TEACHERS' PROFILE, AT UTILIZATION, AND IMPACT ON TEACHING EXCEPTIONAL LEARNERS IN PUBLIC SCHOOLS

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Abstract *– This study employed a descriptive correlational design to investigate the collaborative role of teachers' profiles, assistive technology utilization, and their impact on teaching exceptional learners in public schools. A convenience sample of 63 teachers who had experience teaching exceptional learners in self-contained and inclusive classrooms in Mandaue City, Philippines, was surveyed to understand the relationships between teachers' profiles, assistive technology utilization, and the impact on learners with exceptionalities. The findings revealed that teacher profiles, particularly educational attainment and income, influenced the perceived effectiveness of middle-to-high technology. Teachers reported that assistive technology positively impacted learners' participation, independence, and skills. Based on these insights, a profile-aligned matrix action plan is recommended to equip special education and inclusion teachers to choose and implement appropriate technologies aligned with exceptional learners' needs. With appropriate government support, the integration of teachers' competencies, technology utilization, and learners' outcomes can be optimized to improve exceptional education through a systemic, profile-aligned approach.*
Keywords*: Assistive Technology; Learners with Exceptionalities; Mandaue City, Philippines; Special Education; Special and Inclusive Education Teachers*

INTRODUCTION

Many teachers in the Philippines lack the necessary training and resources to provide specialized supports for learners with exceptionalities, hindering their equitable access to education. Assistive technologies have the potential to help but are underutilized. Research suggests that appropriate implementation by well-trained teachers can improve outcomes for exceptional learners. The Human Activity Assistive Technology (HAAT) model highlights the importance of aligning precise technologies with teachers' competencies to facilitate participation and achievement. This study aims to identify strategies to strengthen teacher training, competencies, and assistive technology integration to improve inclusion for exceptional learners in public schools. The findings can inform policies and advance research towards achieving inclusive education goals.

Theoretical Background

Various models exist to examine teacher profiles, competencies, assistive technology utilization, and exceptional learner outcomes. However, the HAAT model is particularly relevant as it proposes that appropriate assistive technology, implemented through teacher competencies and expertise, enables success for learners with exceptionalities (Cook & Polgar, 2014). The HAAT model recommends that assistive technologies should align with learners' needs and activities based on special educators' assessments, utilizing their expertise (du Plessis, 2021; Drelick et al., 2022; Predhep, 2023). Inclusive policies such as RA 11650, 9442, 10533, DO 44, and DO 21 mandate alignment with HAAT's recommendations for assistive technology use based on special educators' competencies (Babia et al., 2022; Department of Education, 2020, 2021; Republic Act, 2013). In contrast, the RAT and UTAUT models provide limited guidance for planning effective assistive technology use based on teachers' competencies and profiles, compared to the HAAT model (Visser et al., 2020; Drelick, 2022; Kidwai et al., 2022; Venkatesh et al., 2003).

Theoretical Framework

The HAAT model grounds this study, proposing that special educators' competencies reflected in their profiles enable the selection and implementation of appropriate assistive technologies, thus supporting exceptional learners' success. HAAT integrates an ecological view considering learners' abilities, tasks, and environments with technologies. It emphasizes educators aligning technologies

to learners' needs through assessments and judgment as individualized services are mandated. Unlike other models, HAAT accounts for educators' competencies reflected in their profiles as essential for effective technology use. This study examines educator profiles, focusing on technology knowledge, skills, pedagogy competence, appropriate technology selection/use, and impact on learning outcomes. Results aim to validate HAAT's proposition that educator competencies facilitate correctly matching technologies to benefit exceptional learners

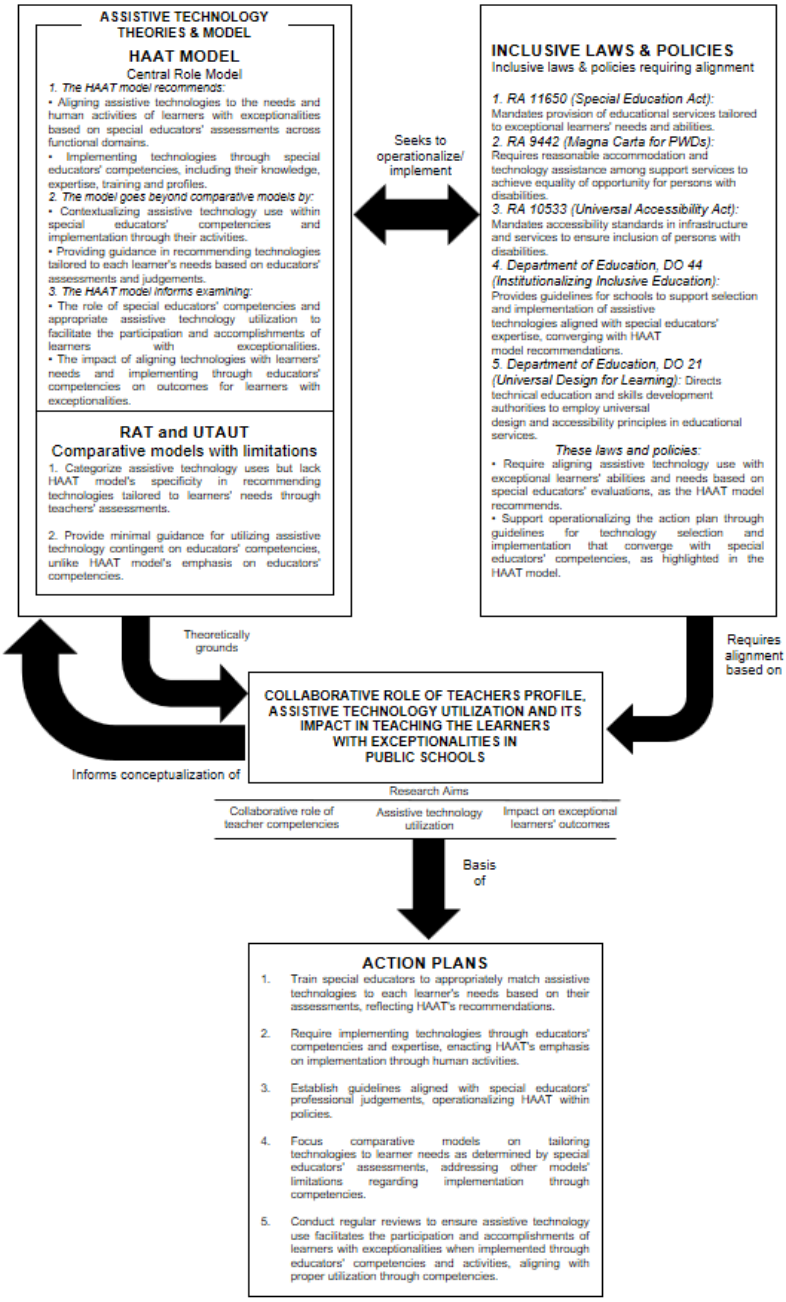

Figure 1. Theoretical Framework

Review of Relevant Literature

This literature review examines the collaborative role of teacher profiles and assistive technology utilization in enhancing teaching and learning outcomes for exceptional learners in public schools. While research shows assistive technology benefits students when implemented appropriately, there remains a need to better understand how teacher characteristics impact effective assistive technology alignment and use. Examining relationships between teacher profiles and assistive technology effectiveness can optimize assistive technology benefits for exceptional learners.

Teacher Profiles and Assistive Technology Implementation

Various studies have examined how teacher profiles impact assistive technology implementation for students with disabilities. Research has found that factors like technology knowledge, skills, attitudes, self-efficacy and competence influence usage (Regan et al., 2019; Anderson & Putman, 2020; Alghamdi, 2022). Developing nations face additional barriers such as lack of training and resources (Kamaghe et al., 2020; Okonji & Ogwezzy, 2019). Technology knowledge and self-efficacy were found to most impact effective implementation (Aldabas & Alhossein, 2023; Siyam, 2019). However, more rigorous analysis is needed of relationships between comprehensive teacher profiles and assistive technology effectiveness (Kinds, 2019; Anderson & Putman, 2020; Ayantoye, 2023). Targeted professional development based on individual profiles shows promise for maximizing benefits (Anderson & Putman, 2020).

Assistive Technology Effectiveness Across Levels

Several studies examined the effectiveness of low, middle, and high-tech assistive technology for students with exceptionalities. Contextual factors strongly influenced helpfulness regardless of technology level (Cagiltay et al., 2019). Implementation quality and teacher knowledge impacted effectiveness. Common impacting factors included implementation quality, training, and need addressed (Cagiltay et al., 2019; Satsangi et al., 2019). However, specificity in effectiveness variation between levels was sometimes lacking (Satsangi et al., 2019). Gaps remain in determining if certain technologies are inherently more effective or if other drivers like implementation impact most. Comparing effectiveness of levels for similar needs has potential to guide selection and utilization for exceptional learners based on knowledgeable instructor evaluations (Cagiltay et al., 2019; Satsangi et al., 2019).

Teacher Profiles and Perceived Effectiveness

Few studies examine relationships between comprehensive teacher profiles and perceived assistive technology effectiveness for students with exceptionalities. Al-Dababneh and Al-Zboon (2022) found technological pedagogical knowledge, experience, and self-efficacy correlated with Jordanian teachers' effectiveness perceptions. Regan et al. (2019) similarly found competence, skills, and confidence influenced Australian special educators' perceptions. Ayantoye (2023) found inadequate Nigerian teacher training and knowledge limited assistive technology benefits. Overall, rigorous research identifying correlations is limited (Al-Dababneh & Al-Zboon, 2022). Most studies focus on individual rather than holistic profiles (Regan et al., 2019; Ayantoye, 2023). Common findings indicate technological pedagogical knowledge, experience, and self-efficacy relate most to perceptions, though more research is needed on additional impacts (Al-Dababneh & Al-Zboon, 2022; Regan et al., 2019; Ayantoye, 2023). Tailoring supports based on profiles may optimize utilization and maximize benefits (Regan et al., 2019).

Impacts of AT on Student Outcomes

Several studies showed proper assistive technology implementation by knowledgeable teachers can improve inclusion, engagement, motivation, and independence for students. High-quality implementation increased participation, interaction, and performance in inclusive classrooms (Cagiltay et al., 2019). However, barriers from competencies and challenges often limit benefits realized (Ayantoye, 2023). Barriers include lack of training, resources, support, unaddressed knowledge gaps, and insufficient funding and preparation time (Ayantoye, 2023). To maximize impact, barriers must be addressed and proper implementation ensured (Howard et al., 2022). This involves tailoring professional development, collaboration, personalized strategies, and ongoing support (Howard et al., 2022). In summary, while research shows potential benefits, many barriers currently limit realization in practice (Ayantoye, 2023). Maximizing student outcomes requires overcoming implementation challenges and ensuring teacher competencies, resources, and supports (Howard et al., 2022).

Best Practices for Maximizing AT Benefits

Several studies outline actions maximizing AT benefits for exceptional learners including targeted professional development based on teacher profiles and needs. Other recommendations include increased funding improving access and support staff. Common suggestions address skills and knowledge barriers through tailored training and foster stakeholder collaboration for personalized

implementation. While research identifies theoretically maximizing actions, examining overcoming practical barriers while optimizing utilization is still needed. Evaluating tailored training, funding, and collaboration impacts may provide practical solution insights for stakeholders seeking maximized benefits. Personalized supports combined with practical solution research aligns with maximizing impact through customized professional development aligning to profiles. (Anderson & Putman, 2020; Al-Zboon, 2020; Winter et al., 2021; Howard et al., 2022; Al-Dababneh & Al-Zboon, 2022).

THE PROBLEM

Statement of the Problem

The Philippines prioritizes educating students with special needs, but challenges remain in providing quality education in public schools. Existing studies examine the role of teachers' competencies, assistive technology utilization, and their impact on academic success separately. This study aims to evaluate their interplay by examining the relationship between teachers' profiles, assistive technology utilization, and its impact on learners' academic success. The study seeks to answer research questions related to teachers' profiles, the effectiveness of assistive technology, its relationship with teacher profile, impacts on learner success, and proposed action plans. The study hypothesis is that there is no significant relationship between teacher profile and assistive technology effectiveness. The study aims to provide valuable insights for educators, policy-makers, and other stakeholders in developing effective strategies and interventions to improve special education in the Philippines.

METHODS

The Research Design

This study explored how teachers' profiles and experiences affect the use of assistive technology in teaching learners with exceptionalities, using a descriptive correlational design. A survey was given to 63 convenience sampled teachers in Mandaue City, Philippines, focusing on teachers' profiles, types of assistive technology used, and the impact on learners. Data analysis involved frequency, percentage, weighted mean, Chi-square, and Pearson Correlation with p-values to identify significant findings. The research design aligned with the research questions and proposed action plans. The study's implications for stakeholders include effective assistive technology utilization to promote exceptional learners' academic success. The previous works inspired and influenced the study, and the findings may inspire future research.

Respondents and Participants of the Study

The study surveyed 63 full-time teachers from three schools for the academic year 2022-2023. Teachers were selected based on their professional teaching certification and current assignment in inclusion or self-contained classes. They volunteered to participate and were chosen for their suitability in gathering data on specialized education programs and services.

Data Gathering Process

The researchers utilized convenience sampling to identify appropriate participants and collect data for the study, allowing for an initial examination of relationships among variables. They obtained approval from the Mandaue City School Division Superintendent and principals of schools where respondents were identified. 63 teachers who met inclusion criteria were conveniently selected. The survey questionnaire was administered in person while adhering to health precautions, and a Google Form was created for remote participants. The survey consisted of three parts to gather data on teachers' profiles, assistive technology use, and learner impacts. The study adhered to data privacy laws and ethics principles, ensuring anonymity, informed consent, and secure data storage and usage, with participants having the right to withdraw at any time.

Data Collection Tool

The researchers used a semi-structured survey questionnaire to collect data from participating teachers, consisting of three parts related to the independent, process, and dependent variables. The first part collected demographic and professional information, the second part listed various assistive technology tools used, and the third part assessed the impact of assistive technology on learners. The list of assistive technology tools was adapted from Jacobsen (2012) and classified as

low, middle or high-level based on the researchers' evaluation. The survey questionnaire was suitable for gathering quantitative data and allowed for statistical analysis to address research questions.

Data Analysis

The researchers performed quantitative analyses using statistical techniques to identify patterns and associations within the data. Measures of central tendency such as frequency, simple percentage, and weighted mean were calculated, and tests of significance were performed using Chi-square and Pearson's correlation coefficient. The scoring procedure involved a 4-point Likert scale with accompanying descriptive ratings and verbal interpretations to quantify teachers' perceptions of assistive technology effectiveness. Statistical analysis provided insights into the overall perceived effectiveness of different assistive technology tools utilized by teachers.

RESULTS

This chapter presents the results of statistical analysis on survey data collected from teachers of learners with exceptionalities in Mandaue City, Philippines.

Age and Gender

Table 1 presents the age and gender distribution of the 63 teacher-respondents who participated in the study. The table shows the frequency (f) and percentage (%) of female and male respondents for each age group.

Table 1
Age and Gender of the Respondents

Age (in years)	Female		Male		Total	
	f	%	f	%	f	%
51 and above	3	4.76	2	3.17	5	7.94
42-50	11	17.46	4	6.35	15	23.81
33-41	12	19.05	1	1.59	13	20.63
24-32	29	46.03	1	1.59	30	47.62
Total	55	87.30	8	12.70	63	100.00

The results show that the majority of the respondents are female, with a total of 55 or 87.30% of the total respondents. The remaining 8 or 12.70% are male respondents.

In terms of age distribution, the highest number of respondents falls within the age range of 24-32 years old, with a frequency of 30 or 47.62%. This is followed by the age range of 42-50 years old, with a frequency of 15 or 23.81%. The age range of 33-41 years old has a frequency of 13 or 20.63%, while the age range of 51 and above has a frequency of 5 or 7.94%.

Civil Status

Table 2 presents the civil status of the 63 teacher-respondents who participated in the study. The table shows the frequency (f) and percentage (%) of respondents for each civil status category.

Table 2
Civil Status of the Respondents

Civil Status	f	%
Single	22	34.92
Married	38	60.32
Separated	2	3.17
Widow	1	1.59
Total	63	100.00

The results show that the majority of the respondents are married, with a frequency of 38 or 60.32% of the total respondents. The second most common civil status is single, with a frequency of 22 or 34.92%. There are also two respondents who are separated, with a frequency of 2 or 3.17%, and one respondent who is a widow, with a frequency of 1 or 1.59%.

Highest Educational Attainment

Table 3 presents the highest educational attainment of the 63 teacher-respondents who participated in the study. The table shows the frequency (f) and percentage (%) of respondents for each educational attainment category.

Table 3
Highest Educational Attainment of the Respondents

Educational Attainment	f	%
Doctorate Degree	1	1.59
With Doctorate Units	3	4.76
Master's Graduate	13	20.63
With Master's Units	32	50.79
Bachelor's degree	14	22.22
Total	63	100.00

The results show that the majority of the respondents have completed graduate-level education, either with a Master's degree (13 or 20.63%) or with Master's units (32 or 50.79%). This is followed by respondents who have completed a Bachelor's degree, with a frequency of 14 or 22.22%. There are also a few respondents who have completed higher levels of education, with one respondent having a Doctorate degree (1.59%) and three respondents who have completed Doctorate units (4.76%).

Field of Specialization

Table 4 presents the field of specialization of the 63 teacher-respondents who participated in the study. The table shows the frequency (f) and percentage (%) of respondents for each field of specialization category.

The results show that the majority of the respondents are specialized in Special Education (SPED), with a frequency of 37 or 58.73% of the total respondents. Among the other fields of specialization, Administration and Supervision has the second highest frequency, with 4 or 6.35%, followed by Early Childhood Education with 2 or 3.17%. The remaining fields of specialization have a frequency of 1 or 1.59% each.

Table 4
Field of Specialization of the Respondents

Field of Specialization	f	%
SPED	37	58.73
Administration and Supervision	4	6.35
Early Childhood Education	2	3.17
MAPEH	1	1.59
Speech Pathology	1	1.59
English	1	1.59
Industrial Arts	1	1.59
Filipino	1	1.59
Science	1	1.59
Vocational Education	1	1.59
Guidance and Counseling	1	1.59
Mathematics	1	1.59
No Response	11	17.46
Total	63	100.00

Length of Service

Table 5 presents the length of service of the 63 teacher-respondents who participated in the study. The table shows the frequency (f) and percentage (%) of respondents for each length of service category.

Table 5
Length of Service of the Respondents

Length of Service (in years)	f	%
16 and above	13	20.63
11-15	8	12.70
6-10	18	28.57
1-5	24	38.10
Total	63	100.00

The results show that the majority of the respondents have been teaching for 5 years or less, with a frequency of 24 or 38.10% of the total respondents. This is followed by respondents who have been teaching for 6-10 years, with a frequency of 18 or 28.57%. The remaining respondents have been teaching for longer periods, with 8 or 12.70% having a length of service of 11-15 years and 13 or 20.63% having a length of service of 16 years and above.

Monthly Income

Table 6 presents the monthly income of the 63 teacher-respondents who participated in the study. The table shows the frequency (f) and percentage (%) of respondents for each monthly income category.

Table 6
Monthly Income of the Respondents

Monthly Income (in Pesos)	f	%
Above 114,240	3	4.76
66,641-114,240	7	11.11
38,081-66,640	19	30.16
19,041-38,080	31	49.21
9,520-19,040	3	4.76
Total	63	100.00

The results show that the majority of the respondents have a monthly income between 19,041 and 38,080 pesos, with a frequency of 31 or 49.21% of the total respondents. This is followed by respondents who have a monthly income between 38,081 and 66,640 pesos, with a frequency of 19 or 30.16%. The remaining respondents have a monthly income in other ranges, with 7 or 11.11% having a monthly income between 66,641 and 114,240 pesos, 3 or 4.76% having a monthly income above 114,240 pesos, and 3 or 4.76% having a monthly income between 9,520 and 19,040 pesos.

Type of Disabilities Handled

Table 7 presents the types of disabilities handled by the 63 teacher-respondents who participated in the study. The table shows the frequency (f) and rank of each type of disability.

Table 7
Type of Disabilities Handled by the Respondents

Type of Disabilities	f	Rank
Learners with Intellectual and Developmental Disabilities	34	1
Learners with Learning Disabilities	32	2

Autism	31	3
Hearing Impaired/Deaf and Hard of Hearing	20	4
Physical Disabilities and Other Health Impairments	17	5
Visually Impaired/Blind and Low Vision	14	6
Special Gifts and Talents	12	7
Slow Learners	1	8

*multiple response

The results show that the most common type of disability handled by the respondents is learners with intellectual and developmental disabilities, with a frequency of 34 or 54.0% of the total respondents. This is followed by learners with learning disabilities, with a frequency of 32 or 50.8%. Autism is the third most common type of disability handled by the respondents, with a frequency of 31 or 49.2%.

Hearing impaired/deaf and hard of hearing is the fourth most common type of disability handled by the respondents, with a frequency of 20 or 31.7%. Physical disabilities and other health impairments is the fifth most common type of disability handled by the respondents, with a frequency of 17 or 27.0%. Visually impaired/blind and low vision is the sixth most common type of disability handled by the respondents, with a frequency of 14 or 22.2%. Special gifts and talents is the seventh most common type of disability handled by the respondents, with a frequency of 12 or 19.0%. Slow learners is the least common type of disability handled by the respondents, with a frequency of 1 or 1.6%.

Perceived Effectiveness of Assistive Technologies Across Technology Categories

Tables 8, 9, and 10 present the respondents' perception of the effectiveness of assistive technologies in teaching learners with exceptionalities. The tables show the indicators, weighted mean (WM), and verbal description of the effectiveness of low-, middle-, and high-level technology, respectively. Table 11 provides a summary of the respondents' perception of the effectiveness of assistive technologies across all categories.

Low-Level Technology. Table 8 shows that the respondents perceive adaptive pencil/color/paper & eraser, jumbo texts/materials, picture board/charts/calendar/cue cards/PECS, and sensorimotor items to be very effective in teaching learners with exceptionalities. The indicators with a weighted mean above 3.25 are considered very effective, while those with a weighted mean between 2.50 and 3.24 are considered effective. The aggregate weighted mean of low-level technology is 3.44, which is considered very effective.

Table 8
Respondents' Perception on the Effectiveness of Assistive Technologies in terms of Low-Level Technology

S/N	Indicators	WM	Verbal Description
1	Adaptive Pencil/Color/Paper & Eraser	3.56	Very Effective
2	Post-It Notes/Graphic Organizer	3.43	Very Effective
3	Highlighter	3.24	Effective
4	Jumbo (texts, materials, etc.)	3.67	Very Effective
5	Velcro/Tactile	3.52	Very Effective
6	Page Protector	3.27	Very Effective
7	Binder Clip	3.11	Effective

8	PictureBoard/Charts/Calendar/CueCards/PECS	3.71	Very Effective
9	Stylus & Slate	3.48	Very Effective
10	Noise Cancellation/Ear Muffs	3.25	Very Effective
11	Cane/Crutches	3.43	Very Effective
12	Sensorimotor Items (blocks, Squishy Ball, etc.)	3.62	Very Effective
	Aggregate Weighted Mean	3.44	Very Effective

Legend: 3.25-4.00-Very Effective; 2.50– 3.24- Effective ;1.75 – 2.49-Less Effective; 1.00 – 1.74– Not Effective

Middle-Level Technology. Table 9 shows that the respondents perceive screen magnifiers, braille embosser, and talking calculator to be very effective in teaching learners with exceptionalities. The indicators with a weighted mean above 3.25 are considered very effective. The aggregate weighted mean of middle-level technology is 3.50, which is also considered very effective.

Table 9
Respondents' Perception on the Effectiveness of Assistive Technologies in terms of Middle-Level Technology

S/N	Indicators	WM	Verbal Description
1	Screen Magnifier	3.62	Very Effective
2	Talking Calculator	3.48	Very Effective
3	Talking Alarm Clock	3.37	Very Effective
4	Audio Book/Auto Replay	3.57	Very Effective
5	Audio Recorder/Mp3/Mp4	3.52	Very Effective
6	Talking Dictionary	3.46	Very Effective
7	Visual Timers/Projectors	3.48	Very Effective
8	Brailler/Electric Brailler/Braille Embosser	3.60	Very Effective
9	Electric Wheelchair	3.32	Very Effective
10	Wheelchair/Scooters	3.46	Very Effective
11	Hearing Aid	3.59	Very Effective
12	Adaptive keyboard and mouse	3.59	Very Effective
	Aggregate Weighted Mean	3.50	Very Effective

High-Level Technology. Table 10 shows that the respondents perceive smartphone/notepads/iPad/tablet, desktop/laptop computer, and A.I. camera/text/picture/voice recognition/word prediction to be very effective in teaching learners with exceptionalities. The indicators with a weighted mean above 3.25 are considered very effective. The aggregate weighted mean of high-level technology is 3.50, which is also considered very effective.

Table 10
Respondents' Perception on the Effectiveness of Assistive Technologies in terms of High-Level Technology

S/N	Indicators	WM	Verbal Description
1	Smartphone/Notepads/iPad/Tablet	3.68	Very Effective

2	Desktop/Laptop Computer	3.73	Very Effective
3	Electric/Electronic Wheelchair	3.37	Very Effective
4	Text-to-Speech Engine/Speech-to-Text Engine/Closed Caption/Applications	3.57	Very Effective
5	Augmentative Alternative Communication	3.54	Very Effective
6	A.I. Camera/Text/Picture/Voice Recognition/Word Prediction	3.67	Very Effective
7	CCTV	3.59	Very Effective
8	Electronic Glasses	3.30	Very Effective
9	Electronic refreshable braille displays	3.51	Very Effective
10	Smart Cane	3.37	Very Effective
11	Electronic Wheelchair	3.32	Very Effective
12	Cochlear Implants	3.35	Very Effective
	Aggregate Weighted Mean	3.50	Very Effective

Summary of Respondents' Perception. Table 11 summarizes the respondents' perception of the effectiveness of assistive technologies across all categories. The grand mean of all categories is 3.48, which is considered very effective. The results indicate that the respondents perceive assistive technologies to be effective in teaching learners with exceptionalities.

Table 11
Summary on the Respondents' Perception on the Effectiveness of Assistive Technologies

Components	WM	Verbal Description
Low-Level Technology	3.44	Very Effective
Middle-Level Technology	3.50	Very Effective
High-Level Technology	3.50	Very Effective
Grand Mean	3.48	Very Effective

Test of Relationship between the Respondents' Profile and the Effectiveness of Low-, Middle-, and High-Level Technology

Tables 12, 13, and 14 present the results of the tests of relationship between the respondents' profile and the effectiveness of low-, middle-, and high-level technology, respectively. The variables tested include age, gender, civil status, educational attainment, experience, and income. The tests were conducted using the Pearson correlation coefficient, and the level of significance was set at $p<0.05$.

Low-Level Technology. Table 12 shows that none of the variables tested have a significant relationship with the effectiveness of low-level technology. The p-values for all variables are above 0.05, indicating that we do not reject the null hypothesis (Ho) of no significant relationship. Therefore, we can conclude that the personal profile of the respondents does not significantly impact the effectiveness of low-level technology in teaching learners with exceptionalities.

Table 12
Test of Relationship between the Respondents' Profile and the Effectiveness of Low-Level Technology

Variables	Test Statistic	p - value	Decision	Remarks
Age and Low-Level Technology	r=-0.024	0.850	Do not reject Ho	Not Significant
Gender and Low-Level Technology	χ^2 =0.490	0.534	Do not reject Ho	Not Significant

Civil Status and Low-Level Technology	χ^2 =0.134	0.935	Do not reject Ho	Not Significant
Educational Attainment and Low-Level Technology	χ^2 =1.001	0.606	Do not reject Ho	Not Significant
Experience and Low-Level Technology	r=0.012	0.924	Do not reject Ho	Not Significant
Income and Low-Level Technology	χ^2 =1.028	0.598	Do not reject Ho	Not Significant

*significant at p<0.05

Middle-Level Technology. Table 13 shows that educational attainment and income have a significant relationship with the effectiveness of middle-level technology. The p-values for these variables are below 0.05, indicating that we reject the null hypothesis (Ho) of no significant relationship. The correlation coefficient for educational attainment is positive, indicating that as a teacher's level of education increases, the perceived effectiveness of middle-level technology also increases. On the other hand, the correlation coefficient for income is negative, indicating that as a teacher's income increases, the perceived effectiveness of middle-level technology decreases. The other variables tested do not have a significant relationship with the effectiveness of middle-level technology.

Table 13
Test of Relationship between the Respondents' Profile and the Effectiveness of Middle-Level Technology

Variables	Test Statistic	p - value	Decision	Remarks
Age and Middle-Level Technology	r=-0.070	0.588	Do not reject Ho	Not Significant
Gender and Middle-Level Technology	χ^2 =1.917	0.384	Do not reject Ho	Not Significant
Civil Status and Middle-Level Technology	χ^2 =0.367	0.832	Do not reject Ho	Not Significant
Educational Attainment and Middle-Level Technology	χ^2 =7.044*	0.030	Reject Ho	Significant
Experience and Middle-Level Technology	r=-0.007	0.959	Do not reject Ho	Not Significant
Income and Middle-Level Technology	χ^2 =8.248*	0.016	Reject Ho	Significant

*significant at p<0.05

High-Level Technology. Table 14 shows that only income has a significant relationship with the effectiveness of high-level technology. The p-value for income is below 0.05, indicating that we reject the null hypothesis (Ho) of no significant relationship. The correlation coefficient is negative, indicating that as a teacher's income increases, the perceived effectiveness of high-level technology decreases. The other variables tested do not have a significant relationship with the effectiveness of high-level technology.

Table 14

Test of Relationship between the Respondents' Profile and the Effectiveness of High-Level Technology

Variables	Test Statistic	p - value	Decision	Remarks
Age and High-Level Technology	r=-0.090	0.481	Do not reject Ho	Not Significant
Gender and High-Level Technology	χ^2 =1.943	0.379	Do not reject Ho	Not Significant
Civil Status and High-Level Technology	χ^2 =2.136	0.344	Do not reject Ho	Not Significant
Educational Attainment and High-Level Technology	χ^2 =2.901	0.234	Do not reject Ho	Not Significant
Experience and High-Level Technology	r=0.009	0.943	Do not reject Ho	Not Significant
Income and High-Level Technology	χ^2 =10.176*	0.006	Reject Ho	Significant

*significant at p<0.05

Impact of Assistive Technology

Table 15 presents the impact of assistive technology on the learners as perceived by the respondents. The table shows the frequency and rank of the different impacts identified by the respondents. The impact categories include promoting learner's participation and engagement, promoting independence, promoting learner's development of skills, providing learner's assistance, stimulating learning, developing learner's confidence, enhancing learner's motivation to learn, addressing learner's challenges, providing comfort to the learners, and helping build the learner's strengths.

Table 15
Impact of Assistive Technology to the Learners

Impact of Assistive Technology	f	Rank
Promotes learner's participation and engagement	37	1
Promotes independence	32	2
Promotes learner's development of skills	31	3
Provide learner's assistance	30	4
Stimulates learning	24	5
Develops learner's confidence	22	6
Enhances learner's motivation to learn	19	7
Address learner's challenges	17	8
Provides comfort to the learners	16	9
Helps build the learner's strengths	13	10

*multiple response

The most commonly cited impact of assistive technology is promoting learner's participation and engagement, with a frequency of 37 and a rank of 1. This suggests that the respondents perceive assistive technology as an effective tool in increasing the involvement of learners with exceptionalities in classroom activities. The second most commonly cited impact is promoting independence, with a frequency of 32 and a rank of 2. This indicates that the respondents recognize the potential of assistive technology in helping learners with exceptionalities become more self-reliant and less reliant on others. The third most commonly cited impact is promoting learner's development of skills, with a frequency of 31 and a rank of 3. This suggests that the respondents perceive assistive technology as an effective tool in developing the skills of learners with exceptionalities.

Other commonly cited impacts include providing learner's assistance, stimulating learning, developing learner's confidence, and enhancing learner's motivation to learn. These impacts highlight the potential of assistive technology in addressing the challenges faced by learners with exceptionalities and in promoting their academic success.

DISCUSSION

Age and Gender

The study found that most teacher-respondents were female, with the highest number in the 24-32 years age range. Male respondents were fewer, with the highest number in the 42-50 years age range. These findings could impact teachers' attitudes towards using assistive technology (AT) in teaching exceptional learners. Previous research suggests that younger special education teachers are more technologically competent and report higher use of AT. This highlights the need for continuous training and support for special education teachers, especially those who are less technologically adept. Despite efforts to improve special education in the Philippines, challenges such as the lack of resources, inadequate teacher training, and insufficient government support remain. It is essential to provide continuous support and training to special education teachers, particularly in the use of AT, to promote the learning experiences and equal access to quality education for students with exceptionalities. (Al-Dababneh & Al-Zboon, 2022; Gaboy et al., 2020; Winter et al., 2021; Allam & Martin, 2021)

Civil Status

Civil status, which includes marital status, family structure, and economic situation, is an important variable in this study as it can provide insights into the teaching and learning experiences and opportunities for utilizing assistive technology (AT). Research suggests that being married can have a significant impact on the physical and mental health of teachers, promoting resilience and growth in the face of trauma, contributing to higher self-efficacy, and resulting in better teaching practices, performance, and professional development. This highlights the importance of considering the civil status of the teacher-respondents in promoting the adoption and effective use of AT in teaching learners with exceptionalities. (Nomaguchi & Milkie, 2020; Lawrence et al., 2019; Rombaoa et al., 2020; Gregersen et al., 2021)

Highest Educational Attainment

Most teacher respondents completed graduate education, positively impacting AT teaching ability through understanding benefits/limitations. However, some with only Bachelor's may have limited AT knowledge/skills suggesting training/support needs. Educational attainment distribution provides valuable demographic characteristics influencing AT attitudes/perceptions. Teachers with higher education possess better problem-solving, critical thinking about technology, allowing full AT potential realization. Higher education is considered crucial for special education success through necessary knowledge/skills for effective utilization. Deep understanding of applications/benefits along with positive attitudes towards usage is essential for successful, sustainable special education implementation. (Cooc, 2019; Wahono & Chang, 2019).

Field of Specialization

Most teachers specialized in SPED as expected given exceptionality focus, positively impacting AT integration through understanding unique needs/challenges. However, others in different fields may have limited AT knowledge potentially affecting exceptionality support. Specialization distribution provides valuable demographic characteristics influencing AT attitudes/perceptions. Teachers can ensure proper needs-based AT selection, fostering inclusion/efficiency through reduced wrong/ineffective costs while improving learner quality of life. This approach improves outcomes while reducing improper selection costs. (Saloviita, 2020).

Length of Service

Most teacher respondents had 5 years teaching experience or less, potentially limiting AT integration ability, while a significant portion had 10 years or less. However, some had longer experience, providing more AT teaching knowledge. Length of service distribution provides valuable demographic characteristics that may influence AT usage attitudes/perceptions. Experienced special education teachers can provide necessary support, guidance, understanding learners' needs, and identifying

optimal strategies for each, contributing to accumulated knowledge for better exceptionality outcomes in education and development. (Atanga et al., 2020; Fahrman et al., 2020).

Income

Most teacher respondents earned 19,041-38,080 pesos monthly, potentially impacting AT access/use, though definitively concluding relationships is difficult without specifics on types/costs utilized. While higher incomes may provide more resources, lower incomes could limit access. The income distribution provides valuable demographic characteristics that may influence AT teaching attitudes/perceptions. Income's potential influence must be considered when interpreting results and designing adoption/effective use interventions for exceptionality teaching. Although AT can be expensive, financial availability is not sole determinant in providing appropriate AT, as formalized support, home/school visits, and user trialing are also important considerations in limited-resource contexts. (Van Niekerk et al., 2019; WHO, 2022).

Types of Disabilities Handled

Most common disabilities handled were intellectual/developmental disabilities and learning disabilities followed by autism, hearing impairment, physical disabilities, visual impairment, special gifts/talents, slow learners, consistent with exceptionality study focus/population prevalence. Understanding exceptionality needs can inform resource allocation/supports ensuring quality education access for all. Tailoring AT to learner disability can maximize special education effectiveness/exceptionality learning outcomes. (Devi & Sarkar, 2019). Further disability type research provides Philippine insights on challenges/opportunities in exceptionality services.

Perceived Effectiveness of Assistive Technologies Across Technology Categories

Assistive technologies (AT) support exceptional learners, though effectiveness varies by disability and needs. Promoting AT use with appropriate teacher training is important. PECS, picture boards, charts, cue cards are effective low-level AT, providing visual support aiding communication, independence, participation for diverse needs including speech/language difficulties or ASD (Shrestha & Shah, 2020; West, Swanson, & Lipscomb, 2019; Walters et al., 2021). Magnifiers effectively support visual impairments/low vision through customizable magnification (Pundlik, Shivshanker, & Luo, 2023). Computers powerfully support inclusion through customized applications (Kuo, et. al., 2021; Kisanga & Kisanga, 2022). AT encourages inclusion and high-quality AT aids academics (Al-Dababneh & Al-Zboon, 2022; Bell & Foiret, 2020; Atanga et al., 2020). As a support, AT benefits academics by hindering learning obstacles (Al-Dababneh & Al-Zboon, 2022).

Test of Relationship between the Respondents' Profile and the Effectiveness of Low-, Middle-, and High-Level Technology

This study tested relationships between respondents' profiles and low, middle, high-level technology effectiveness for exceptional learners. For low-level technology, no significant profile relationship suggests other factors impact effectiveness requiring further exploration. For middle-level technology, educational attainment and income play a role (Wahono & Chang, 2019; Van Niekerk, Dada & Tönsing, 2019). Income has a significant negative relationship with middle and high-level effectiveness, indicating lower income teachers perceive greater effectiveness, likely linked to access and familiarity (Febrianto, Mas'udah, & Megasari, 2020). Profile impacts high-level effectiveness limitedly though income disparities exist, requiring training, resources, and development to enhance classroom integration. Further research is needed to explore relationships, especially high-level technology and income, in more detail.

Impact of Assistive Technology

The most cited assistive technology impacts were promoting learner participation/engagement and independence, followed by skill development, highlighting potential to address exceptionality challenges and promote academic success. Other impacts included providing assistance, stimulating learning, and developing confidence/motivation (McNicholl et al., 2021). Respondents positively perceived assistive technology's impact on exceptional learners, supporting promoting usage through appropriate teacher training/support for integration. Findings reinforce that assistive technology significantly promotes participation/engagement by enhancing learner ability to actively participate,

engage materials/peers/instructors, ultimately improving academic outcomes (McNicholl et al., 2021).

Limitations

The self-reported, convenience sample limits generalizability. The study relied on perceived rather than objective effectiveness.

Implications

The HAAT model suggests that assistive technologies effectively implemented through teacher competencies can benefit learners. However, teacher profiles also impact effectiveness.

CONCLUSION

The study's findings suggest that teacher interventions play a crucial role in implementing assistive technologies that align with their competencies and positively impact learners. The majority of the teacher respondents were female and specialized in Special Education, while most handled learners with Intellectual and Developmental Disabilities. Teachers perceived low, middle, and high technologies as very effective in supporting learners. Educational attainment and income significantly affected the perceived effectiveness of middle and high-level technologies. Assistive technology positively impacted learners by promoting participation, independence, and skill development. A matrix action plan proposes strategies in professional development, resources, funding, and research to enhance the effective use of assistive technology for exceptional learners through a profile-aligned approach.

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