Empowering Inclusion Through Technology: Special Education Teachers' Knowledge and Attitudes Toward Assistive Technology Intervention
DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Empowering Inclusion Through Technology: Special Education Teachers' Knowledge and Attitudes Toward Assistive Technology Intervention

Beatrice Patricia T. Peconcillo
Philippine Women's University, Manila, Philippines
Email: 202311303@pwu.edu.ph

Gerald John T. Javellana
Faculty, Philippine Women's University, Manila, Philippines
Email: gtjavellana@pwu.edu.ph

Abstract

This study assessed the knowledge and attitudes of special education teachers toward assistive technology interventions in a special education school in Iloilo City, Philippines. Employing a mixed-method embedded design, the study combined quantitative survey data from forty-eight (48) special education teachers and qualitative insights from interviews with ten (10) selected respondents. Quantitative data analysis utilized frequency, percentage, mean, standard deviation, t-test, and ANOVA, while qualitative data underwent thematic analysis. The findings revealed that the respondents demonstrated adequate overall knowledge (M = 3.80) and highly positive attitudes (M = 4.05) toward assistive technology interventions. While teachers exhibited robust proficiency in identifying and matching tools (M = 3.93), a significant deficit was identified in technical operating and troubleshooting skills (M = 3.45). Key challenges included an acute insufficiency of devices, restricted training avenues, unstable digital connectivity, and sparse specialist backup. Profile variations indicated that age, academic qualifications, and baseline training exposure significantly modulated pedagogical competencies, whereas tenure did not present statistically meaningful variations. Based on these outcomes, a comprehensive professional training program is put forward to bridge the highlighted technical and systemic execution discrepancies.

Keywords: *Assistive technology, special education teachers, inclusive education, teacher knowledge, teacher attitudes*

Bio-profile

Beatrice Patricia T. Peconcillo is an international educator with eleven years of teaching experience across the educational systems of the Philippines and the United States. She earned her Bachelor of Elementary Education major in Special Education, graduating Magna Cum Laude from the University of Iloilo-PHINMA Education Network, and is currently a candidate for a Master of Arts in Education specializing in Special Education at the Philippine Women's University. Her pedagogical background spans multiple school systems, including Iloilo Doctors' College and Hibao-an Integrated School in the Philippines. She spent five years in Chicago, Illinois, USA, serving as a Special Education Case Manager and member of the Senior Leadership Team at the Henry H. Nash School of Fine and Performing Arts under Chicago Public Schools. Her international exposure and hands-on case

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

management work drive her research focus on assistive technology integration, multi-tiered educational support setups, and sustainable classroom inclusion methodologies.

Introduction

Education serves as an essential engine for personal empowerment and lifelong trajectory shifts, with classroom practitioners enacting the most immediate, durable impact on academic and socio-emotional parameters (UNESCO, 2020). According to Social Learning Theory (Bandura, 1986), knowledge acquisition is significantly mediated via guided structured interaction, scaffolded cognitive observation, and intentional mentoring design. In contemporary inclusive classrooms, where learners display heavily diverse neuro-developmental and sensory configurations, teachers are mandated to deploy modern pedagogical workflows and specialized toolkits to anchor engagement and provide access (Campado et al., 2023). Chief among these infrastructural frameworks is assistive technology (AT), which translates as a broad spectrum of assistive products, operational methodologies, and clinical software protocols designed to stabilize or upgrade functional capabilities for persons with disabilities (World Health Organization, 2024). Legally supported by baseline directives such as the Individuals with Disabilities Education Act (2017), the implementation of low-tech, mid-tech, and high-tech AT solutions shifts specialized environments from traditional exclusion models toward optimized instructional alignment.

Despite expansive global recognition of the transformative capacity of assistive tools, a severe execution gap persists within emerging school systems, most noticeably in local environments in the Philippines (Toquero, 2021). Prior inquiries have frequently mapped the broad macro-level utility of academic technology or focused primarily on standardized student performance data, leaving a marked gap regarding the targeted experiences, diagnostic competence, and specific barriers confronting field practitioners (Fteiha et al., 2024). Special education (SPED) teachers are expected to seamlessly plan lessons, analyze child criteria, and perform complex electronic troubleshooting without formal preparation or regular resource supply (Tercero & Delos Reyes, 2025). This institutional mismatch induces systematic instructional friction, leading to underutilized apparatus or the instructional isolation of special needs students inside general environments. Empirical investigation that ties systematic quantitative metrics on teacher knowledge profiles with granular qualitative text on frontline challenges is notably absent within the Philippine regional sphere.

To answer this gap, the present study systematically assessed the structural knowledge baselines, operational attitudes, and frontline challenges experienced by special education teachers handling assistive technology configurations within a dedicated SPED facility in Iloilo City, Philippines. By examining these core dynamics across professional profiles, this inquiry identifies exact technical skill deficiencies to establish an evidence-based foundation for structured capacity enhancement.

Theoretical Framework

This inquiry is theoretically anchored upon three complementary developmental and behavioral models: the Technology Acceptance Model (TAM), Vygotsky's Constructivist Learning Theory, and Social Cognitive Theory. TAM posits that an agent's intention to

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

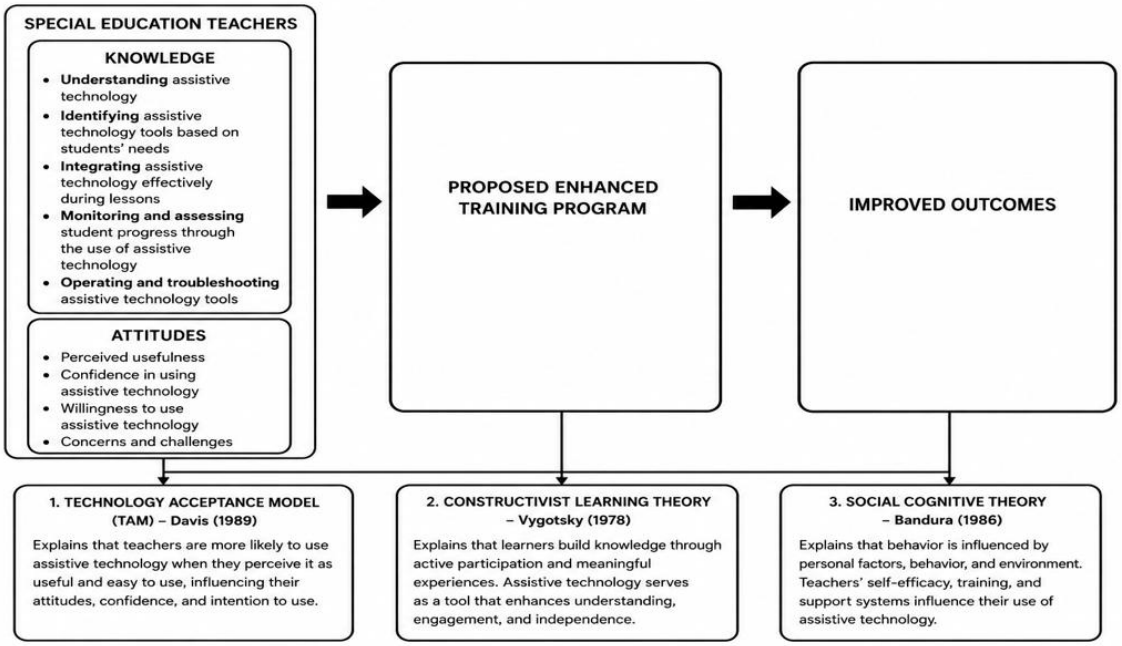
exploit a given technical framework is uniquely shaped by its perceived usefulness and perceived ease of use (Davis, 1989). In inclusive configurations, special educators exhibit increased workflow assimilation when they perceive that AT tools directly improve learning metrics, provided they also find the devices easy to manage. Secondly, Constructivist Learning Theory underscores that learning progresses via contextualized tool mediation, instructional scaffolding, and tailored external interventions within a child's Zone of Proximal Development (Vygotsky, 1978). Here, AT acts as an analytical mediator that bridges the gap between independent capacity and collaborative potential. Lastly, Social Cognitive Theory integrates the construct of self-efficacy—an individual's confidence to carry out tasks required to meet specific performance thresholds (Bandura, 1986). Teacher's technology integration behaviors are deeply influenced by personal self-efficacy beliefs, which are directly reinforced by specialized training and administrative support systems.

Conceptual Framework

The study operates on a multi-variable diagnostic framework where selected teacher demographic profiles (Age, Gender, Highest Educational Attainment, Years of Teaching Experience in SPED, and Number of AT-Related Seminars/Trainings Attended) serve as descriptive context elements that potentially condition two primary dependent dimensions: Teachers' Knowledge and Teachers' Attitudes toward assistive technology intervention. The Knowledge profile maps across five clear competence spaces: Understanding AT, Identifying and Matching Tools, Lesson Integration, Progress Monitoring, and Technical Troubleshooting. Concurrently, the Attitude profile measures Perceived Usefulness, Self-efficacy/Confidence, Willingness to Integrate, and Field Concerns. These interlocking elements are checked against systemic workspace challenges and institutional barriers, directly culminating in the formulation of an Enhanced Professional Training Program designed to stabilize technical execution, enhance teacher confidence, and solidify inclusive outcomes for special needs populations.

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Figure 1. Schematic Diagram of the Theoretical Basis



Research Questions

This study systematically assessed special education teachers' operational knowledge baselines and current attitudes toward assistive technology interventions. Specifically, it sought to resolve the following research objectives:

1. What is the demographic and professional profile of the respondents in terms of Age, Gender, Highest Educational Attainment, Years of Teaching Experience in Special Education, and Number of Seminars/Trainings Relative to Technology Attended?
2. How do the respondents assess their knowledge of assistive technology interventions in terms of: Understanding Assistive Technology, Identifying and Matching Assistive Technology Tools, Using and Integrating Assistive Technology During Lessons, Monitoring and Assessing Students' Progress, and Operating and Troubleshooting Assistive Technology?
3. How do the respondents assess their attitudes toward the use of assistive technology interventions in terms of: Perceived Usefulness of Assistive Technology, Confidence in Using Assistive Technology, Willingness to Use Assistive Technology, Concerns Using Assistive Technology, and Commitment to Trainings/Professional Growth?
4. Is there a significant difference in the respondents' assessment of their knowledge of assistive technology interventions when grouped according to their profile variables?
5. Is there a significant difference in the respondents' assessment of their attitudes toward the use of assistive technology interventions when grouped according to their profile variables?
6. What knowledge-related challenges do the respondents encounter when using assistive technology interventions for students with special needs?
7. How do the respondents perceive the value and effectiveness of assistive technology interventions in their teaching practice?

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

8. Based on the findings, what enhanced professional training program on assistive technology interventions may be proposed?

Literature Review

Assistive Technology in Inclusive Education

Assistive technology serves as a core foundation for inclusive practice by providing equal access to the general curriculum and removing physical, cognitive, and communicative barriers (UNESCO, 2020). Grounded in Vygotsky's Zone of Proximal Development, AT acts as a functional bridge that helps learners navigate complex tasks that would otherwise remain inaccessible (Alkahtani, 2013). Empirical evaluations indicate that the deployment of specialized tools significantly enhances student engagement, boosts self-esteem, and counteracts instructional isolation (Stewart, 2024). Within the Philippine theater, the integration of mobile platforms, sensory aids, and adaptive software has been shown to improve both student motivation and conceptual retention (Campado et al., 2023). However, systemic integration remains highly uneven, and the broad educational impact continues to be restricted by technological discrepancies across school systems (Wulandari et al., 2024).

Teachers' Knowledge of Assistive Technology

The successful implementation of assistive configurations relies entirely on the depth of teacher knowledge and analytical competence (Onivehu et al., 2017). Teachers must possess strong skills not only to identify relevant options but also to adapt instructional materials to ensure compatibility with specialized devices (Alkahtani, 2013). Focused preparation programs consistently upgrade technical execution baselines, enhance instructional fluency, and improve readiness for inclusive classrooms (Park et al., 2023). Conversely, a lack of deep conceptual understanding often causes misalignments, where devices are incorrectly matched to child profiles or abandoned entirely during live lessons due to basic technical issues (Aldehami, 2022; Van Laarhoven et al., 2012).

Teachers' Attitudes Toward Assistive Technology

Teacher dispositions and behavioral views act as primary determinants of technology adoption inside inclusive spaces (Masoud, 2025). When educators directly observe improvements in student engagement and understanding, they develop highly positive attitudes and a strong commitment to professional development (Campado et al., 2023). While local evaluations show that Philippine educators widely recognize the underlying value of AT systems, their actual willingness to deploy them regularly is often limited by high anxiety regarding personal technical limitations (Quiño-Justol, 2024). This validation aligns with TAM, proving that perceived usefulness must be coupled with technical ease of use to ensure sustainable integration (Aldagamseh et al., 2026).

Challenges and Training Needs in Assistive Technology

The literature highlights a dense network of institutional barriers that restrict assistive interventions, including limited funding, high hardware costs, and a lack of specialized personnel (Micua-Rodriguez, 2024). Educators frequently report feeling unprepared to handle complex equipment or design inclusive lessons for heavily diverse groups due to a lack of hands-on, practice-based professional development (Atanga et al., 2020; Fteiha et al., 2024). This issue is further compounded by poor internet connectivity and a lack of technical

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

support from school administrators, leaving teachers isolated when addressing technical faults (Keshav et al., 2018; Toquero, 2021).

Method

Research Design

This investigation deployed a mixed-method embedded design to achieve a comprehensive, multi-layered assessment of the target metrics. The embedded approach allows secondary qualitative datasets to be directly integrated within a primary quantitative design, helping to contextualize standardized survey trends with descriptive text on frontline teacher experiences (Creswell et al., 2011). The quantitative phase used descriptive survey methods to examine broad profiles, knowledge baselines, and attitude patterns across the sample. Simultaneously, the qualitative phase used semi-structured key informant interviews to explore nuanced operational barriers and specific challenges that could not be fully captured by standardized scales alone.

Participants

The study sample comprised forty-eight (48) special education teachers actively deployed within a public SPED school facility in Iloilo City, Philippines, selected via census sampling. Within this cohort, participants were distributed across distinct instructional specializations: 21% were assigned to the Intellectual Disabilities Sequence (also serving autism spectrum and health impairments), 17% to the Elementary Multiple Intelligences line, 17% to the Secondary Multiple Intelligences segment, and 6% to the Visual Impairment line, alongside one administrative staff member (2%) without active classroom loads. From the baseline sample, a sub-group of ten (10) teachers was selected via purposive sampling (Tajik et al., 2025) to participate in the qualitative interviews, ensuring balanced representation across varying specializations and career stages.

Instrument

Data collection was executed using two researcher-formulated instruments adapted from established technology adoption literature (Alkahtani, 2013; Atanga et al., 2020; Campado et al., 2023). The primary survey instrument consisted of three parts: Part I collected demographic and professional profiles; Part II measured specific knowledge across five sub-spaces using targeted items; and Part III evaluated attitudes across five distinct operational areas. All items used a standard 5-point Likert scale (5 = Strongly Agree to 1 = Strongly Disagree). The secondary instrument was an open-ended interview guide containing six core questions that explored specific implementation challenges, instructional adaptations, and administrative support needs.

Ethical Considerations

Strict ethical protocols were maintained throughout the research process. Institutional clearance was obtained from school authorities prior to engagement. All participants received a detailed information letter and signed an informed consent form, explicitly confirming that participation was voluntary and that they retained the right to withdraw at any stage without consequences. Anonymity and data confidentiality were protected by replacing identifiable information with numeric codes. Raw data were stored securely, accessed exclusively by the primary research team, and handled without any manipulation or selective distortion.

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Statistical Treatment

Quantitative data analysis was performed using SPSS. Profiles were mapped using frequency distributions and percentages. Knowledge baselines and attitude dimensions were calculated using means and standard deviations, interpreted against formal scale boundaries (1.00-1.49: Strongly Disagree; 1.50-2.49: Disagree; 2.50-3.49: Neutral; 3.50-4.49: Agree; 4.50-5.00: Strongly Agree). Significant variations across gender were evaluated using independent samples t-tests, while variations across age, academic attainment, and training exposure were determined using one-way Analysis of Variance (ANOVA) with alpha set at 0.05. Qualitative interview data were processed using thematic analysis (Braun & Clarke, 2006) to identify recurring challenges and perceptions.

Results and Discussion

1. Demographic and Professional Profile of the Respondents

1. 1 Age Distribution of Respondents

The age metrics of the surveyed special education workforce reveal a mature and deeply experienced cohort of educators.

Table 1: **Age Distribution of the Respondents**

Age Bracket	Frequency (f)	Percentage (%)
20–25	1	2
26–30	6	13
31–35	7	15
36–40	3	6
41–45	7	15
46–50	8	17
51–55	7	15
56–60	7	15
60 and above	2	4
Total	**48**	**100**

As shown in Table 1, the largest singular proportion of the teaching workforce belongs to the 46–50 age bracket, representing 8 individuals or 17% of the total sample.

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Conversely, early-career professionals in the 20–25 age range constitute a minor fraction of the population at just 1 individual or 2%. When evaluating the overall distribution, the data implies that the institution is heavily staffed by mid-to-late career professionals who possess a wealth of classroom experience. However, as noted in the literature, an aging or highly senior workforce can occasionally present unique institutional vulnerabilities, specifically regarding potential hesitation or adaptability challenges when adjusting to rapidly evolving technical setups and modern educational software innovations (Atanga et al., 2020; Huliganga, 2025).

1.2 Gender Configuration of Respondents

The gender array displays a stark demographic imbalance that aligns closely with historical deployment trends observed in primary and specialized education spaces.

Table 2: **Gender Distribution of the Respondents**

Gender Vector	Frequency (f)	Percentage (%)
Male	6	13
Female	42	88
Total	**48**	**100**

The data in Table 2 establishes that the sample is predominantly female, with 42 individuals making up 88% of the cohort, compared to only 6 male participants at 13%. This composition mirrors macro-level educational trends in the Philippines, where the special education division is historically and overwhelmingly populated by female educators. While literature suggests that instructional preferences and baseline openness to pedagogical technology can occasionally vary across gender lines in generalized setups, clinical evaluations within specialized environments demonstrate that these operational variations are ultimately minimal or completely non-significant when teachers are provided uniform professional development (Onivehu et al., 2017; Aldehami, 2022).

1.3 Highest Educational Attainment of Respondents

The academic tracking demonstrates a highly motivated workforce actively engaged in pursuing postgraduate qualifications and continuous professional self-improvement. According to Table 3, more than half of the surveyed teachers (25 individuals or 52%) have actively progressed beyond their baseline undergraduate training by accumulating master's degree units. Full graduate degree holders—encompassing those with completed Master's degrees, completed Doctorates, or active Doctoral units—constitute 23% of the total sample.

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Table 3: **Highest Educational Attainment of the Respondents**

Educational Level	Frequency (f)	Percentage (%)
Bachelor's Degree	12	25
Bachelor's Degree with Master's Units	25	52
Master's Degree	7	15
Master's Degree with Doctoral Units	2	4
Doctorate Degree	2	4
Total	**48**	**100**

This active academic progression serves as a highly favorable indicator, as continuous postgraduate tracking generally broadens a teacher's theoretical baseline and enhances their institutional openness to modern pedagogical strategies. However, partial or uncompleted graduate coursework can simultaneously indicate restricted systematic exposure to highly specialized, advanced technical coursework dedicated purely to assistive software configurations (Alkahtani, 2013; Atanga et al., 2020).

1.4 Years of Teaching Experience in Special Education

The tenure parameters indicate a deeply anchored and contextually seasoned group of classroom practitioners.

Table 4: **Years of Teaching Experience in Special Education**

Length of SPED Service	Frequency (f)	Percentage (%)
1–5 years	13	27
6–10 years	8	17
11–15 years	3	6
15 years and above	24	50
Total	**48**	**100**

As detailed in Table 4, an absolute majority of the surveyed population (24 individuals or 50%) possess an extensive professional tenure of 15 years or more dedicated

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

exclusively to teaching students with special needs. Practitioners with intermediate experience (6–15 years) make up 23%, while newer field entries (1–5 years) account for 27%. This high concentration of veteran teachers is a significant asset, as senior educators typically possess refined adaptive workflows, deep diagnostic intuition, and extensive experience handling complex student behavioral profiles. Nonetheless, tenure can present double-edged outcomes; when veteran instructors are insulated from modern technological advancements, they may display a preference for traditional, non-digital teaching methodologies unless explicitly brought into structured technical training (Onivehu et al., 2017; Huliganga, 2025).

1.5 Assistive Technology-Related Trainings Attended

The final vector maps the specific institutional preparation received by the educators and uncovers a severe systemic training deficit.

Table 5: **Number of Seminars/Trainings Relative to Technology Attended**

AT Training Seminars Attended	Frequency (f)	Percentage (%)
0 None	35	73
1–2 trainings received	9	19
3–5 trainings received	4	8
Total	**48**	**100**

Table 5 exposes a critical training gap: a stark 73% of these highly experienced educators (35 individuals) report having received absolutely zero formal training or seminars focused on assistive technology configurations. Only a small fraction (8%) have managed to secure 3 to 5 relevant workshops throughout their careers. This specific metric is a critical finding, as it exposes a severe mismatch between the mandated integration of inclusive tools and the baseline technical preparation provided to educators. Despite their extensive tenure, an absolute lack of continuous professional training significantly limits teachers' hands-on operational confidence, giving rise to high levels of workplace anxiety and self-doubt when managing devices (Van Laarhoven et al., 2012; Atanga et al., 2020). This clear deficiency directly underscores the immediate, compelling need to implement a structured, hands-on capacity building program.

2. Respondents' Assessment of Their Knowledge of AT Interventions

The special education teachers demonstrated an overall mean knowledge score of 3.80, which is verbally interpreted as **Agree**, indicating that they generally possess an adequate conceptual and instructional understanding of assistive technology. Their primary competence lies in *Identifying and Matching Assistive Technology Tools* ($M = 3.93$, Agree),

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

where teachers expressed strong confidence in matching available tools to a learner's specific educational needs. This satisfies core constructivist assumptions that familiarizing educators with available technical apparatus directly enhances their capability to provide tailored instructional support (Alkahtani, 2013; Campado et al., 2023).

In sharp contrast, the weakest dimension evaluated was *Operating and Troubleshooting Assistive Technology*, which generated a mean score of only 3.45 (**Neutral**). Teachers reported a explicit lack of competence when tasked with performing basic technical fixes when a tool stops working during a live class ($M = 3.27$, **Disagree**). This gap points to a clear weakness in hands-on technical skills; while teachers know what tools exist and can integrate them into basic lesson materials, they lack the technical capability to manage equipment failures independently, reinforcing existing literature showing that technical competence remains a severe stumbling block unless supported by targeted practical training (Onivehu et al., 2017; Pascuas, 2015).

Table 6: ***Summary of Respondents' Assessment of Their Knowledge***

Knowledge Domain / Indicators	Mean	Standard Deviation	VI
2.1 Understanding Assistive Technology	**3.90**	**0.831**	**Agree**
2.1.1 Understanding the meaning of AT	4.02	0.812	Agree
2.1.2 Explaining how AT supports learners	3.65	0.863	Agree
2.1.3 Knowing low-, mid-, and high-tech examples	4.04	0.771	Agree
2.2 Identifying and Matching AT Tools	**3.93**	**0.724**	**Agree**
2.2.1 Knowing tools used for communication	4.06	0.633	Agree
2.2.2 Choosing tools based on student needs	4.02	0.729	Agree
2.2.3 Identifying learner needs supported by AT	3.88	0.733	Agree
2.2.4 Explaining why a chosen tool is appropriate	3.77	0.778	Agree
2.3 Using and Integrating AT During Lessons	**3.92**	**0.767**	**Agree**
2.3.1 Planning lessons that support objectives	3.88	0.703	Agree
2.3.2 Adjusting instruction to prevent peer isolation	3.92	0.794	Agree

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

2.3.3 Adapting instructional materials to be compatible	3.98	0.812	Agree
2.4 Monitoring and Assessing Students' Progress	**3.76**	**0.679**	**Agree**
2.4.1 Using AT to monitor academic progress	3.77	0.692	Agree
2.4.2 Observing and tracking student participation	3.77	0.692	Agree
2.4.3 Documenting AT outcomes for planning/reporting	3.75	0.668	Agree
2.5 Operating and Troubleshooting AT	**3.45**	**0.765**	**Neutral**
2.5.1 Performing basic troubleshooting steps	3.27	0.792	Disagree
2.5.2 Handling common issues during class	3.50	0.772	Neutral
2.5.3 Guiding parents on simple AT use at home	3.58	0.710	Neutral
OVERALL MEAN	**3.80**	**0.772**	**Agree**

3. Respondents' Assessment of Their Attitudes Toward the Use of AT Interventions

The survey data revealed an exceptionally high overall attitude baseline mean of 4.05 (**Agree**), demonstrating that the educators maintain deeply favorable perceptions regarding technology integration for inclusive practices. Their strongest attitudinal marker was *Commitment to Trainings/Professional Growth* ($M = 4.34$, **Agree**), reflecting a collective desire for advanced, hands-on professional development to optimize tool usage. Additionally, teachers strongly acknowledged the *Perceived Usefulness of Assistive Technology* ($M = 4.20$, **Agree**), highlighting their firm conviction that these devices directly foster curriculum accessibility, student independence, and classroom inclusion. This positive baseline satisfies the core constraints of the Technology Acceptance Model (TAM), confirming that teachers display strong intrinsic motivation to adopt tools when they recognize their therapeutic and educational utility (Masoud, 2018; Quiño-Justol, 2024).

However, this systemic willingness is heavily hindered by environmental anxieties measured under *Concerns Using Assistive Technology* ($M = 3.87$, **Agree**). Teachers expressed acute concern regarding the persistent lack of physical hardware and devices ($M = 4.08$) and the ongoing deficiency of administrative and technical support ($M = 3.90$). This dynamic reveals that while educators maintain highly positive attitudes and a willingness to integrate technology, they feel restricted by structural anxieties. This supports existing literature asserting that positive behavioral intentions will remain unfulfilled unless actively backed by physical resource supply and targeted administrative engineering (Fteiha et al., 2024; Park et al., 2023).

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Table 7: ***Summary of Respondents' Assessment of Their Attitudes***

Attitudinal Domain / Indicators	Mean	SD)	VI
3.1 Perceived Usefulness of Assistive Technology	**4.20**	**0.807**	**Agree**
3.1.1 AT helps improve learners' performance	4.19	0.842	Agree
3.1.2 AT helps learners become more independent	4.17	0.834	Agree
3.1.3 AT supports inclusion and participation	4.25	0.758	Agree
3.2 Confidence in Using Assistive Technology	**3.69**	**0.743**	**Agree**
3.2.1 Confident using AT in current teaching	3.69	0.748	Agree
3.2.2 Confident learning new AT tools when needed	3.79	0.771	Agree
3.2.3 Explaining AT use to parents practically	3.58	0.710	Agree
3.3 Willingness to Use Assistive Technology	**4.12**	**0.695**	**Agree**
3.3.1 Willing to use AT regularly in teaching	3.96	0.651	Agree
3.3.2 Open to trying new technologies for needs	4.21	0.713	Agree
3.3.3 Believe AT should be part of inclusive teaching	4.19	0.704	Agree
3.4 Concerns Using Assistive Technology	**3.87**	**0.903**	**Agree**
3.4.1 Concerned about insufficient time in lessons	3.42	0.964	Neutral
3.4.2 Lack of devices/materials limits effective use	4.08	0.821	Agree
3.4.3 Concerned about not receiving enough training	4.08	0.739	Agree
3.4.4 Concerned about lack of support from school heads	3.90	0.928	Agree
3.5 Commitment to Trainings/Professional Growth	**4.34**	**0.659**	**Agree**
3.5.1 Committed to attending training when available	4.27	0.676	Agree
3.5.2 Desire professional development with hands-on practice	4.33	0.663	Agree
3.5.3 Want training workshops on matching tools to needs	4.40	0.644	Agree

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Attitudinal Domain / Indicators	Mean	SD)	VI
3.5.4 Want training on monitoring/evaluating effectiveness	4.35	0.668	Agree
OVERALL MEAN ATTITUDINAL SCORE	**4.05**	**0.803**	**Agree**

4. Comparison of Respondents' Assessment of Their Knowledge Across Profile Variables

The inferential comparative computations demonstrated that **Age**, **Highest Educational Attainment**, and **Number of Seminars/Trainings Attended** significantly modulate a teacher's assistive technology knowledge profile, whereas active **Gender** vectors display highly isolated significance, and **Years of Experience** yield mixed results.

One-way ANOVA mapping across age groups revealed statistically significant variations across all five evaluated knowledge spaces, leading to the clear rejection of the baseline null hypothesis. Older, mid-to-late career professionals consistently outscored early-career cohorts—noticeably within *Understanding AT* ($\mathcal{F} = 2.41, p = 0.019$) and *Identifying Tools* ($\mathcal{F} = 7.64, p < 0.05$)—proving that continuous exposure over time builds stronger conceptual baselines. When grouped by Gender, no significant variance was observed across four domains, indicating that male and female educators share relatively equal conceptual understandings; however, an isolated significant difference surfaced inside *Monitoring and Assessing Progress* ($t = 2.75, p = 0.007$), where male teachers reported higher self-assessed competency.

Educational attainment tracking yielded mixed configurations ($\mathcal{F} = 9.41, p = 0.000$ for tool selection), revealing that holders of Master's degrees and postgraduate certificates generated higher scores than active Doctorate holders. This indicates that academic advancement at the highest level does not automatically translate into functional classroom IT skills, which depend more heavily on immediate practical exposure (Alkahtani, 2013; Atanga et al., 2020). Finally, the volume of training courses attended generated high statistical significance for conceptual mastery ($\mathcal{F} = 3.37, p = 0.037$) and lesson integration ($\mathcal{F} = 3.28, p = 0.040$). Respondents with 3–5 specialized trainings vastly outpaced untrained peers, verifying that structured workshops directly drive technical knowledge development (Huliganga, 2025; Van Laarhoven et al., 2012).

Table 8: ***Inferential Analysis: Knowledge Variations Across Profile Vectors***

Knowledge Space Vectors	Age (F / p) PDF	Gender (t / p) PDF	Educational Attainment (F / p) PDF	AT Trainings Attended (F / p) PDF
2.1 Understanding AT	2.41 / 0.019*	0.83 / 0.410	3.49 / 0.009*	3.37 / 0.037*
2.2 Identifying Tools	7.64 / <0.05*	-0.41 / 0.680	9.41 / 0.000*	3.15 / 0.045*

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Knowledge Space Vectors	Age (F / p) PDF	Gender (t / p) PDF	Educational Attainment (F / p) PDF	AT Trainings Attended (F / p) PDF
2.3 Lesson Integration	5.34 / <0.05*	1.11 / 0.270	9.26 / 0.000*	3.28 / 0.040*
2.4 Progress Monitoring	4.90 / <0.05*	2.75 / 0.007*	5.19 / 0.001*	2.69 / 0.071
2.5 Technical Troubleshooting	2.54 / 0.013*	-0.37 / 0.710	2.19 / 0.073	1.59 / 0.207

*Note: * Statistically significant at the alpha threshold of* $p < 0.05$.

5. Comparison of Respondents' Assessment of Their Attitudes Across Profile Variables

The attitudinal inferential mapping indicated that **Age** significantly modulates almost all operational behavioral parameters, and **Highest Educational Attainment** drives selective shifts in openness, whereas **Gender**, **Years of Experience in SPED**, and the **Total Number of Training Seminars Attended** display non-significant variations across the entire attitudinal ecosystem.

When tracking Age brackets, highly significant differences were rejected across *Perceived Usefulness* ($\mathcal{F} = 2.31, p = 0.024$), *Confidence* ($\mathcal{F} = 2.63, p = 0.010$), *Willingness* ($\mathcal{F} = 2.04, p = 0.046$), and *Technical Concerns* ($\mathcal{F} = 2.10, p = 0.038$). Senior professionals (aged 60 and above) expressed perfect mean scores ($M = 5.00$) for willingness and value appreciation, while mid-career segments (aged 36–40) registered significantly lower confidence patterns ($M = 3.00$) alongside elevated workspace anxiety scores ($M = 4.25$). Gender arrays did not yield statistical significance across four dimensions, with the sole exception of *Confidence in Using Assistive Technology* ($t = 2.64, p = 0.009$), where male respondents displayed significantly higher structural confidence ($M = 4.11$) than female instructors ($M = 3.63$).

Educational attainment generated significant variations in *Operational Willingness* ($\mathcal{F} = 2.49, p = 0.046$) and *Training Commitment* ($\mathcal{F} = 2.74, p = 0.030$), proving that academic progression corresponds to a deeper professional commitment to pursue continuous skill acquisition. Crucially, active tenure parameters ($\mathcal{F} = 1.24, p = 0.298$ for value perception) and total training volumes ($\mathcal{F} = 1.09, p = 0.341$ for confidence vectors) generated non-significant variances across all evaluated attitudinal axes. This proves that teachers maintain a deeply positive and stable vocational validation for inclusive technology that is anchored in their general dedication to special education, regardless of active workspace restrictions or specific training frequencies (Quiño-Justol, 2024; Garcia & Miller, 2024).

Table 9: ***Inferential Analysis: Attitudinal Variations Across Profile Vectors***

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Attitudinal Space Vectors	Age (F / p) PDF	Gender (t / p) PDF	Educational Attainment (F / p) PDF	AT Trainings Attended (F / p) PDF
3.1 Perceived Usefulness	2.31 / 0.024*	0.74 / 0.460	2.35 / 0.057	1.04 / 0.358
3.2 Confidence Baseline	2.63 / 0.010*	2.64 / 0.009*	1.35 / 0.255	1.09 / 0.341
3.3 Open Willingness	2.04 / 0.046*	1.41 / 0.161	2.49 / 0.046*	1.90 / 0.153
3.4 Technical Concerns	2.10 / 0.038*	-0.94 / 0.350	0.35 / 0.843	0.18 / 0.835
3.5 Training Commitment	1.21 / 0.296	0.62 / 0.536	2.74 / 0.030*	0.25 / 0.780

*Note: * Statistically significant at the alpha threshold of* $p < 0.05$.

6. Knowledge-Related Challenges Encountered by Respondents

6.1 Lack of Assistive Technology Devices and Resources

Special education teachers face a dense network of institutional and technical challenges that hinder the effective implementation of assistive technology (AT) interventions. A primary barrier is the acute lack of assistive technology devices and resources, driven by high equipment costs and limited school funding. For instance, teachers note that many deaf students lack access to expensive hearing aids, while other learners lack personal mobile devices capable of running essential accessibility applications like the TalkBack screen reader. This resource scarcity frequently forces pupils to share devices, which severely reduces the quality and consistency of the learning support. Furthermore, classrooms heavily lack specialized instructional materials, such as braillers, embossers, and graded braille books. This creates severe learning inequities for visually impaired students who are expected to follow the regular standard curriculum without proper sensory resources. This resource deficiency is widely documented in developing school systems across the Philippines, where limited material access directly limits the overall impact of classroom integration (Campado et al., 2023; Micua-Rodriguez, 2024).

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

6.2 Lack of Training and Knowledge

This problem is further compounded by a significant lack of specialized training and technical preparation among educators. Teachers are frequently assigned to handle diverse special education sequences without prior formal training on how to use fundamental tools, such as the slate and stylus, which triggers initial instructional difficulties and low baseline confidence. This highlights a critical national gap where the absence of targeted capacity building hinders effective instructional support, aligning with observations that comprehensive professional preparation remains a major unaddressed need in the region (Atanga et al., 2020; Campado et al., 2023).

6.3 Technical Difficulties and Troubleshooting Issues

Consequently, teachers experience persistent technical difficulties and troubleshooting issues during live classes. Basic equipment malfunctions and application crashes routinely disrupt the flow of classroom instruction, yet schools drastically lack dedicated IT support staff or technical personnel to assist educators. Software-related accessibility flaws, such as unlabeled buttons that screen readers like Non-Visual Desktop Access (NVDA) cannot read, present technical barriers that frontline teachers do not possess the technical competence to resolve independently. This matches external research proving that continuous professional development must emphasize technical skill acquisition alongside theoretical principles to ensure baseline operational readiness (Garcia & Miller, 2024; Pascuas, 2015).

6.4 Poor Internet Connectivity

Systemic operational constraints further restrict technology integration within local classrooms. Unstable and poor internet connectivity serves as a major infrastructure barrier, as many modern assistive tools and digital applications depend entirely on a stable connection to function effectively. When schools lack proper digital foundations, the efficacy of inclusive applications drops significantly, making infrastructural stabilization an absolute necessity for sustainable instructional execution (Campado et al., 2023; Fteiha et al., 2024).

6.5 Difficulty in Integrating Assistive Technology in Inclusive Classrooms

Teachers also face immense difficulty integrating these technologies smoothly within inclusive classrooms because they must design flexible lessons that simultaneously accommodate heavily diverse student needs and disability profiles. This requires extensive extra planning, heavy instructional modification, and significant preparation time, such as manually adding sign language captions to video lessons for students with hearing impairments. For beginners who do not know spellings yet, using traditional tools like the slate and stylus requires time-consuming, letter-by-letter, one-on-one guidance that slows down general discussions. This instructional friction mirrors broader pedagogical concerns regarding the readiness of inclusive classroom spaces to handle advanced technology without structured strategic methodologies (Campado et al., 2023; Toquero, 2021).

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

6.6 Lack of Support from Parents and Specialists

Finally, a severe lack of support from parents and specialists limits learning continuity. Because parents receive no formal school-led orientations on how to manage these specialized devices, students are unable to continue using their interventions effectively at home. Schools also lack consistent collaboration with essential clinical experts like audiologists and therapists, leaving teachers completely helpless when complex medical hardware malfunctions during class hours. This highlights the necessity of localized ecosystem support, showing that institutional and parental collaboration are essential to stabilize instructional gains outside school walls (Campado et al., 2023; Garcia & Miller, 2024).

7. Perceptions of the Value and Effectiveness of Assistive Technology Interventions in Their Teaching Practice

7.1 Improves Student Participation and Engagement

Despite encountering severe structural and systemic barriers, the respondents universally view assistive technology as a highly valuable and effective asset that transforms their pedagogical practice. Teachers strongly report that the systematic integration of AT directly improves student participation and engagement within the classroom. The use of specialized tools actively counteracts instructional isolation, making special needs learners noticeably more active, self-assured, and confident when joining collaborative school activities. This integration establishes a highly inclusive, student-centered learning environment where students are motivated to express themselves and engage deeper with the academic content, a dynamic strongly supported by regional literature emphasizing technology's role in boosting classroom engagement (Campado et al., 2023; Quiño-Justol, 2024).

7.2 Enhances Learning and Understanding

Furthermore, the deployment of assistive apparatus significantly enhances student learning and conceptual understanding. Through the strategic use of visual, audio, and interactive digital resources—such as captioned videos, speech-to-text programs, and tailored visual presentations—hearing-impaired students and other learners can follow instructions seamlessly and comprehend lessons much better. Teachers observe that these multi-media tools improve overall classroom interaction, support the rapid development of essential literacy skills, and optimize the effectiveness of their daily teaching delivery. This aligns perfectly with foundational frameworks proving that sensory-tailored tools match diverse modalities to maximize curricular comprehension (Karagianni & Drigas, 2023; Quiño-Justol, 2024).

7.3 Promotes Independence and Confidence

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Crucially, assistive technology promotes long-term independence and personal confidence among learners with special educational needs. By utilizing these tools, students are empowered to execute tasks, complete assignments quickly, and navigate learning modules autonomously without constantly relying on the direct assistance of teachers or peers. From an operational standpoint, this increased learner autonomy vastly improves general classroom management and teaching efficiency, which is particularly beneficial for educators who must manage large, high-density class sizes simultaneously. This practical baseline supports international findings that autonomous tool mastery acts as a primary step for shifting exceptional populations toward structural self-reliance (Atanga et al., 2020; Campado et al., 2023).

7.4 Supports Inclusive and Differentiated Instruction and Progress Monitoring

Additionally, AT serves as an indispensable framework that supports inclusive and differentiated instruction while streamlining student progress monitoring. Because inclusive spaces are occupied by diverse disability profiles, AT gives teachers the flexibility to execute differentiated lessons that cater directly to varied individual learning styles and speeds. It also saves valuable instructional time by allowing materials to be organized ahead of time, resulting in a smooth lesson flow that directly enhances academic performance. Simultaneously, it provides teachers with clear diagnostic pathways to track, observe, and document student learning progress and participation metrics effectively. This flexibility matches existing models showing that modern multi-tiered learning configurations require responsive digital tracking to optimize differentiated instruction (Campado et al., 2023; Garcia & Miller, 2024).

7.5 The Effectiveness of Assistive Technology Depends on Proper Support and Resources

Ultimately, teachers emphasize that the true effectiveness of assistive technology operates on a conditional success model. While its functional potential to elevate special education is clear, its successful application is entirely dependent upon the availability of proper support and resources, requiring careful lesson planning, continuous technical training, robust institutional infrastructure, and a patient, committed disposition from the educator to discover the best integration methods for the absolute benefit of the students. This perspective unifies prior academic assertions that positive teacher attitudes and willingness alone cannot guarantee success unless backed by continuous institutional engineering and practical training systems (Campado et al., 2023; Garcia & Miller, 2024).

PROJECT PROPOSAL: ENHANCED PROFESSIONAL TRAINING PROGRAM ON ASSISTIVE TECHNOLOGY INTERVENTIONS

Target Beneficiaries: Special Education (SPED) Teachers and Students in Iloilo City, Philippines

Implementation Timeline: (10-Month Modular Rollout)

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Total Estimated Budget: PHP 84,000

Managing Institution: Division Special Education Unit in cooperation with School Heads

I. Rationale

Data collected from special education facilities in Iloilo City indicates a critical instructional paradox: while 50% of the active SPED teaching workforce possesses more than 15 years of classroom tenure , an overwhelming 73% of these veteran educators have received zero formal training in assistive technology (AT) configurations. This lack of preparation directly targets teacher self-efficacy.

Quantitative diagnostics reveal that although teachers possess acceptable conceptual understanding ($M = 3.90$) and tool selection skills ($M = 3.93$) , their technical proficiency drops significantly in *Operating and Troubleshooting Assistive Technology* ($M = 3.45$) and *Progress Monitoring* ($M = 3.76$). Qualitative interviews corroborate these gaps, with teachers citing frequent device crashes, high planning fatigue, and an absolute absence of technical support networks. Because teacher competence is the primary driver of digital equity , this proposal establishes a structured, 10-month continuous capacity blueprint to transform teacher anxiety into highly confident, inclusive instructional execution.

II. Project Objectives

The project aims to achieve the following specific outcomes:

1. **Build Baseline Conceptual Depth:** Enhance basic teacher understanding of low-tech, mid-tech, and high-tech assistive technology tools.
2. **Elevate Technical Self-Reliance:** Train 100% of participating educators to perform real-time software troubleshooting, adjust device volume/connectivity settings, and handle hardware faults during live instruction.
3. **Embed Adaptive Planning:** Improve competencies in modifying standard worksheets, generating captioned multi-media elements, and aligning AT with individual student learning objectives.
4. **Formulate Diagnostic Progress Monitoring:** Equip educators with structured documentation templates to track, observe, and report student performance milestones mediated by AT devices.
5. **Construct Community Ecosystem Networks:** Cultivate systemic teacher confidence to conduct parent orientations and build collaborative pathways with clinical specialists.

III. Professional Development Matrix (Knowledge Modules)

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Key Result Area (KRA)	Specific Objectives	Activities & Strategies	Timeframe & Commitment	Key Personnel Involved	Materials & Resources	Budget (PHP)	Expected Success Indicators
1. Understanding Assistive Technology	Enhance teacher understanding of AT concepts, low-tech, mid-tech, and high-tech applications.	Orientation Seminar on Assistive Technology Awareness	Month 1	SPED Teachers, AT Specialist (Resource Speaker)	Laptops, Projector, Handouts, Internet Connection	6,000	Teachers demonstrate improved understanding of baseline AT architecture.
2. Identifying and Matching Tools	Strengthen ability to select appropriate tools based on individual student neuro-profiles.	Workshop on Identifying and Matching Assistive Technology Tools	Month 2	SPED Teachers, AT Specialist	Laptops, Sample AT Worksheets, Internet Connection	10K	Teachers match devices effectively with specific learning limitations.
3. Using and Integrating AT During Lessons	Upgrade daily lesson planning fluencies to prevent student isolation during main activities.	Hands-on Training on Integrating Assistive Technology into Lessons	Month 3	SPED Teachers, AT Specialist	Laptops, Lesson Plan Templates, Selected AT Devices	10K	Seamless assimilation of adaptive tools within regular curricula materials.
4. Monitoring and Assessing Progress	Upgrade competencies in tracking progress, documentation, and data-driven reporting via AT.	Workshop on Monitoring and Assessing Students' Progress using AT	Month 4	SPED Teachers, AT Specialist, Assessment Coordinator	Laptops, Projectors, Progress Tracking Logs, Assessment Forms	10K	Systematic documentation of learning outputs for diagnostic decision-making.

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Key Result Area (KRA)	Specific Objectives	Activities & Strategies	Timeframe & Commitment	Key Personnel Involved	Materials & Resources	Budget (PHP)	Expected Success Indicators
5. Operating and Troubleshooting Technology	Build direct manual skills to handle hardware malfunctions and app crashes instantly in class.	Technical Training in Operating and Troubleshooting Assistive Devices	Month 5	SPED Teachers, AT Specialist	Laptops, Faulty Equipment Units, Technical Manuals	10K	Complete reduction of classroom instructional downtime caused by system glitches.

IV. Professional Development Matrix (Attitude & Ecosystem Modules)

Key Result Area (KRA)	Specific Objectives	Activities & Strategies	Timeframe & Commitment	Key Personnel Involved	Materials & Resources	Budget (PHP)	Expected Success Indicators
1. Perceived Usefulness of AT	Solidify teacher valuation of AT's long-term utility regarding student self-reliance and inclusion.	Seminar on the Benefits and Best Practices of Assistive Technology	Month 6	SPED Teachers, School Heads, AT Specialist	Laptops, Best-Practice Case Folders, Multimedia Handouts	6K	Stronger baseline appreciation of the classroom value of AT interventions.
2. Confidence in Using Assistive Technology	Build workspace self-efficacy and strengthen communication lines with families.	Confidence-Building and Communication Workshop	Month 7	SPED Teachers, AT Specialist	Parent Orientation Guides, Role-Play Toolkits, Projectors	10K	Teachers articulate device logic confidently during parent-teacher interfaces.
3. Willingness to Use Assistive Technology	Minimize technological anxiety and foster sustained	Classroom Integration Workshop	Month 8	SPED Teachers, AT Specialist	Active Hardware Assortments, Internet	6K	High spontaneous deployment of adaptive configuration

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Key Result Area (KRA)	Specific Objectives	Activities & Strategies	Timeframe & Commitment	Key Personnel Involved	Materials & Resources	Budget (PHP)	Expected Success Indicators
	daily tool deployment.				Connection		s across routine lessons.
4. Concerns Using Assistive Technology	Address operational hurdles, resource limits, and specific workspace administrative bottlenecks.	Open Forum on Assistive Technology Challenges	Month 9	SPED Teachers, School Heads	Administrative Policy Files, Evaluation Sheets, Projectors	6K	Shared formulation of school-wide solutions to overcome infrastructural blocks.
5. Commitment to Training/ Growth	Embed a long-term commitment to continuous learning and technical skill refinement.	Assistive Technology Professional Enrichment Program	Month 10	SPED Teachers, School Heads, AT Specialist	Certificates of Professional Competency, Lifelong Strategy Handouts	8K	Graduation of highly certified educators committed to modern inclusive practices.

V. Expected Program Impact

By establishing a structured, modular rollout over a 10-month period, the training program minimizes information overload while maximizing real-world implementation. SPED educators will directly transition away from low-confidence operational behaviors into a unified technical network. This systematic capacity baseline ensures that high-value educational equipment avoids underutilization or abandonment. Ultimately, this program establishes an actionable model for modern inclusive practice, directly supporting long-term literacy gains, individual independence, and academic achievements for special needs students across the region.

Conclusions

Based on the findings, the following conclusions are drawn from:

Based on the comprehensive findings of the research, the following general conclusions can be drawn regarding the landscape of assistive technology (AT) integration within inclusive and special education environments:

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

1. Professional longevity and extensive classroom experience do not automatically translate into technical proficiency with assistive technology configurations. While veteran educators demonstrate refined pedagogical workflows and a solid conceptual understanding of assistive tools, they frequently lack the operational skills required to maintain and update specialized hardware. Longevity in the field without targeted technical training breeds a workforce that is contextually seasoned but structurally unprepared for modern digital intervention.

2. There is a stark bifurcated skill gap among exceptional education practitioners. Educators generally excel at the cognitive dimensions of technology integration, such as identifying low-, mid-, and high-tech tools and matching them theoretically to diverse learner limitations. However, their operational capacity is severely restricted by low self-efficacy and a pronounced deficit in active hardware troubleshooting, software configuration management, and minor technical error resolution.

3. Pedagogical technology knowledge and specialized field attitudes are dynamically shaped by target demographic shifts rather than tenure alone. Age brackets directly condition technical anxieties and confidence parameters, while intermediate postgraduate education (such as targeted master's coursework) functions as a stronger driver of practical tool selection skills than purely high-level terminal doctoral credentials. Most crucially, formal exposure to specialized training programs is the primary determinant for scaling instructional integration fluency.

4. The active willingness of frontline educators to adopt and sustain innovative inclusive tools is heavily restricted by systemic workspace infrastructure barriers. Even when teachers maintain highly positive, intrinsically motivated viewpoints regarding the usefulness of technology for student independence, their execution is compromised by structural resource shortages, high device procurement costs, unstable digital connectivity, and excessive lesson preparation times.

5. The ultimate viability and therapeutic impact of classroom technological interventions operate on a conditional success model that cannot survive in institutional isolation. Sustaining learner autonomy and cross-environment literacy milestones depends completely on establishing a multi-layered support ecosystem. This requires combining on-site administrative resource provisioning, dedicated immediate technical IT support, clinical expert collaboration, and explicit school-led orientation programs for parents to bridge the home-school execution gap.

Recommendations

The following recommendations are presented based on the conclusions:

1. **Institutionalize Targeted, Practice-Based Technical Training Courses:** Authorities must shift professional development programs away from generalized theoretical frameworks toward mandatory, hands-on technical training courses focused explicitly on operating, configuring, and troubleshooting assistive technology devices. Because extensive teaching longevity does not automatically translate into digital literacy , training configurations must target the workforce's weakest operational competence areas—specifically hardware troubleshooting, software crash resolution, and technical maintenance under live classroom conditions. These training courses

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

should be differentiated by age bracket to effectively mitigate technical anxiety and systematically build classroom self-efficacy across all career stages.

2. **Establish Dedicated Campus IT Support and Specialist Networks:** To eliminate high instructional downtime caused by device failures, authorities must deploy dedicated, on-site technical support staff and specialist IT networks within special education environments. Frontline educators must not be left isolated to act as technical repair agents; instead, school heads must provide immediate technical infrastructure backups and establish formal collaborative pathways with clinical specialists—including audiologists, speech therapists, and assistive technology coordinators—to handle complex hardware malfunctions.
3. **Strengthen Funding and Strategic Procurement for AT Infrastructure:** Authorities must address severe environmental anxieties by establishing a stable, subsidized procurement framework to acquire and maintain assistive technology hardware. Educational leaders must directly allocate institutional budgets or secure external financial partnerships to ensure that students with disabilities have individual, uninterrupted access to essential devices—such as hearing aids, braillers, embossers, screen readers, and adaptive sensory tools—thereby eliminating the ineffective practice of device sharing.
4. **Stabilize Reliable Digital Infrastructure and High-Speed Connectivity:** National and division-level authorities must prioritize the installation and continuous maintenance of robust technological infrastructure, focusing heavily on stable, high-speed school internet connectivity. Because modern assistive software, online digital applications, and interactive learning platforms rely entirely on a stable network to function, stabilizing this core digital pipeline is an absolute requirement for successful technology integration.
5. **Provide Standardized Time Allocations and Lesson Preparation Templates:** To counteract high lesson planning fatigue and long preparation times, authorities should release standardized inclusive lesson templates and provide dedicated planning hours specifically for assistive technology modification. Educators require systemic administrative relief to handle the extra planning demands of inclusive instruction—such as adding sign captions to video lessons or guiding beginning learners letter-by-letter—without slowing down general class discussions.
6. **Deploy School-Led Parent Orientation and Home Continuation Seminars:** Authorities must fund and mandate structured, school-led parent orientation programs to bridge the home-school execution gap. School heads must provide families with clear instructional guides, training seminars, and basic device management strategies to ensure that special needs learners can continue using their assistive interventions consistently and effectively outside school walls.

Acknowledgment

The authors express sincere gratitude to the school administrators, special education teachers, and expert specialists in Iloilo City who generously provided their time, data, and frontline insights. We also thank the Philippine Women's University for institutional support throughout this research project.

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

References

Aldagamseh, B. I., Maberah, S., Obaidat, L. T., & Qandil, B. (2026). The relationship between special education teachers' attitudes and their competencies in using assistive technology in Jordan. Frontiers in Education, 11, 1-9. https://doi.org/10.3389/feduc.2026.1769030

Aldehami, S. (2022). Special education teachers' attitudes toward assistive technology use for students with intellectual disability. Contemporary Educational Technology, 14(2), ep358. https://doi.org/10.30935/cedtech/11541

Alkahtani, K. D. (2013). Teachers' knowledge and use of assistive technology for students with special educational needs. Journal of Studies in Education, 3(2), 65-86. https://doi.org/10.5296/jse.v3i2.3424

Atanga, C., Jones, B. A., Krueger, L. E., & Lu, S. (2020). Teachers of students with learning disabilities: Assistive technology knowledge, perceptions, interests, and barriers. Journal of Special Education Technology, 35(4), 236-248. https://doi.org/10.1177/0162643419864858

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Prentice-Hall, Inc.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

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://doi.org/10.30935/ijpdll/13022

Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). Best practices for mixed methods research in the health sciences. Office of Behavioral and Social Sciences Research, National Institutes of Health.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340. https://doi.org/10.2307/249008

Fernández-Batanero, J. M., Montenegro-Rueda, M., & Fernández-Cerero, J. (2022). Assistive technology for the inclusion of students with disabilities: A systematic review. Educational Technology Research and Development, 70(6), 1911-1930. https://doi.org/10.1007/s11423-022-10127-7

Fteiha, M., Al-Rashaida, M., Elsori, D., Khalil, A., & Al Bustami, G. (2024). Obstacles for using assistive technology in centres of special needs in the UAE. Disability and Rehabilitation: Assistive Technology, 19(8), 2934-2944. https://doi.org/10.1080/17483107.2024.2323698

Garcia, A., & Miller, B. (2024). Teacher training and support for assistive technology in inclusive education: A global perspective. In Global practices in inclusive education curriculum and policy (pp. 53-76). IGI Global. https://doi.org/10.4018/979-8-3693-4058-5.ch003

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

Huliganga, H. J. (2025). Teachers' preparedness for using assistive technology in the education of students with hearing impairment. International Journal of Inclusive Education, 29(3), 342-356.

Individuals with Disabilities Education Act. (2017). Assistive technology (Sec. 300.105). U.S. Department of Education. https://sites.ed.gov/idea/regs/b/b/300.105

Keshav, S., & Podolsky, A. (2018). External and internal barriers in classroom technology integration schemes. Learning Policy Institute.

Masoud, S. (2025). Investigating teachers' attitudes toward using assistive technology in teaching students with hearing impairments. Jordan Journal of Applied Science: Humanities Series, 43(2), 157-171.

Micua-Rodriguez, M. (2024). Towards universal design: Enhancing assistive technology accessibility in academic library environments. Philippine Education Journal, 41(1), 112-125.

Onivehu, A. O., Ohawuiro, O. E., & Oyeniran, B. J. (2017). Teachers' attitude and competence in the use of assistive technologies in special needs schools. International Journal of Special Education, 32(2), 353-362.

Park, J., Gremp, M., & Ok, M. W. (2024). Effects of assistive technology instruction on pre-service teachers' systematic review. Journal of Special Education Technology, 39(3), 349-362. https://doi.org/10.1177/01626434231210988

Quiño-Justol, J. B. (2024). Perspectives of teachers on the integration of assistive technology in higher education inclusive classrooms in the Philippines: Importance, benefits, social support, and challenges. Journal of Interdisciplinary Perspectives, 2(12), 497-509. https://doi.org/10.69569/jip.2024.0428

Stewart, R. L. (2024). The impact of assistive technology on academic achievement and inclusion for students with special needs. ResearchGate Publication. https://www.researchgate.net/publication/380347303

Tajik, O., Golzar, J., & Noor, S. (2025). Purposive sampling. International Journal of Education & Language Studies, 3(1), 1-9. https://doi.org/10.22034/ijels.2025.490681.1029

Tercero, M. E., & Delos Reyes, G. R. (2025). Technical competence and level of knowledge on classroom equipment configurations. Philippine E-Journal of Educational Research, 14(2), 88-101.

Toquero, C. M. D. (2021). Inclusive education and teacher preparation in the Philippines. International and Multidisciplinary Journal of Social Sciences, 10(1), 1-25. https://doi.org/10.17833/rimcis.2020.6316

UNESCO. (2020). Global education monitoring report 2020: Inclusion and education: All means all. UNESCO Publishing.

Van Laarhoven, T., Munk, D. D., Chandler, L. K., Zurita, L., & Lynch, K. (2012). Integrating assistive technology into teacher education programs: Trials, tribulations, and lessons learned. Assistive Technology Outcomes and Benefits, 8(1), 32-47.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

DOI: https://doi.org/10.56738/issn29603986.geo2026.7.218
ISSN 2960-3986
GEO Academic Journal Vol. 7 No. 4

World Health Organization. (2024). Assistive technology. WHO Fact Sheets. https://www.who.int/news-room/fact-sheets/detail/assistive-technology

Wulandari, C. E., Firdaus, F. A., & Saifulloh, F. (2024). Promoting inclusivity through technology: A literature review in educational settings. Journal of Learning and Technology, 3(1), 19-28. https://doi.org/10.33830/jlt.v3i1.9731