

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inclusive classrooms, AT equipment like screen readers, hearing aids, and adaptable software can reduce obstacles to learning and promote autonomous involvement (Quiño-Justol, 2024).

Babia (2022) draws attention to the growth of SPED facilities in Cebu, the Philippines, which provide organized learning environments and prioritize the provision of efficient AT services. These centers provide examples of how the level of support given to exceptional learners is directly impacted by service adequacy. However, there are still gaps in implementation and access, particularly in underprivileged communities.

SPED teachers are under growing pressure to incorporate inclusive pedagogies with cutting-edge technologies as 21st-century classrooms change. They have to adjust to evolving educational paradigms while navigating a wide range of learner profiles. A high degree of competency, adaptability, and ongoing professional development is necessary for this dual responsibility—managing complicated learning demands and utilizing digital resources (Tabiin & Ari, 2023).

According to Wang and Tahir (2020), interactive digital technologies can improve student engagement and retention, especially in inclusive classrooms. According to Koç and Dikmen (2021), gamification can be very motivating, but its effectiveness depends on institutional support and teacher competency, highlighting the necessity for focused training. Another crucial aspect is the customization of education. Effective personalization, according to Alghamdi and Holland (2021), necessitates both pedagogical insight and technology fluency—a dual competency that SPED teachers must develop.

The multifaceted nature of SPED teacher competency is supported by recent research. According to Ok et al. (2021), functional access and instructional equity depend on the ability to choose the right instruments. According to Dell'Anna et al. (2022), many teachers need continuous assistance to become proficient in both the educational and operational aspects of assistive technology. While Bond et al. (2020) emphasize that assessing engagement in digital settings necessitates unambiguous indicators, real-time feedback systems, and reflective teaching techniques, Rüth and Kaspar (2021) underline the motivational benefits of gamification, particularly for learners with various needs.

Teacher competency is further expanded through the use of learning analytics. According to Ifenthaler and Yau (2020), data-driven insights enable teachers to tailor their lessons and enhance student results. Effective personalization necessitates a combination of pedagogical understanding and technical flexibility, according to Kimmons et al. (2021). While Tondeur et al. (2020) note that platform navigation abilities are shaped by institutional support, exposure, and continuous digital literacy development, Kormos and Neumann et al. (2017) emphasize digital confidence as a significant predictor of effective technology integration.

Additionally, Osorio's (2025) systematic review examined the training models and approaches employed over the past decade, as well as the competencies and skills in educational technology required by in-service teachers working in elementary, middle, and high schools. To identify current trends in teacher preparation for educational technology, the review examined competencies, skills, training models, and approaches. Seven key competences were identified by the review, with a focus on abilities such as virtual collaboration and the use of software, educational tools, and platforms. The TPACK model, which includes professional learning communities and problem-based learning, became the most popular framework for teacher preparation. To enhance teachers' abilities, which include both the adoption of emerging technologies and fundamental technical skills, a methodical and gradual strategy is required. For pedagogical transformation and sustained integration, teachers must receive ongoing, context-specific training in educational technology. Obstacles, including inadequate infrastructure and resistance to change, underscore the need for robust

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institutional support and mentorship. To confirm and broaden these conclusions, future studies should try to extend to a variety of educational contexts.

Theoretical Underpinnings

This study is anchored on three interrelated theories that collectively explain how SPED teachers engage with technology-assisted learning. First is the Theory of Resource Utilization by Ogundu (2022); second, the Theory of Competence by White (1959); and the Theory of Difficulty by Perkins (1992). Together, these frameworks offer a multidimensional lens for understanding how teachers utilize, apply, and respond to digital tools to create an inclusive educational setting.

Ogundu's (2022) Theory of Resource Utilization emphasizes that the mere availability of educational resources—such as assistive technologies, digital platforms, or multimedia content does not guarantee their effective use. Instead, utilization depends on how strategically these resources are deployed to meet instructional goals. In the context of SPED, this theory underscores the importance of aligning technological tools with the specific developmental, sensory, and cognitive needs of learners. It also highlights the role of institutional support, teacher training, and contextual adaptability in maximizing the impact of available technologies.

Complementing this is White's (1959) Theory of Competence, which frames competence as an individual's capacity to interact effectively with their environment. Applied to SPED teachers, this theory suggests that competence in technology-assisted learning is not only a matter of technical skill but also of confidence, motivation, and adaptive expertise. Teachers who feel competent are more likely to explore new tools, personalize instruction, and persist through challenging behaviors that are essential in dynamic, digitally mediated classrooms.

However, even with access and competence, teachers may still encounter barriers. Perkins' (1992) Theory of Difficulty provides insight into why specific tasks, such as integrating assistive apps, interpreting learning analytics, or designing inclusive digital content, are perceived as more challenging. According to Perkins, difficulty arises from factors such as intrinsic task complexity, lack of transparency, and insufficient scaffolding. In SPED contexts, these challenges are often magnified by the need to accommodate diverse learner profiles and align with individualized education plans (IEPs).

By integrating these three theories, the study recognizes that effective technology integration in SPED is not a linear process. It is shaped by how well teachers utilize resources (Ogundu), how competent they feel and perform (White), and how they navigate perceived instructional difficulties (Perkins). This theoretical foundation informs the study's aim to assess the current state of utilization, competence, and difficulties among SPED teachers, and to generate evidence-based recommendations for targeted faculty development.

Objectives

This study aimed to determine the extent of utilization, levels of competence, and difficulties faced by SPED teachers in implementing technology-assisted learning in special education in selected cities in Central Philippines for the 2025-2026 school year. Specifically, this study sought to determine: 1) the extent of utilization of SPED teachers in the implementation of technology-assisted learning in Special Education in terms of Accessibility, Engagement and Motivation, Personalized Learning, Communication and Collaboration, and Digital Content and Platforms; 2) the level competence of SPED teachers in the implementation of technology-assisted learning in Special Education in the

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aforementioned areas; 3) the level of difficulties of SPED teachers in the implementation of technology-assisted learning in Special Education in the aforementioned areas; 4) whether a significant difference exists in the extent of utilization of SPED teachers in the implementation of technology-assisted learning in special education when grouped and compared according to aforementioned variables; 5) whether a significant difference exists in the level of competence of SPED teachers in the implementation of technology-assisted learning in special education when grouped and compared according to aforementioned variables; 6) if there is a significant difference exists in the level of difficulties of SPED teachers in the implementation of technology-assisted learning in special education when grouped and compared according to aforementioned variables.

Methodology

This section discusses the methods used to gather and analyze the data based on the specific predetermined objectives. This outline includes the research design, subject-respondents, research instruments, data collection procedures, ethical considerations, data analysis, and statistical methods.

Research Design

This study employed a descriptive research design to determine the extent of utilization, levels of competence, and difficulties faced by SPED teachers in implementing technology-assisted learning. Descriptive research design attempts to determine, describe, or identify characteristics found within the phenomenon under investigation. This research design is appropriate for this study because it is aimed at finding out what prevails in the present condition or relationships, held opinions and beliefs, processes and effects, and developing trends. (Dudovskiy, 2017).

Respondents

The respondents of the study were the 64 SPED teachers distributed in a medium-sized school division. Since the number of respondents is quite manageable, total enumeration – a form of purposive sampling was used. Purposive total enumeration, also known as total population sampling, is a type of purposive sampling where a researcher chooses to examine the entire population that possesses a specific characteristic or set of characteristics. This method is used when the population of interest is relatively small or when it's crucial to include every member to ensure comprehensive coverage (Laerd Statistics, 2020).

Instrument

This study employed a self-made questionnaire to assess the extent of utilization, levels of competence, and difficulties faced by SPED teachers in implementing technology-assisted learning in special education in selected cities in Central Philippines for the 2025-2026 school year. The questionnaire was divided into two parts. Part 1 collected profile information, and Part 2 was the questionnaire proper. The respondents were asked to rate each item using a five-point Likert scale, which ranges from 5 as always, 4 as often, 3 as sometimes, 2 as rarely, to 1 as never, reflecting their perceptions and experiences. This scale

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captures the participants' quantitative data to analyze and interpret their responses systematically.

Procedure for Data Collection

The smooth conduct of the study followed several steps. First, a letter request was submitted to the Schools Division Office, particularly to the Education Program Supervisor (EPS) for Special Education, seeking approval to conduct the study. The questionnaires were administered to target respondents after the approval was secured. The printed hard copies were distributed to the schools that were tagged for the survey, and with the help of the school heads, distribution and collection were organized smoothly as well. After 3 days, the questionnaires were gathered, recorded, and analyzed. The data that was gathered from the responses of the respondents were tallied and tabulated using the appropriate statistical tools.

Data Analysis and Statistical Treatment

Objective No. 1 employed a descriptive analytical scheme, utilizing the mean as a statistical tool to determine the extent of SPED teachers' utilization of technology-assisted learning in Special Education, in terms of Accessibility, engagement, motivation, Personalized Learning, Communication, and Collaboration, as well as digital content and Platforms. Objective No. 2 also used a descriptive analytical scheme and Mean to determine the level of competence of SPED teachers in the implementation of technology-assisted learning in Special Education in the aforesaid areas. Objective No. 3 still employed a descriptive analytical scheme and the mean to determine the level of difficulties encountered by SPED teachers in implementing technology-assisted learning in Special Education in the aforementioned areas. Objective No. 4 utilized a comparative analytical scheme and Mann-Whitney U test to determine the significant difference in the extent of utilization of SPED teachers in the implementation of technology-assisted learning in special education when grouped and compared according to the aforementioned variables. Objective No. 5 also used comparative analytical scheme and Mann Whitney U test to determine to the significant difference in the level of competence of SPED teachers in the implementation of technology-assisted learning in special education when grouped and compared according to aforementioned variable. Lastly, Objective No. 6 still used comparative analytical scheme to determine to the significant difference in the level of difficulties encountered by SPED teachers in the implementation of technology-assisted learning in special education when grouped and compared according to aforementioned variables.

Ethical Considerations

In conducting this study, ethical considerations were prioritized to ensure the protection of all participants, particularly school heads and teachers. Informed consent was obtained from each respondent prior to data collection. Participants were informed about the purpose of the study, the nature of their involvement, and their right to withdraw at any time without penalty. The researcher ensured that participation was entirely voluntary and that no coercion or undue influence was exerted on any individual or institution. Confidentiality and anonymity were strictly maintained throughout the research process. Identifiable information, such as names, school affiliations, and personal responses, was excluded from the published findings. Data were stored securely and used solely for academic purposes. Responses were aggregated during analysis to prevent any attribution of specific feedback to individual participants, thereby protecting their professional reputation and ensuring honest, unbiased

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input. Lastly, the study adhered to principles of academic integrity and respect for institutional protocols. Approval from the appropriate school division office or ethics review board was secured prior to implementation. The researcher is committed to presenting findings objectively, avoiding misrepresentation or manipulation of data. By upholding these ethical standards, the study aimed to contribute responsibly to the discourse on educational leadership and teacher performance without compromising the dignity or rights of its participants.

Results and Discussions

This section summarizes the study's findings, which are based on careful data gathering, in-depth analysis, and thoughtful interpretation.

Extent of utilization of SPED teachers in the implementation of technology-assisted learning in Special Education in the Areas of Accessibility, Engagement and Motivation, Personalized Learning, Communication and Collaboration, and Digital Content and Platforms

Table 1
Extent of Utilization of SPED Teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Accessibility

Accessibility		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. use technology to make learning materials more accessible for students with disabilities.	3.75	Great Extent
2. apply assistive tools (e.g., screen readers, magnifiers) to meet diverse learner needs.	4.23	Great Extent
3. ensure all digital content is compatible with accessibility standards.	4.17	Great Extent
4. adjust technology settings (e.g., text size, contrast) to accommodate individual student needs	4.09	Great Extent
5. select devices and software that support equitable access for all learners.	4.66	Very Great Extent
Overall Mean	**4.18**	**Great Extent**

Table 1 shows that the overall mean score is 4.18, which is interpreted as a Great Extent. Line-item No. 5, which states “As a teacher, I select devices and software that support equitable access for all learners," has the highest mean score of 4.66, interpreted as Very Great Extent.

Meanwhile, line-item No. 1, which states “As a teacher, I use technology to make learning materials more accessible for students with disabilities," received the lowest mean score of 3.75, interpreted as Great Extent. This implies that while teachers recognize the importance of accessible content, there may be gaps in training, resource availability, or technical support that limit full implementation. This observation echoes the study of Castañeda et al. (2020), which noted that accessibility efforts often depend on institutional infrastructure and teacher familiarity with assistive technologies.

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Table 2
Extent of Utilization of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Engagement and Motivation

Engagement and Motivation		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. integrate gamified learning activities to boost student motivation.	4.09	Great Extent
2. use interactive tools (e.g., quizzes, polls) to maintain student attention.	4.34	Great Extent
3. incorporate visually stimulating content to spark learner interest.	4.23	Great Extent
4. know how to adjust digital content to sustain learner interest.	4.23	Great Extent
5. can evaluate students' engagement levels during tech-assisted lessons.	4.28	Great Extent
Overall Mean	**4.24**	**Great Extent**

Table 2 shows that the overall mean score is 4.24, interpreted as Great Extent.

Line-item No. 2, which states "As a teacher, I use interactive tools (e.g., quizzes, polls) to maintain student attention," has the highest mean score of 4.34, interpreted as Great Extent. On the other hand, line-item No. 1, which states "As a teacher, I integrate gamified learning activities to boost student motivation," received the lowest mean score of 4.09, although it is still interpreted as a Great Extent. This implies that while gamification is practiced, it may be less consistently applied or constrained by access to platforms, training, or time for design. This observation echoes the findings of Koç and Dikmen (2021), who noted that while gamification has proven motivational benefits, its implementation often depends on teacher familiarity and institutional support.

Table 3
Extent of Utilization of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Personalized Learning

Personalized Learning		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. use technology to tailor lessons to individual learning styles.	3.73	Great Extent
2. assign adaptive digital tasks based on student performance levels.	4.48	Great Extent
3. employ learning platforms that allow students to progress at their own pace.	4.39	Great Extent
4. adjust digital resources based on student feedback and needs.	4.42	Great Extent
5. use data from tech tools to inform personalized instruction	4.44	Great Extent
Overall Mean	**4.29**	**Great Extent**

Table 3 shows that the overall mean score is 4.29, which is interpreted as a Great Extent.

Line-item No. 2, which states "As a teacher, I assign adaptive digital tasks based on student performance levels," received the highest mean score of 4.48, interpreted as Great Extent. On the other hand, line-item No. 1, which states "As a teacher, I use technology to tailor lessons to individual learning styles," received the lowest mean score of 3.73, though still interpreted as Great Extent. This suggests that while personalization is practiced, there

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may be challenges in fully aligning digital content with diverse cognitive preferences. These may include limited access to customizable platforms or gaps in training on learning style frameworks. This observation aligns with the study by Alghamdi and Holland (2021), which noted that effective personalization requires both pedagogical insight and technological fluency.

Table 4

Extent of Utilization of SPED Teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Communication and Collaboration

Communication and Collaboration Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. Use digital tools to communicate regularly with my SPED students.	4.17	Great Extent
2. facilitate collaborative projects through online platforms.	3.97	Great Extent
3. support peer interaction using chat, forums, or shared digital spaces.	4.06	Great Extent
4. provide timely feedback using communication technologies.	3.64	Great Extent
5. encourage parent-teacher communication through digital platforms.	3.88	Great Extent
Overall Mean	**3.94**	**Great Extent**

Table 4 shows that the overall mean score is 3.94, which is interpreted as a Great Extent.

Line-item No. 1, which states "As a teacher, I use digital tools to communicate regularly with my SPED students," received the highest mean score of 4.17, interpreted as Great Extent. On the other hand, line-item No. 4, which states “As a teacher, I provide timely feedback using communication technologies," received the lowest mean score of 3.64. However, it is still interpreted as a Great Extent. This suggests that while feedback is provided, there may be challenges in ensuring timeliness due to workload, platform limitations, or connectivity issues. This observation echoes the findings of Alqurashi (2020), who noted that timely feedback in online environments requires structured systems, clear expectations, and adequate support mechanisms.

Table 5

Extent of Utilization of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Digital Content and Platforms

Digital Content and Platforms Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. Use reliable digital platforms to deliver instruction.	4.08	Great Extent
2. Incorporate multimedia content to enhance SPED learning.	3.81	Great Extent
3. curate online resources that support my learning goals.	3.86	Great Extent
4. Regularly update my digital materials to keep lessons relevant.	4.23	Great Extent
5. evaluate and select digital content that aligns with SPED standards.	3.84	Great Extent
Overall Mean	**3.97**	**Great Extent**

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Table 5 shows that the overall mean score is 3.97, which is interpreted as a Great Extent.

Line-item No. 4, which states "As a teacher, I regularly update my digital materials to keep lessons relevant," received the highest mean score of 4.23, interpreted as a Great Extent. This reflects the teachers' commitment to maintaining instructional relevance and responsiveness through timely updates of digital content. On one hand, line-item No. 2, which states "As a teacher, I incorporate multimedia content to enhance SPED learning," received the lowest mean score of 3.81, though still interpreted as Great Extent. This suggests that while multimedia integration is practiced, there may be limitations in access to tools, training, or time for content creation. This observation echoes the study of Alqurashi (2020), which noted that effective multimedia use requires both technical fluency and pedagogical intentionality to meet diverse learner needs.

Level of Competence of SPED teachers in the implementation of technology-assisted learning in Special Education in the Areas of Accessibility, Engagement and Motivation, Personalized Learning, Communication and Collaboration, and Digital Content and Platforms

Table 6

Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Accessibility

Accessibility		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. am skilled in using assistive technologies (e.g., screen readers, AAC devices).	3.59	High Level
2. can modify digital content to ensure accessibility for all learners.	3.94	High Level
3. know how to apply accessibility features (e.g., captions, text-to-speech) in digital tools.	3.97	High Level
4. can choose tech tools that match the functional needs of students with disabilities.	4.12	High Level
5. am confident in adapting settings to increase accessibility (e.g., font size, contrast).	3.98	High Level
Overall Mean	**3.92**	**High Level**

Table 6 shows that the overall mean score is 3.92, interpreted as High Level.

Line-item No. 4, which states "As a teacher, I can choose tech tools that match the functional needs of students with disabilities," received the highest mean score of 4.12, interpreted as High Level. Line-item No. 1, which states "As a teacher, I am skilled in using assistive technologies (e.g., screen readers, AAC devices)," received the lowest mean score of 3.59, though still interpreted as High Level. This suggests that while teachers are generally competent, there may be gaps in hands-on experience or specialized training with specific assistive technologies. This observation aligns with the study of Dell'Anna et al. (2022), which found that many educators require ongoing support to master the operational and pedagogical use of assistive devices in inclusive classrooms.

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Table 7
Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Engagement and Motivation

Engagement and Motivation		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. can design tech-based activities that engage and motivate SPED learners.	4.05	High Level
2. effectively use gamification to encourage student participation.	4.22	High Level
3. can select interactive tools that suit learners' cognitive and behavioral profiles.	4.16	High Level
4. know how to adjust digital content to sustain learner interest.	4.17	High Level
5. can evaluate students' engagement levels during tech-assisted lessons.	3.84	High Level
Overall Mean	**4.09**	**High Level**

Table 7 shows that the overall mean score is 4.09, interpreted as High Level.

Line-item No. 2, which states "As a teacher, I effectively use gamification to encourage student participation," received the highest mean score of 4.22, interpreted as High Level. Conversely, Line-item No. 5, which states "As a teacher, I can evaluate students' engagement levels during tech-assisted lessons," received the lowest mean score of 3.84, although it is still interpreted as a High Level. This suggests that while teachers are competent in designing engaging activities, they may face challenges in systematically assessing engagement, especially in asynchronous or remote settings. This observation echoes the findings of Bond et al. (2020), who noted that engagement evaluation in digital environments requires clear indicators, real-time feedback tools, and reflective practices.

Table 8
Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Personalized Learning

Personalized Learning		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. can adapt technology to address individual learning styles and needs.	3.69	High Level
2. am proficient in using platforms that offer differentiated instruction.	4.05	High Level
3. utilize learning analytics to inform personalized instructional planning	4.39	High Level
4. can modify digital learning paths based on student progress.	4.17	High Level
5. can tailor tech tools to support IEP (Individualized Education Program) goals.	4.28	High Level
Overall Mean	**4.12**	**High Level**

Table 8 shows that the overall mean score is 4.12, interpreted as High Level.

The line-item No. 3, which states "As a teacher, I utilize learning analytics to inform personalized instructional planning," received the highest mean score of 4.39, interpreted as High Level. Meanwhile, Line-item No. 1, which states "As a teacher, I can adapt technology to address individual learning styles and needs," received the lowest mean score of 3.69, although it is still interpreted as High Level. This suggests that while teachers are generally

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competent, there may be challenges in fully customizing digital tools to match diverse cognitive profiles. These may stem from limited platform flexibility, lack of training in learning style frameworks, or constraints in classroom implementation. This observation echoes the findings of Kimmons et al. (2021), who noted that personalization requires both pedagogical insight and technological adaptability to be effective.

Table 9

Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Communication and Collaboration

Communication and Collaboration Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. use digital platforms confidently to facilitate student communication.	4.03	High Level
2. can guide students in using online tools for collaborative tasks.	4.02	High Level
3. know how to communicate with parents and guardians using digital channels.	4.09	High Level
4. effectively use tech to deliver timely and constructive feedback.	3.64	High Level
5. promote peer interaction through structured digital activities.	4.16	High Level
Overall Mean	**3.99**	**High Level**

Table 9 reveals that the overall mean score is 3.99, interpreted as High Level.

Line-item no. 5, which states "As a teacher, I promote peer interaction through structured digital activities," received the highest mean score of 4.16, interpreted as High Level. On the other hand, line-item No. 4, which states "As a teacher, I effectively use tech to deliver timely and constructive feedback," received the lowest mean score of 3.64, though still interpreted as High Level. This suggests that while teachers are competent in providing feedback, they may face challenges in ensuring timeliness and personalization, especially in asynchronous or low-connectivity environments. This observation echoes the findings of Trust and Whalen (2020), who noted that feedback delivery in digital contexts requires intentional planning, platform familiarity, and sustained communication routines.

Table 10

Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Digital Content and Platforms

Digital Content and Platforms Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. can evaluate the quality and relevance of digital content for SPED.	3.87	High Level
2. am competent in navigating various online learning platforms.	3.75	High Level
3. can integrate multimedia elements effectively into instruction.	3.77	High Level
4. know how to curate and adapt digital resources for lesson objectives.	3.98	High Level
5. am confident in using technology to enhance SPED curriculum delivery	4.03	High Level
Overall Mean	**3.88**	**High Level**

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Table 10 shows that the overall mean score is 3.88, interpreted as High Level. Line-item No. 5, which states "As a teacher, I am confident in using technology to enhance SPED curriculum delivery," received the highest mean score of 4.03, interpreted as High Level. Meanwhile, line-item No. 2, which states "As a teacher, I am competent in navigating various online learning platforms," received the lowest mean score of 3.75, though still interpreted as High Level. This suggests that while teachers are generally proficient, there may be variability in platform familiarity or access to training across different systems. This observation echoes the findings of Tondeur et al. (2020), who noted that platform navigation skills are often shaped by institutional support, exposure, and ongoing digital literacy development.

Level of Difficulties of SPED teachers in the implementation of technology-assisted learning in Special Education in the Areas of Accessibility, Engagement and Motivation, Personalized Learning, Communication and Collaboration, and Digital Content and Platforms

Table 11
Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Accessibility

Accessibility		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. find it difficult to locate assistive technologies that meet my students' needs.	2.72	Moderate Level
2. find it difficult to locate assistive technologies that meet my students' needs.	2.77	Moderate Level
3. struggle to make digital content usable for learners with disabilities.	3.22	Moderate Level
4. lack confidence in using assistive features like screen readers or captioning tools.	2.86	Moderate Level
5. rarely adapt tech tools to accommodate sensory or mobility challenges.	3.28	Moderate Level
Overall Mean	**2.97**	**Moderate Level**

Table 11 reveals that the overall mean score is 2.97, interpreted as Moderate Level.

Line-item No. 5, which states "As a teacher, I rarely adapt tech tools to accommodate sensory or mobility challenges," received the highest mean score of 3.28, interpreted as Moderate Level. Meanwhile, line-item No. 1, which states "As a teacher, I find it difficult to locate assistive technologies that meet my students' needs," received the lowest mean score of 2.72, yet still falls within the Moderate Level. This reflects the ongoing difficulty in identifying appropriate tools that match the diverse functional profiles of SPED learners. It echoes the findings of Sharma et al. (2021), who noted that the availability and contextual relevance of assistive technologies are critical factors influencing their adoption in inclusive classrooms.

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Table 12
Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Engagement and Motivation

Engagement and Motivation Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. have trouble designing tech activities that keep SPED students motivated.	2.59	Moderate Level
2. struggle to maintain student attention during technology-assisted lessons.	2.87	Moderate Level
3. struggle to maintain student attention during technology-assisted lessons.	2.84	Moderate Level
4. lack strategies to gamify lessons for students with special needs.	2.95	Moderate Level
5. rarely see improved motivation when I use technology in class	2.84	Moderate Level
Overall Mean	**2.82**	**Moderate Level**

Table 12 shows that the overall mean score is 2.82, interpreted as Moderate Level.

The line-item No. 4, which states that "As a teacher, I lack strategies to gamify lessons for students with special needs," got the highest mean score of 2.95, interpreted as Moderate Level. Line-item No. 1, which states "As a teacher, I have trouble designing tech activities that keep SPED students motivated," received the lowest mean score of 2.59, although it is still interpreted as a Moderate Level. This reflects the difficulty in crafting digital tasks that sustain intrinsic motivation, especially when learners face attention, processing, or behavioral challenges. It echoes the findings of Krouska et al. (2020), who noted that motivation in technology-enhanced learning depends on personalization, relevance, and emotional connection—factors that require deliberate instructional design.

Table 13
Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Personalized Learning

Personalized Learning Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. find it difficult to customize digital content for individual learning needs.	2.83	Moderate Level
2. am unsure how to align tech tools with my students' IEP goals.	3.27	Moderate Level
3. rarely use platforms that offer differentiated instruction.	2.67	Moderate Level
4. lack the skills to interpret learning data for personalized planning.	3.20	Moderate Level
5. feel unprepared to adjust digital instruction based on learner progress.	2.97	Moderate Level
Overall Mean	**2.99**	**Moderate Level**

Table 13 shows that the overall mean score is 2.99, interpreted as Moderate Level.

Line-item No. 2, which states "As a teacher, I am unsure how to align tech tools with my students' IEP goals," received the highest mean score of 3.27, interpreted as Moderate

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Level. On the other hand, line-item No. 3, which states "As a teacher, I rarely use platforms that offer differentiated instruction," received the lowest mean score of 2.67, although it is still interpreted as a Moderate Level. This reflects a gap in platform utilization, which may stem from a lack of exposure, institutional constraints, or uncertainty about platform features. It echoes the findings of Alghamdi and Holland (2021), who noted that differentiated platforms are underutilized in SPED contexts due to limited professional development and resource availability.

Table 14
Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Communication and Collaboration

Communication and Collaboration		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. face challenges using digital tools to communicate with SPED learners.	1.70	Low Level
2. find it difficult to involve parents in tech-based learning.	1.56	Low Level
3. do not know how to foster peer interaction through online platforms.	1.63	Low Level
4. struggle to provide timely feedback using digital means.	1.66	Low Level
5. rarely facilitate collaborative activities using technology.	1.73	Low Level
Overall Mean	**1.66**	**Low Level**

Table 14 shows that the overall mean score is 1.66, interpreted as Low Level.

Line-item No. 5, which states "As a teacher, I rarely facilitate collaborative activities using technology," received the highest mean score of 1.73, interpreted as Low Level. On the other hand, line-item No. 2, which states "As a teacher, I find it difficult to involve parents in tech-based learning," received the lowest mean score of 1.56, also interpreted as a Low Level. This reflects the teachers' confidence in engaging parents through digital channels, possibly due to established routines, mobile accessibility, or community support. It echoes the findings of Domínguez-Garrido et al. (2022), who emphasized that parent-teacher digital communication is most effective when platforms are user-friendly and culturally responsive.

Table 15
Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Digital Content and Platforms

Digital Content and Platforms		
Items	**Mean**	**Interpretation**
As a teacher, I . .		
1. find it hard to choose reliable digital content for SPED instruction.	1.87	Low Level
2. struggle to use online learning platforms effectively.	1.92	Low Level
3. lack training in integrating multimedia into my lessons.	2.06	Low Level
4. often use outdated digital resources.	1.91	Low Level
5. feel overwhelmed by the number of tech platforms available.	1.88	Low Level

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Overall Mean	**1.93**	**Low Level**

Table 15 shows that the overall mean score is 1.93, interpreted as Low Level.

Line-item No. 3, which states "As a teacher, I lack training in integrating multimedia into my lessons," received the highest mean score of 2.06, interpreted as a Low Level.

Line-item No. 1, which states "As a teacher, I find it hard to choose reliable digital content for SPED instruction," received the lowest mean score of 1.87, also interpreted as a Low Level. This reflects teachers' confidence in evaluating and selecting appropriate content, possibly due to accumulated experience, peer sharing, or access to curated repositories. It echoes the findings of Eri et al. (2021), who noted that educators with digital competence are better equipped to filter and adapt content for inclusive learning environments.

Comparative Analysis on the Extent of utilization of SPED teachers in the implementation of technology-assisted learning in Special Education in the Areas of Accessibility, Engagement and Motivation, Personalized Learning, Communication and Collaboration, and Digital Content and Platforms When Grouped According to Age, Highest Educational Attainment, Length of Service, ICT/SPED Training, and Average Family Monthly Income

Table 16
Differences in the Extent of Utilization of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Accessibility When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	33.89	441.0		0.461	Not Significant
	Older	26	30.46				
Highest Educational Attainment	Lower	43	33.78	396.5		0.424	Not Significant
	Higher	21	29.88				
Length of Service	Shorter	41	33.89	414.5	0.05	0.417	Not Significant
	Longer	23	30.02				
Number of ICT/SPED Training	Few	37	32.72	491.5		0.912	Not Significant
	Many	27	32.20				
Average Family Monthly Income	Lower	29	34.69	444.5		0.384	Not Significant
	Higher	35	30.69				

Table 16 shows that there is no significant difference in the extent of utilization of SPED teachers in the implementation of Technology-Assisted Learning in the area of Accessibility when grouped according to age, highest educational attainment, length of service, number of ICT/SPED trainings, and average family monthly income. The p-values for all variables—age (0.461), educational attainment (0.424), length of service (0.417), number of trainings (0.912), and income (0.384)—are all above the significance level of 0.05. Therefore, the hypothesis stating that "there is no significant difference in the extent of Accessibility-related technology utilization among SPED teachers when grouped by demographic and professional variables" is accepted. This implies that demographic and experiential factors do not significantly influence how SPED teachers utilize accessibility tools and platforms. The uniformity in utilization may be attributed to the system-wide nature of assistive technology deployment, where schools provide standardized tools and protocols regardless of teacher background. Moreover, the integration of accessibility features such as screen readers, captioning tools,

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and sensory supports may be embedded in institutional routines, minimizing disparities in usage. Gonzales et al. (2025) conducted a mixed-methods study on digital equity among Filipino SPED teachers and found that access to assistive technologies was consistent across income and service levels, largely due to school-based provisioning and peer-led support.

Table 17
Differences in the Extent of Utilization of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Engagement and Motivation When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	29.22	369.5		0.085	Not Significant
	Older	26	37.29				
Highest Educational Attainment	Lower	43	31.58	412.0		0.568	Not Significant
	Higher	21	34.38				
Length of Service	Shorter	41	29.17	335.0	0.05	0.053	Not Significant
	Longer	23	38.43				
Number of ICT/SPED Training	Few	37	27.85	327.5		0.018	Significant
	Many	27	38.87				
Average Family Monthly Income	Lower	29	32.38	504.0		0.962	Not Significant
	Higher	35	32.60				

Table 17 shows that there is no significant difference in the extent of utilization of SPED teachers in the implementation of Technology-Assisted Learning in the area of Engagement and Motivation when grouped according to age ($p = 0.085$), highest educational attainment ($p = 0.568$), length of service ($p = 0.053$), and average family monthly income ($p = 0.962$). All p-values are above the significance level of 0.05, indicating that these variables do not significantly affect how teachers engage learners through technology. However, a significant difference was found when grouped according to number of ICT/SPED trainings attended, with a p-value of 0.018, which is below the 0.05 threshold. This implies that training exposure plays a critical role in enhancing SPED teachers' ability to motivate and engage learners through technology, while demographic and experiential factors such as age, income, and tenure do not significantly influence utilization levels. The finding supports the hypothesis that "there is a significant difference in the extent of utilization in terms of Engagement and Motivation when grouped by training exposure." Gonzales et al. (2025) emphasized that SPED teachers who undergo targeted ICT and gamification workshops demonstrate stronger learner engagement and improved classroom motivation strategies.

Table 18
Differences in the Extent of Utilization of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Personalized Learning When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	30.88	432.5	0.05	0.391	Not Significant
	Older	26	34.87				
	Lower	43	32.62	446.5		0.942	Not Significant

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Highest Educational Attainment	Higher	21	32.26				
Length of Service	Shorter	41	31.18	417.55		0.441	Not Significant
	Longer	23	34.85				
Number of ICT/SPED Training	Few	37	29.22	378.0		0.092	Not Significant
	Many	27	37.00				
Average Family Monthly Income	Lower	29	32.43	505.5		0.978	Not Significant
	Higher	35	32.56				

Table 18 shows that there is no significant difference in the extent of utilization of SPED teachers in the implementation of Technology-Assisted Learning in the area of Personalized Learning when grouped according to age (p = 0.391), highest educational attainment (p = 0.942), length of service (p = 0.441), number of ICT/SPED trainings (p = 0.092), and average family monthly income (p = 0.978). All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect how teachers personalize instruction through technology. Therefore, the hypothesis stating that "there is no significant difference in the extent of utilization in terms of Personalized Learning when grouped by demographic and professional variables" is accepted. This implies that SPED teachers' ability to customize digital instruction for individual learning needs is consistent across age, education, experience, training exposure, and income levels. The uniformity may be attributed to the standardized nature of digital platforms used in SPED settings, which often include built-in features for differentiation and learner tracking. Additionally, institutional support and peer collaboration may help bridge gaps in personalization practices. Gonzales et al. (2025) found that SPED teachers across diverse backgrounds rely on shared lesson repositories and adaptive platforms to meet individualized education goals.

Table 19

Differences in the Extent of Utilization of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Communication and Collaboration When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	35.36	385.5		0.134	Not Significant
	Older	26	28.33				
Highest Educational Attainment	Lower	43	33.74	3698.0		0.439	Not Significant
	Higher	21	29.95				
Length of Service	Shorter	41	36.70	299.5	0.05	0.015	Significant
	Longer	23	25.02				
Number of ICT/SPED Training	Few	37	35.74	379.5		0.099	Not Significant
	Many	27	28.06				
Average Family Monthly Income	Lower	29	32.57	505.5		0.978	Not Significant
	Higher	35	32.44				

Table 19 shows that there is no significant difference in the extent of utilization of SPED teachers in the implementation of Technology-Assisted Learning in the area of Communication and Collaboration when grouped according to age (p = 0.134), highest educational attainment (p = 0.439), number of ICT/SPED trainings (p = 0.099), and average family monthly income (p = 0.978). All p-

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values are above the significance level of 0.05, indicating that these variables do not significantly affect how teachers communicate and collaborate through technology. However, a significant difference was found when grouped according to length of service, with a p-value of 0.015, which is below the 0.05 threshold. This implies that SPED teachers' length of service significantly influences their extent of utilization of communication and collaboration tools, while other demographic and professional variables do not. Gonzales et al. (2025) found that early-career SPED teachers often demonstrate stronger digital fluency and are more likely to use messaging apps, collaborative platforms, and feedback tools to engage learners and families. Similarly, Santos and Villanueva (2025) emphasized that younger educators benefit from simulation-based coaching and peer-led digital routines, which enhance their confidence in facilitating inclusive communication.

Table 20
Differences in the Extent of Utilization of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Digital Content and Platform When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	33.93	439.5		0.453	Not Significant
	Older	26	30.40				
Highest Educational Attainment	Lower	43	32.97	431.5		0.773	Not Significant
	Higher	21	31.55				
Length of Service	Shorter	41	35.27	358.0	0.05	0.109	Not Significant
	Longer	23	27.57				
Number of ICT/SPED Training	Few	37	34.36	430.5		0.344	Not Significant
	Many	27	29.94				
Average Family Monthly Income	Lower	29	31.84	488.5		0.796	Not Significant
	Higher	35	33.04				

Table 20 shows that there is no significant difference in the extent of utilization of SPED teachers in the implementation of Technology-Assisted Learning in the area of Digital Content and Platforms when grouped according to age (p = 0.453), highest educational attainment (p = 0.773), length of service (p = 0.109), number of ICT/SPED trainings (p = 0.344), and average family monthly income (p = 0.796). All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect how teachers utilize digital content and platforms in SPED instruction. Therefore, the hypothesis stating that "there is no significant difference in the extent of utilization in terms of Digital Content and Platforms when grouped by demographic and professional variables" is accepted.

This implies that SPED teachers' ability to navigate and integrate digital platforms is consistent across diverse backgrounds, suggesting that institutional access and standardized platform use may play a more influential role than individual characteristics. The uniformity may be attributed to the widespread availability of school-endorsed platforms and shared digital routines, which help ensure equitable usage regardless of age, training, or income. Gonzales et al. (2025) found that SPED teachers across income and service levels rely on school-based digital ecosystems and peer-led tutorials to navigate online platforms. Similarly, Alvarez and De Jesus (2024) emphasized that while training enhances multimedia fluency, the presence of structured digital tools and collaborative lesson repositories ensures consistent implementation.

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Table 21
Differences in the Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Accessibility When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	33.62	451.5		0.555	Not Significant
	Older	26	30.87				
Highest Educational Attainment	Lower	43	32.09	434.0		0.799	Not Significant
	Higher	21	33.33				
Length of Service	Shorter	41	33.80	418.0	0.05	0.447	Not Significant
	Longer	23	30.17				
Number of ICT/SPED Training	Few	37	33.27	471.0		0.694	Not Significant
	Many	27	31.44				
Average Family Monthly Income	Lower	29	35.02	434.5		0.317	Not Significant
	Higher	35	30.41				

Table 21 shows that there is no significant difference in the level of competence of SPED teachers in the implementation of Technology-Assisted Learning in the area of Accessibility when grouped according to age (p = 0.555), highest educational attainment (p = 0.799), length of service (p = 0.447), number of ICT/SPED trainings (p = 0.694), and average family monthly income (p = 0.317). All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect teachers' competence in using accessibility-related technologies. Therefore, the hypothesis stating that "there is no significant difference in the level of competence in terms of Accessibility when grouped by demographic and professional variables" is accepted. This implies that SPED teachers demonstrate comparable competence in accessibility integration regardless of their background, suggesting that institutional factors—such as standardized tools, school-based support, and peer collaboration—may play a more decisive role than individual characteristics. The consistency across groups may also reflect the growing availability of built-in accessibility features in mainstream platforms, which reduce the technical barrier for teachers. Gonzales et al. (2025) found that SPED teachers across income and service levels benefit from school-provided assistive technologies and informal mentoring networks, which help equalize competence levels.

Table 22
Differences in the Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Engagement and Motivation When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	33.83	443.5	0.05	0.483	Not Significant
	Older	26	30.56				

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Highest Educational Attainment	Lower	43	34.02	386.0	0.341	Not Significant
	Higher	21	29.38			
Length of Service	Shorter	41	35.99	328.5	0.042	Significant
	Longer	23	26.28			
Number of ICT/SPED Training	Few	37	35.20	399.5	0.167	Not Significant
	Many	27	28.80			
Average Family Monthly Income	Lower	29	33.29	484.5	0.752	Not Significant
	Higher	35	31.84			

Table 22 shows that there is no significant difference in the level of competence of SPED teachers in the implementation of Technology-Assisted Learning in the area of Engagement and Motivation when grouped according to age (p = 0.483), highest educational attainment (p = 0.341), number of ICT/SPED trainings (p = 0.167), and average family monthly income (p = 0.752). All p-values are above the significance level of 0.05, indicating that these variables do not significantly affect how competent teachers feel in engaging and motivating learners through technology. However, a significant difference was found when grouped according to length of service, with a p-value of 0.042, which is below the 0.05 threshold. This implies that SPED teachers' length of service significantly influences their competence in using technology to engage and motivate learners, while other demographic and professional variables do not. Gonzales et al. (2025) found that early-career SPED teachers often demonstrate stronger digital fluency and are more likely to integrate motivational features such as badges, interactive quizzes, and real-time feedback. Similarly, Santos and Villanueva (2025) emphasized that younger educators benefit from simulation-based coaching and peer-led digital routines, which enhance their confidence in sustaining learner attention and motivation. These findings support the need for retooling programs for veteran teachers, focusing on gamification, adaptive engagement, and inclusive digital design.

Table 23

Differences in the Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Personalized Learning When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	31.64	461.5		0.654	Not Significant
	Older	26	33.75				
Highest Educational Attainment	Lower	43	32.02	431.0		0.767	Not Significant
	Higher	21	33.48				
Length of Service	Shorter	41	31.49	430.0	0.05	0.558	Not Significant
	Longer	23	34.30				
Number of ICT/SPED Training	Few	37	29.08	373.0		0.082	Not Significant
	Many	27	37.19				
Average Family Monthly Income	Lower	29	30.86	460.0		0.518	Not Significant
	Higher	35	33.86				

Table 23 shows that there is no significant difference in the level of competence of SPED teachers in the implementation of Technology-Assisted Learning in the area of Personalized Learning when grouped according to age (p = 0.654), highest educational attainment (p = 0.767), length of

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service (p = 0.558), number of ICT/SPED trainings (p = 0.082), and average family monthly income (p = 0.518). All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect teachers' competence in customizing instruction through technology. Therefore, the hypothesis stating that "there is no significant difference in the level of competence in terms of Personalized Learning when grouped by demographic and professional variables" is accepted. This implies that SPED teachers demonstrate comparable competence in personalized learning integration regardless of their background, suggesting that institutional access to adaptive platforms and shared instructional routines may help equalize personalization practices. Gonzales et al. (2025) found that SPED teachers across income and service levels rely on collaborative lesson repositories and adaptive platforms to meet individualized education goals.

Table 24
Differences in the Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Communication and Collaboration When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	33.50	456.0		0.593	Not Significant
	Older	26	31.04				
Highest Educational Attainment	Lower	43	34.81	352.0		0.143	Not Significant
	Higher	21	27.76				
Length of Service	Shorter	41	33.65	424.5	0.05	0.499	Not Significant
	Longer	23	30.46				
Number of ICT/SPED Training	Few	37	32.91	484.5		0.834	Not Significant
	Many	27	31.94				
Average Family Monthly Income	Lower	29	32.78	499.5		0.912	Not Significant
	Higher	35	32.27				

Table 24 shows that there is no significant difference in the level of competence of SPED teachers in the implementation of Technology-Assisted Learning in the area of Communication and Collaboration when grouped according to age (p = 0.593), highest educational attainment (p = 0.143), length of service (p = 0.499), number of ICT/SPED trainings (p = 0.834), and average family monthly income (p = 0.912). All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect teachers' competence in facilitating digital communication and collaborative learning. Therefore, the hypothesis stating that "there is no significant difference in the level of competence in terms of Communication and Collaboration when grouped by demographic and professional variables" is accepted. This implies that SPED teachers demonstrate consistent competence in using technology to communicate with learners, parents, and peers, regardless of their background. The uniformity may be attributed to the widespread use of accessible platforms such as messaging apps, feedback tools, and collaborative learning environments that are integrated into school systems.

Table 25
Differences in the Level of Competence of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Digital Content and Platform When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation

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Age	Younger	38	34.64	412.5		0.261	Not Significant
	Older	26	29.37				
Highest Educational Attainment	Lower	43	33.44	411.0		0.559	Not Significant
	Higher	21	30.57				
Length of Service	Shorter	41	32.63	466.0	0.05	0.938	Not Significant
	Longer	23	32.26				
Number of ICT/SPED Training	Few	37	34.89	411.0		0.225	Not Significant
	Many	27	29.22				
Average Family Monthly Income	Lower	29	35.95	407.5		0.174	Not Significant
	Higher	35	29.64				

Table 25 shows that there is no significant difference in the level of competence of SPED teachers in the implementation of Technology-Assisted Learning in the area of Digital Content and Platform when grouped according to age (p = 0.261), highest educational attainment (p = 0.559), length of service (p = 0.938), number of ICT/SPED trainings (p = 0.225), and average family monthly income (p = 0.174).

All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect teachers' competence in navigating digital platforms or selecting appropriate content.

Therefore, the hypothesis stating that "there is no significant difference in the level of competence in terms of Digital Content and Platform when grouped by demographic and professional variables" is accepted. This implies that SPED teachers demonstrate consistent competence in using digital platforms and curating instructional content, regardless of their background. Gonzales et al. (2025) found that SPED teachers across income and service levels rely on collaborative digital ecosystems and intuitive platform design to deliver inclusive instruction. Similarly, Alvarez and De Jesus (2024) emphasized that while training enhances multimedia fluency, the presence of structured digital tools and school-wide routines ensures equitable implementation. Santos and Villanueva (2025) further noted that digital content competence is shaped more by platform accessibility and instructional culture than by demographic variables, reinforcing the need for inclusive systems and universal design principles.

Comparative Analysis on the Level of Difficulties of SPED teachers in the implementation of technology-assisted learning in Special Education in the Areas of Accessibility, Engagement and Motivation, Personalized Learning, Communication and Collaboration, and Digital Content and Platforms When Grouped According to Age, Highest Educational Attainment, Length of Service, ICT/SPED Training, and Average Family Monthly Income

Table 26
Differences in the Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Accessibility When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	32.89	479.0	0.05	0.837	Not Significant
	Older	26	31.92				
Highest Educational Attainment	Lower	43	33.87	392.5		0.396	Not Significant
	Higher	21	29.69				

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Length of Service	Shorter	41	32.28	462.5		0.899	Not Significant
	Longer	23	32.89				
Number of ICT/SPED Training	Few	37	32.53	498.5		0.989	Not Significant
	Many	27	32.46				
Average Family Monthly Income	Lower	29	33.53	477.5		0.684	Not Significant
	Higher	35	31.64				

Table 26 shows that there is no significant difference in the level of difficulties experienced by SPED teachers in the implementation of Technology-Assisted Learning in the area of Accessibility when grouped according to age (p = 0.837), highest educational attainment (p = 0.396), length of service (p = 0.899), number of ICT/SPED trainings (p = 0.989), and average family monthly income (p = 0.684). All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect how difficult teachers perceive accessibility-related tasks. Therefore, the hypothesis stating that "there is no significant difference in the level of difficulties in terms of Accessibility when grouped by demographic and professional variables" is accepted. This implies that SPED teachers encounter similar levels of difficulty in implementing accessibility features regardless of their background, suggesting that challenges in locating, adapting, or using assistive technologies are systemic rather than individual. The uniformity may reflect shared limitations in institutional resources, platform usability, or training depth across schools. Gonzales et al. (2025) found that SPED teachers across income and service levels often rely on school-provided tools and informal peer support to navigate accessibility integration.

Table 27

Differences in the Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Engagement and Motivation When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	32.20	482.5		0.874	Not Significant
	Older	26	32.94				
Highest Educational Attainment	Lower	43	33.77	397.0		0.434	Not Significant
	Higher	21	29.90				
Length of Service	Shorter	41	30.15	375.0	0.05	0.175	Not Significant
	Longer	23	36.70				
Number of ICT/SPED Training	Few	37	31.09	447.5		0.477	Not Significant
	Many	27	34.43				
Average Family Monthly Income	Lower	29	30.91	461.5		0.533	Not Significant
	Higher	35	33.81				

Table 27 shows that there is no significant difference in the level of difficulties experienced by SPED teachers in the implementation of Technology-Assisted Learning in the area of Engagement and Motivation when grouped according to age (p = 0.874), highest educational attainment (p = 0.434), length of service (p = 0.175), number of ICT/SPED trainings (p = 0.477), and average family monthly income (p = 0.533). All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect how difficult teachers perceive the task of engaging and motivating learners through technology. Therefore, the hypothesis stating that "there is no significant difference in

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the level of difficulties in terms of Engagement and Motivation when grouped by demographic and professional variables" is accepted. This implies that SPED teachers encounter similar challenges in sustaining learner attention and motivation through digital tools, regardless of their background. The uniformity may reflect shared limitations in gamification training, platform design, or learner responsiveness across school contexts. It also suggests that system-wide interventions—rather than segmented support—are needed to improve engagement strategies. Gonzales et al. (2025) found that SPED teachers across income and service levels often rely on trial-and-error approaches to digital engagement, with limited access to structured gamification models.

Table 28
Differences in the Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Personalized Learning When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	32.50	494.0		1.000	Not Significant
	Older	26	32.50				
Highest Educational Attainment	Lower	43	33.55	406.5		0.519	Not Significant
	Higher	21	30.36				
Length of Service	Shorter	41	30.46	388.0	0.05	0.241	Not Significant
	Longer	23	36.13				
Number of ICT/SPED Training	Few	37	31.82	474.5		0.733	Not Significant
	Many	27	33.43				
Average Family Monthly Income	Lower	29	31.43	476.5		0.675	Not Significant
	Higher	35	33.39				

Table 28 shows that there is no significant difference in the level of difficulties experienced by SPED teachers in the implementation of Technology-Assisted Learning in the area of Personalized Learning when grouped according to age (p = 1.000), highest educational attainment (p = 0.519), length of service (p = 0.241), number of ICT/SPED trainings (p = 0.733), and average family monthly income (p = 0.675). All p-values are above the significance level of 0.05, indicating that none of the variables significantly affect how difficult teachers perceive the task of customizing digital instruction for individual learning needs. Therefore, the hypothesis stating that "there is no significant difference in the level of difficulties in terms of Personalized Learning when grouped by demographic and professional variables" is accepted. This implies that SPED teachers encounter similar challenges in implementing personalized learning through technology, regardless of their background. Gonzales et al. (2025) found that SPED teachers across income and service levels often rely on standardized platforms with limited customization features, which may constrain personalization efforts.

Table 29
Differences in the Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Communication and Collaboration When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	34.46	419.5	0.05	0.300	Not Significant

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	Older	26	29.63			
Highest Educational Attainment	Lower	43	35.91	305.0	0.033	Significant
	Higher	21	25.52			
Length of Service	Shorter	41	34.15	404.5	0.336	Not Significant
	Longer	23	29.57			
Number of ICT/SPED Training	Few	37	37.20	325.5	0.016	Significant
	Many	27	26.06			
Average Family Monthly Income	Lower	29	36.62	388.0	0.101	Not Significant
	Higher	35	29.09			

Table 29 shows that there is no significant difference in the level of difficulties experienced by SPED teachers in the implementation of Technology-Assisted Learning in the area of Communication and Collaboration when grouped according to age (p = 0.300), length of service (p = 0.336), and average family monthly income (p = 0.101). However, significant differences were found when grouped according to the highest educational attainment (p = 0.033) and the number of ICT/SPED trainings attended (p = 0.016), both below the 0.05 threshold. This implies that teachers with higher educational attainment and more training experience fewer difficulties in facilitating digital communication and collaboration, while other demographic factors do not significantly influence perceived challenges. Gonzales et al. (2025) emphasized that SPED teachers with advanced degrees are more likely to integrate inclusive communication strategies and leverage collaborative platforms effectively.

Table 30

Differences in the Level of Difficulties of SPED teachers in the Implementation of Technology-Assisted Learning in Special Education in the Area of Digital Content and Platform When Grouped and Compared According to Variables

Variables	Categories	N	Mean Rank	Mann Whitney U - test	Sig. Level	p-value	Interpretation
Age	Younger	38	34.93	401.5		0.202	Not Significant
	Older	26	28.94				
Highest Educational Attainment	Lower	43	36.57	276.5		0.012	Significant
	Higher	21	24.17				
Length of Service	Shorter	41	34.57	386.5	0.05	0.230	Not Significant
	Longer	23	28.80				
Number of ICT/SPED Training	Few	37	35.84	376.0		0.090	Not Significant
	Many	27	27.93				
Average Family Monthly Income	Lower	29	36.50	391.5		0.114	Not Significant
	Higher	35	29.19				

Table 30 shows that there is no significant difference in the level of difficulties experienced by SPED teachers in the implementation of Technology-Assisted Learning in the area of Digital Content and Platform when grouped according to age (p = 0.202), length of service (p = 0.230), number of ICT/SPED trainings (p = 0.090), and average family monthly income (p = 0.114). However, a significant difference was found when grouped according to highest educational attainment, with a p-value of 0.012, which is below the 0.05 threshold. This implies that SPED teachers with lower

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educational attainment experience greater difficulty in navigating digital platforms and curating instructional content, while other demographic and professional variables do not significantly influence perceived challenges. Gonzales et al. (2025) found that SPED teachers with advanced degrees are more likely to integrate multimedia resources and navigate platform features with ease, often due to prior exposure to research-based instructional design.

Table 31
Relationship Between the Level of Teachers' Instructional Skills and the Level of Academic Performance

Variable	rho	p-value	Sig. level	Interpretation
Extent of Utilization Level of Competence	0.153	0.225	0.05	Not Significant

Table 31 presents the relationship between SPED teachers' instructional skills and the level of academic performance of learners in Technology-Assisted Learning. The data show that the extent of utilization of technology has a positive but weak correlation with academic performance, with a Spearman rho value of 0.153 and a p-value of 0.225, which is not statistically significant at the 0.05 level. This suggests that while increased use of technology may contribute to academic gains, the relationship is not strong enough to be considered conclusive. The finding implies that mere frequency of technology use does not guarantee improved learner outcomes. Instead, the quality of integration, instructional design, and contextual relevance may play a more critical role. This aligns with the findings of Gonzales et al. (2025), who emphasized that utilization must be paired with pedagogical intent and learner-centered strategies to yield measurable academic benefits.

Conclusions

SPED teachers demonstrate a great extent of utilization across all key areas of technology-assisted learning, indicating widespread integration of digital tools in Accessibility, Engagement, Personalized Learning, Communication, and Content Delivery. Teachers exhibit a high level of competence in implementing technology-assisted learning, suggesting that they are not only using digital tools frequently but are also confident and capable in applying them effectively across instructional domains. Moderate difficulties were reported in Accessibility, Engagement, and Personalized Learning, while low difficulties were noted in Communication and Digital Content, implying that while teachers are generally confident, targeted support is needed in customizing instruction and ensuring inclusive access. Utilization levels remain consistently high across demographic and professional variables, indicating that technology use is broadly adopted regardless of age, education, service length, training, or income. Competence levels are uniformly high across all respondent groups, suggesting that SPED teachers, regardless of background, possess the necessary skills to implement technology-assisted learning effectively.
Difficulties in implementation are experienced similarly across all variables, reflecting shared challenges that may stem from systemic factors such as platform limitations, resource availability, or institutional support. No significant difference was found in utilization when grouped by demographic and professional variables, confirming that technology use is not dependent on personal characteristics but may be shaped by school-wide practices and access.
No significant difference was found in competence across variables, reinforcing the idea that teacher skill in technology integration is broadly consistent and may be supported by standardized training or shared digital routines. No significant difference in reported difficulties across variables suggests that barriers to implementation are common and not isolated to specific groups, highlighting the need for universal design and inclusive infrastructure.No significant relationship was found between utilization and competence, indicating that frequent use of technology does not

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automatically translate to higher skill levels, and that quality of training and contextual support may be more influential than usage frequency alone.

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Authorship Contribution Statement

Olarte: Concept and design, literature review, data collection, analysis, and interpretation.
Hermosura: Final concept editing, guidance and supervision, and manuscript proof-reading.

Conflict of Interest

The authors declare the absence of any conflict of interest that could have influenced the content or conclusions of this paper. They affirm that no financial, personal, or professional relationships with other individuals or organizations have compromised the objectivity, integrity, or impartiality of the research work. As a final point, no external parties influenced the study design, data collection, analysis, or interpretation.

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