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Teachers' Attitudes Toward the Use of Assistive Technology and Its Correlation with Student Learning Outcomes in Special and Inclusive Education

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Abstract: - The purpose of this paper is to establish the relationship between how the teachers feel about the usage of Assistive Technology (AT) in class and their students' performance in special and inclusive classes in Cebu, Philippines. Quantitative were used in the research design and questionnaires were used to elicit information from 60 teachers. The results showed that the teachers' attitudes toward AT, on average, were positive, their usage of specific AT tools is rather limited. A positive relationship (0.635) confirmed the relationship between teachers' attitudes with students' learning achievement, while the r-value of 0.185 confirmed the non-significant relationship between the frequency of the use of AT and students' achievement. Consequently, the study suggests the following recommendations: increasing professional development programs related to assistive technology, important resources, positive attitudes, cost issues, and practice interdependence. Such strategies are intended to better support students with disabilities to implement AT in classrooms; in turn, positively influence the educational processes' quality. This research gives important findings to guide policymakers and practitioners in the areas of inclusive education and appropriate use of technology.

Keywords*: Assistive Technology, Special Education, Teacher Attitudes, Teacher Usage of AT, Learning Outcomes, Cebu City, Philippines.*

1. Introduction

Inclusive education is widely recognized as a crucial strategy to promote diversity, equity, and inclusion in educational institutions. It advocates for giving students with disabilities the opportunity to learn alongside their able-bodied peers in a regular education context. In this context, assistive technology (AT) has emerged as a critical component in improving learning possibilities for students with disabilities, enabling them to access the curriculum more efficiently and achieve better learning outcomes. Assistive technology refers to a variety of

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tools, gadgets, and software developed to meet the learning needs of students who have physical, cognitive, sensory, or communication impairments. For example, Baragash et al. (2019) indicated a large overall effect of AT like Augmented Reality (AR) in enhancing gains of skills and recommended wider adoption of such technologies in special education. However, no matter how effective, the success of assistive technology is heavily influenced by the attitudes and perspectives of the teachers in charge of integrating these tools into their classrooms.

In the Philippines, inclusive education is mandated by legislation such as Republic Act 10533, also known as the Enhanced Basic Education Act of 2013, as well as Department of Education (DepEd) policies encouraging inclusive and special education. Despite these efforts, there are still issues in providing adequate training and resources for teachers to use assistive technology effectively in the classroom. According to McNicholl et al., (2020), if the students AT requirement is properly addressed, academic self-efficacy, well-being, and education engagement improve significantly. This brings out the psychosocial advantage of effective AT use and stresses the importance of furthering research on teachers' perceptions of its use and how attitudes affect the success of inclusive education initiatives.

As a public-school teacher in an inclusive education context, the researcher felt increasingly motivated to research this topic as a result of the issues witnessed in class. There is a substantial research gap on how assistive technology is implemented into mainstream classes in public schools. Teachers frequently have limited access to suitable tools and resources, insufficient training, and a misunderstanding of how to properly use assistive technology to serve their students' diverse needs. Despite efforts to promote diversity, these issues lead to a gap in the learning experiences of students with disabilities compared to their counterparts.

Furthermore, in the study of Barua et al., (2022) and Alanazi (2023), it was found that many teachers in special and inclusive education struggle to embrace assistive technology due to misconceptions about its complexity, effectiveness, and relevance to their students' learning needs. Students with exceptionalities' learning potential be hampered by their reluctance to use assistive technology. Another issue the researcher noticed throughout the observations is variability in AT implementation between classes; some instructors are skilled at using technology to benefit their students, while others lack the confidence and competence to do so. This variability results in varying learning outcomes, with some pupils benefiting tremendously from AT and others remaining underserved.

This research was carried out in public schools in Cebu. The intended audience of the center includes students with one or multiple types of learning disabilities, visual impairment, Deaf, autism, intellectual disability, and physical disabilities among other categories of exceptionalities. This study aims to provide insights into the following research goals: First, to assess teachers' current attitudes and perceptions toward the use of assistive technology in special and inclusive education settings; second, to determine the relationship between these

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attitudes and the learning outcomes of students with disabilities; and third, to identify the correlation between the ATs used and students learning.

Finally, the study's goal is to add to the body of research that can inform policies and practices targeted at increasing the use of assistive technology in special and inclusive education. By investigating the relationship between teachers' attitudes and students' learning results, the study aims to provide practical recommendations for improving teacher training, resource allocation, and support systems in public schools. The findings are intended to help advocate for more inclusive policies that prioritize the effective use of assistive technology, which can lead to better educational outcomes for students with exceptionalities. Furthermore, the study aims to instill a more positive attitude toward assistive technology in instructors, encouraging them to see these technologies as useful assets that can improve their students' learning experiences.

2. Objectives

This research aimed to evaluate the correlation between teachers' attitudes toward the use of assistive technology tools and the learning outcomes of students with exceptionalities in special and inclusive education at Naga Special Education Center, Consolacion Central School, and Zapatera Special Education Center for the Academic Year 2024-2025, as a basis for an Action Plan.

Specifically, it sought answers to the following sub-problems:

1. What is the demographic profile of the teacher-respondents in terms of:
   1.1 civil status,
   1.2 teaching position?
2. What is the level of attitudes among the teacher-respondents toward the use of assistive technology in the teaching and learning of students with exceptionalities?
3. devices in special education programs?
4. What is the level of learning outcomes among students with exceptionalities in relation to the use of assistive technology devices?
5. Is there a significant relationship between the teacher-respondents:
   5.1 attitude towards the use of assistive technology in teaching and learning and the level of students with exceptionalities learning outcomes, and
   5.2 frequently used AT devices in special education programs and the level of students with exceptionalities learning outcomes?
6. Based on the findings of the study, what Action Plan can be proposed?

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3. Methods

3.1 Theoretical Framework

The Technology Acceptance Model (TAM) formulated by Davis in 1989 helps the researcher to know why users accept or reject technology. In TAM, perceived usefulness and perceived ease of use are two components that explain users' attitudes toward the technology and their intentions to use such technology in their day-to-day undertakings (Marikyan and Papagiannidis, 2023). Another element understood as perceived usefulness looks at the degree up to which an individual adopting a certain piece of technology supposes the application of this technology to improve his or her outcomes and productivity. While perceived ease of use refers to the extent an individual believes that using the technology is trouble-free. TAM indicates that if the users consider a certain technology as being useful and easy to use, they have a positive attitude towards it and hence adopt it. In the light of special education specifically, the TAM appears suitable to explain how teachers' attitudes toward AT affect their usage of ATs. Using the proposed TAM model, this study seeks to reveal how teachers' beliefs on the usefulness and easy use of assistive technologies impact their attitudes towards the use of such tools, and hence their adoption with a view of promoting student learning.

Backing up this framework, Şahin & Yildiz's (2024) investigates the mobile learning acceptance among university students with special needs by extending TAM with the self-determination theory constructs. The present research offers an understanding of factors including motivation and perceived technology characteristics on the use of assistive technologies in the learning environment. There is also an integration of self-determination theory to explain students' attitudes towards technology usage and its effectiveness on course outcomes. Additionally, Buabeng-Andoh (2022) helps to advance the TAM understanding by examining the per-service teachers' acceptance of assistive technology in the special education context. Specifically, this study aims to establish factors that influence the intended use of the technology by modeling the psychological and usability factors that influence educators' perceptions and behaviors. It helps to supplement and build on existing literature on how TAM can help to understand the usage of technology in helping students having learning disabilities. According to Xia et al., (2023), TAM is especially relevant in these contexts because it looks into special education teachers' acceptance and sustained adoption of educational information technology. This study employs a questionnaire survey to offer a viewpoint on how TAM can assist in determining teachers' perceptions and participation toward technological enhancement in supporting students, especially such students. Nasir et al. (2021), on the other hand, examines the effectiveness of mobile technologies while ESL students with hearing impairment are learning. In any case, this investigation, which has been mainly concerned with a particular population only, brings out the importance of ascertaining students' attitudes toward the instrument in question. It fosters TAM by stressing on the need to assess the ways

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students with disabilities both view and engage with technology, thus expanding knowledge of acceptance of technology in the learning environment.

TAM gives a clear framework for the assessment of the effects of teachers' attitudes of assistive technology on the practices of the use of such technologies and on student achievement. The presented framework is useful for understanding the correlation between technology acceptance and educational efficiency in specific learning environments for special needs students.

Furthermore, the Unified Theory of Acceptance and Use of Technology was proposed by Venkatesh, Morris, Davis, and Davis in 2003. UTAUT amalgamates components from eight earlier advancements: the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), and etcetera (Marikyan and Papagiannidis, 2023). This model is designed to propose the factors that relate to user acceptance and usage behavior including performance expectancy, effort expectancy, social influence, and facilitating conditions. In the larger perspective of understanding the teachers' perceptions about the assistive technology and its direct relation with students' learning achievement in special education, the instrument known as the UTAUT provides a strong theoretical foundation to comprehend how and to what extent the various factors influence the acceptance of technology. Thus, based on the UTAUT model this study examined how performance expectancy, effort expectancy, social influence, and facilitating conditions influence the teachers' attitudes towards assistive technologies and the subsequent influence on the student's achievement.

This theoretical underpinning is supported by Marikyan and Papagiannidis (2023) who expound on the explanation of the proposed UTAUT model by elaborating on the fact that the study incorporates a wide range of constructs and that validated scales from prior research have been employed. Thus, the study reinforces the relevance of the model through measurement of the constructs borrowed from other theories and assessing the faith, or their reliability and validity. Alshabeb et al. (2020) make use of the UTAUT when examining the usage of assistive technology by persons with special needs in the learning environment. The study was undertaken in Saudi Arabia, emphasizing the applicability of UTAUT to the adoption of technology in e-learning contexts and sheds light on how the factors impacting technology acceptance be particularly useful when implemented in special education contexts. In the same vein, Ursavaş (2022) offers a proper analysis of the UTAUT model by describing its parts, including voluntariness and the expectancy theory. This reference explains how UTAUT can be used in evaluating the acceptance and usage of assistive technology, as well as the factors that influence these factors when utilizing technology in teaching special needs students.

Furthermore, Dwivedi et al. (2020) propose a new extension of UTAUT called meta-UTAUT derived from an analysis of 162 articles. In this article, these trends are outlined and a list of directions for future meta-UTAUT research is provided. According to the analysis, despite a

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number of investigations that have been focused on the adaptation of the meta-UTAUT for different contexts, only a few of them have examined the relationships postulated by this model while considering the acceptance and use of technology in various contexts. The integration of this meta-UTAUT provides for a refinement of the theoretical perspective advanced by the initial UTAUT.

In the same manner, Blut et al. (2022) respond to the criticism that the studies on UTAUT and technology adoption are now in the 'post-quantitative', by arguing that the theory has not previously been tested in diverse contexts. The authors raise questions about the universality of UTAUT arguing that misapplication and misspecification might have led to previous conclusions. Cleverly, this meta-analysis encompasses data from approximately 25,619 effect sizes, which were derived from 737,112 users in a total of 1,935 independently sampled studies, and consequently proposes a revised model of UTAUT. This updated model replaces existing variables, like perceived facilitating conditions, perceived behavior control, and actual use, with new ones, like technology compatibility, user education, personal innovativeness, and costs of technology. Further, new moderators have been included to test the cross-national and generalizability of UTAUT and other technologies like mobile commerce technologies. This revised UTAUT provides a direction for future studies of technology acceptance and enhancement of the UTAUT model.

On the other hand, Genc et al. (2021) examine special education students' perceptions study regarding assistive technologies, consequently following the UTAUT principles. This research stresses the importance of technological aids in teaching and learning in special education and contributes to the knowledge on aspects relating to technology uptake among the learner. A study by Carey et al., (2022) aims at discussing the possibilities of the assistive technology in the learning process of students, emphasizing the applicability of UTAUT in studying the acceptance of technology. The findings of this research provide an understanding concerning the support roles of technology in tutoring students with special needs as well as understanding the applicability of the UTAUT model in investigating the acceptance and utilization of technology.

Rabonye (2020) describes how technology can assist students with a disability. While this study is not directly related to UTAUT, extending one's knowledge of the incorporation of assistive technologies in educational practices can be helpful for the further investigation of the UTAUT in the SPED setting. To this end, by adopting UTAUT in this study, researchers can gain a holistic view into the moderated influence of the teacher's attitude towards assistive technology and how it affects the learning outcome of the students and the effectiveness of the technology integration in special needs classrooms.

Also, the Diffusion of Innovations (DOI) Theory by E. M. Rogers, developed in 1962, offers a broad theoretical foundation to study how a new idea, practice, or object circulates within a social system. The source asserts that Rogers holds that an innovation is "an idea, practice, or

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object that is perceived as new by an individual or other unit of adoption," and that diffusion is "the communication process by which an innovation is spread over some period of time among the members of a social system" (Kurt, 2023). The theory categorizes adopters into five groups: The five categories of users – innovators, early adopters, early majority, late majority, and laggards, all of which differ in terms of how often they are ready to adopt an innovative product. According to the DOI theory, some important characteristics that affect the usage of innovations are relative advantage, compatibility, complexity, trialability, and observability. Relative advantage is the comparison of the new product or idea to the current traditional practices, compatibility is the level at which the change aligns with the organization's beliefs and practices, and complexity is the ease with which one is able to understand the innovation and trialability is the extent to which an innovation can be tested in a small way before full implementation and observability is the degree to which the outcome of the new idea can be seen by others. Implemented in the understanding of teacher attitudes concerning assistive technologies and their relationship with learners' progress in special needs learning, DOI Theory can be helpful in explaining how these technologies are actualized and incorporated into teaching. Applying DOI Theory, the researchers can explore teachers' attitudes to the benefits of assistive technologies, their compatibility with the existing approaches to teaching, and the factors that enhance or inhibit the utilization of such technologies. Awareness of such factors can be useful in planning ways to increase the appropriate utilization of assistive technology in special education.

Related research is presented as evidence that DOI Theory is useful in explaining technology use in different settings. For example, using DOI Theory, Anthony et al. (2020) examine blended learning in the context of higher education in an effort to clarify how exactly the concept of this framework can be applied to the use of assistive technologies. Based on their study, the authors contribute to the understanding of the implementation of innovative educational technologies in teaching practices and underscore the application of DOI Theory for the investigation of the diffusion of such technologies in special education environments. King et al. (2019) consider new technologies in the learning environment, with special attention to the implementation of new technologies in teacher practices. Discussing the results concerning DOI applicability to the context of the analyzed diffusion process of new technologies in teaching and the impact of this process on students' engagement, this study reveals some insights into the usage of special needs education and the role of assistive technologies based on DOI Theory.

On the other hand, Raman et al., (2024) applies DOI Theory to explore the acceptance of ChatGPT by university students along with sentiment analysis. The study presents a new perspective to grasp technology acceptance and gives an idea about how DOI Theory can be useful for different educational technologies, especially the special needs students' technological tools. The impact of the Twitter network is explored by Schuster and Kolleck

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(2020) to understand the global diffusion of social innovations concerning the field of inclusive education. Although their study does not specifically address assistive technology, their research proves helpful as it illustrates the context of DOI Theory that can be applied to analyze the flow and the diffusion of innovations in education in general, which can be regarded as the background for the diffusion of assistive technologies.

In his paper, Nwokolo et al., (2023) explores the adoption of an innovative technology solution for carbon footprinting in Africa and evaluates the DOI Theory regarding the dissemination of innovative technologies. Although unrelated to special education, this shows how DOI Theory can be used in realizing technology transfer in general. Chille & Mollel (2024) looks into the use of social media innovations by football clubs in Tanzania using DOI Theory. Therefore, the case study helps to enrich the knowledge about the use of DOI Theory in various contexts and apply it to cognition of how the assistive technologies are implemented and incorporated into education practices. Hence, by applying DOI Theory, this study comprehensively addresses the factors affecting the acquisition of assistive technologies in special education, which focuses on recommending viable methods of promoting the use of the technologies in the teaching of the students so as to foster their learning outcomes.

The bases for this study on the attitudes of teachers toward assistive technology and this survey in relation to learners' achievements in special education classes are rooted in several policies and legislation that highlight the right to education for students with learning disabilities as well as fostering of integrated learning environments.

Republic Act No. 7277 commonly referred to as "Magna Carta for Disabled Persons" is a policy passed designed for the protection and advancement of the rights of Persons with Disabilities. This law was passed on 24th March 1992 and commits the state to the protection of PWDs' rights and promotion of their welfare in education employment and acquisition and use of social and public services and facilities. It encourages the independent living of PWDs and their inclusion in community and social activities. Discrimination on the basis of the disability is prohibited by the act and the affected population is provided equal access to facilities such as schools. It supports the use of the special educational equipment and individualized learning, which are vital for managing the learning of students with disabilities. Republic Act No. 9442 which is an Act amending Republic Act No. 7277 strengthens the rights of PWDs as it develops the provisions on the welfare and the social inclusion of the disabled. This law remains helpful in the continued effectiveness of this initiative aimed at the incorporation of assistive technologies in education so as to enable disabled students to have requirements met to enable the realization of their potential.

Republic Act No. 11650, enacted in 2022, mandates inclusive education for learners with disabilities in the Philippines. The law requires educational institutions to provide equal access to quality education in regular classrooms and ensure the availability of assistive technology. It also emphasizes continuous teacher training in special and inclusive education, and mandates

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monitoring of inclusive education programs by the Department of Education. Collaboration with other agencies is encouraged to support learners with disabilities.

These legal frameworks encompass the contexts presented in the study, which aims to explore the teachers' perceptions about assistive technology accommodative strategies and their effects on students' achievement. They form the frame of reference in terms of assessing the degree of success of the implementation of the principles of inclusion and the use of technology to support learning for children with disabilities.

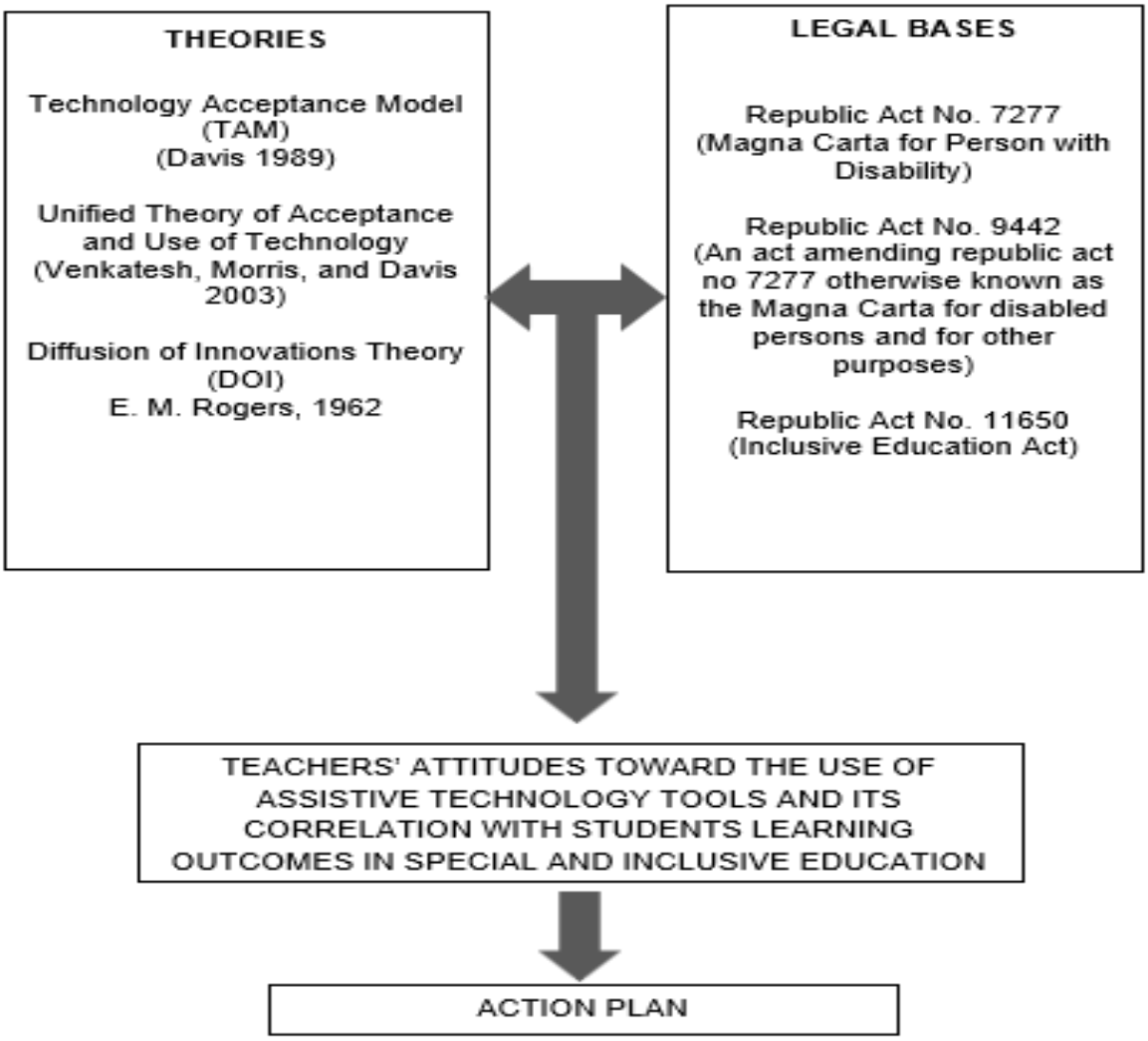

Figure 1
Theoretical Framework of the Study

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3.2 IPO Model

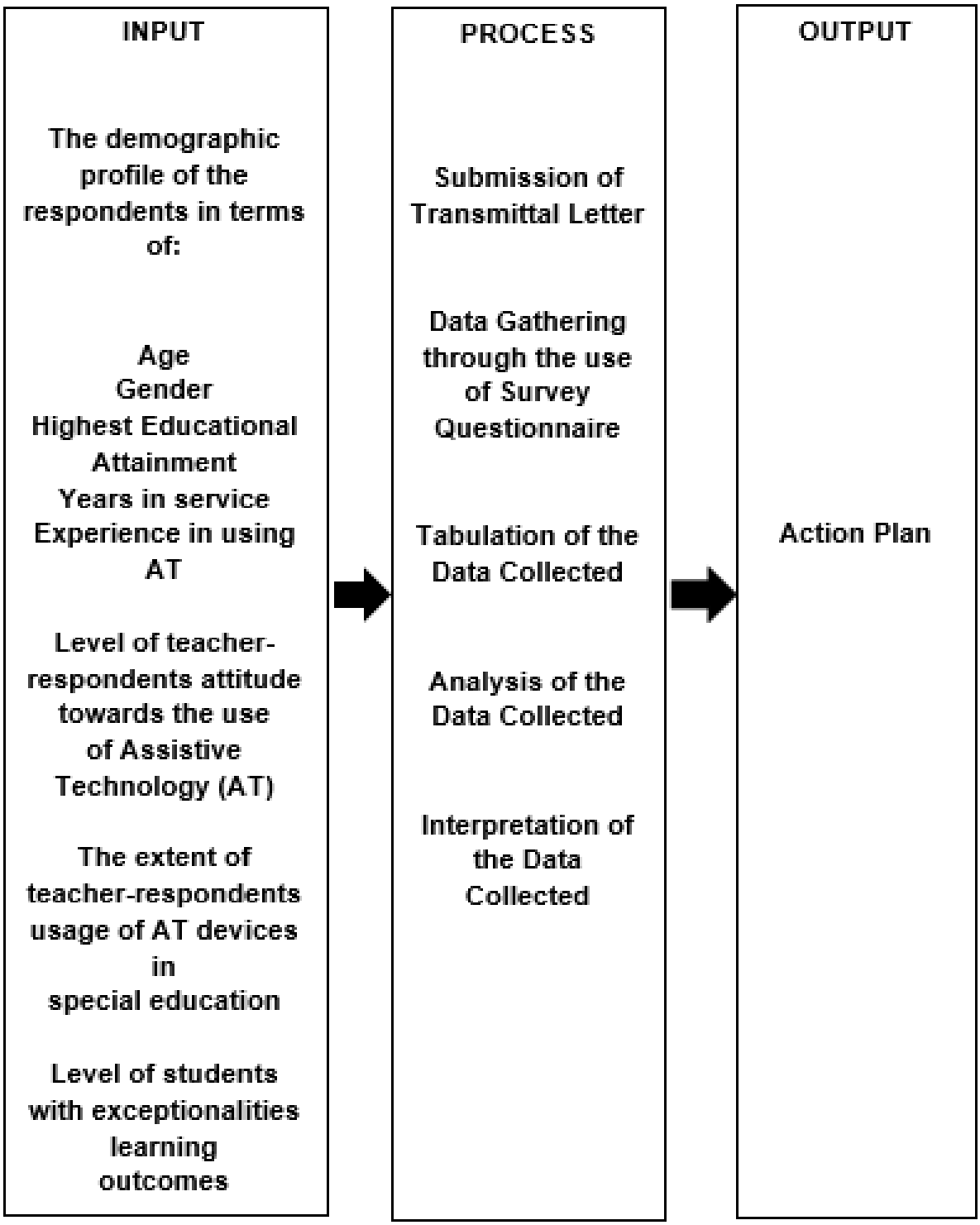

Figure 2
Flow of the Study

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The flow of this study was presented in the diagram which can be seen in Figure 2. It reflects the path the study took, the data it used, processed done to analyze the data, and the output made based on the analyzed data.

3.2.1 Input. The demographic profile of the teacher-respondents, their level of attitudes toward the use of assistive technology in the teaching and learning of students with exceptionalities, and the level of learning outcomes among students with exceptionalities in relation to the use of assistive technology devices. These variables were measured in order to get an overall view of AT usage and establish a relationship between them.

3.2.2 Process. The study begins in the preparations stage, during which the plan is fully developed and clearances from organizations such as institutional and school review boards are obtained. To maximize the survey instrument and thereby improve its validity and dependability, a pilot test is conducted. Following the preparation stage, the phase of data collecting consists of distributing the survey to the intended subjects. After the collection of the data, the next step would be to analyze them. Data analysis, in which the gathered data is entered into a statistical program, is the penultimate stage in quantitative research data collecting. The results are reviewed and explained in view of the research questions and aim to grasp the elements influencing the attitude of teachers toward AT in special education programs. Finally, the reporting stage consists of the compilation of all the produced data into a report. It offers concise justifications of the methods used in the research, the results, and the relevance of the project.

3.2.3 Output. After all this, an output was developed based on the data gathered and analyzed. In the case of this study, an action plan for the teachers was made. The proposed action plan is aimed at narrowing down the gaps regarding the integration of assistive technology (AT) in school, with reference to special education. Hence, the plan aims to raise teachers' awareness and enhance their favorable attitudes toward the utilization of AT to foster the development of a sustainable, supportive culture that promotes the effective use of these tools.

3.3 Design

This research utilizes a quantitative research strategy with a cross-sectional survey technique. While the general purpose is to determine the association between teacher perception of AT with students' learning outcomes in special education environments, the study also utilized a descriptive design to analyze the overall demographics of the respondents. The quantitative approach ensures collection and analysis of data is done systematically because it deals with figures and numbers hence giving reliable and universal results. Hence, the study design of a structured questionnaire with Likert scale items enables the study to obtain precise teacher

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perceptions and regards to AT and its various facets. This design is ideal for education research because it allows the researcher to collect data from many respondents in a relatively short time while at the same time attaining maximum coverage and depth of information.

4. Results

4.1 Profile of the Respondents

It was found that most respondents were married. Moreover, it identified a diverse range of teaching positions but Special Education Teachers were found as a majority. This variety refers to varying degrees of training and experience, which are likely to influence the productive use of assistive technology (AT) in the classroom.

4.2 The Attitude of Teacher-Respondents Toward the Use of AT

The strong positive attitudes held by teachers towards AT were manifested in the view that AT has benefits to education such as improving learning and adapting to student needs. Despite these, concerns were raised regarding ease of use and cost-effectiveness, particularly in the area of training and resources to build up confidence and competence using AT.

4.3 Teacher Use of AT

Generally, teachers used AT rarely, and the overall degree to which AT usage among teachers was observed was minimal. This discrepancy between perceived AT benefits and actual AT implementation points to possible barriers to access, training, and support, which should be addressed in order to enhance the integration of AT into educational settings.

4.4 Learning Outcomes of the Students

The use of AT was perceived by the teachers to have a positive impact on the learning outcomes of the students through improving the engagement and the student's individual learning experience. However, this emphasizes the need for continued professional development along with the availability of resources in order to derive the full benefits of AT for students with disabilities.

4.5 Relationship between Attitude towards the use of assistive technology vs learning outcome

A strong positive relationship between teachers' AT attitudes and students' learning outcomes was discovered. This implies that positive teachers' perception of AT could positively affect students' performance.

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4.6 Relationship between Use of AT devices vs learning outcomes

The frequency of usage of AT was not related to student learning outcomes. Simply engaging in AT is not sufficient; the technology to be used and its application in a specific context is important to that desired student achievement.

5. Discussion and Conclusion

5.1 Discussion

The study gathered data from 60 respondents. Based on their responses, this section summarizes their civil status and teaching position. The summary presents the frequency of the response as well as its percentage.

5.1.1 Civil Status

The respondents were asked whether they were married or single. Out of the 20 respondents, the following data were collected:

Table 1.
Civil Status of the Respondents

Civil Status	Frequency	Percentage
Married	40	67
Single	19	32
Widow	1	1
Total	**60**	**100**%

On the demographic information part, the study found that 67% of the respondents were married, 32% were single and 1% were widowed. This demographic breakdown is important since it affects their attitudes toward the use of technology and its implementation in teaching. The respondents' civil status in the study implies that many of them, (67%) are married which could mean that they are more experienced and possibly more established in their careers, which may call for a different attitude toward embracing change, especially in the integration of technology in teaching. Thus, the marital status of participants can contribute to the assumption that, due to greater life stability and possibly stronger psychological and financial conditions, married people will be in a position to apply for professional development or introduce new teaching-learning aids more frequently. However, it does not mean that 40% of single respondents, or 5% of widowed respondents, are less inclined to adopt or use a particular technology. Job security, for instance, may apply to married teachers' performance while single and widowed educators may have other attributes like flexibility or high motivation levels in integrating technology into their teaching practices. It is possible to assume that the willingness or readiness of educators to accept and apply the assistive technologies might be more complex

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and be influenced by other factors, including, civil status, age, previous experience, as well as the opportunity to participate in professional development programs related to the use of technologies in teaching.

The discussions made in the current study are in congruity with the literature knowledge that demographic characteristics like the civil status of a person can affect the choice of AT. Previous results also showed that married people more often use AT like HAT compared to unmarried persons; therefore, personal factors like marital status may influence the decision to adopt technology. But this study also highlighted that there were other factors that are equally important, which are related to the nature of the occupation of the person and his or her needs and requirements. In the same manner, Clay (2023) discussed that demographic and socio-economic factors including marital status, gender, and income, affect the extent to which AT is used. This fits nicely with the notion of the current study that married teachers might use AT in their classrooms more effectively than other teachers but it does not mean that single/widowed teachers cannot or do not employ these technologies as such appropriately. The results of the studies by van Leeuwen et al. and Clay support the call for a multi-dimensional approach regarding personal characteristics that influence the utilization of assistive technologies, and further note that a singular approach based on a single variable is not enough.

5.1.2 Teaching Position

Teaching positions were also gathered to determine the status of the participants. Out of the 60 respondents, the following data were collected:

Table 2.
Teaching Position of the Respondents

Teaching Position	Frequency	Percentage
Teacher I	12	20
Teacher II	5	8
Teacher III	9	15
Master Teacher I	1	2
Master Teacher II	1	2
Special Education Teacher I	21	35
Special Education Teacher II	3	5
Special Education Teacher III	7	11
Special Education Teacher V	1	2
Total	**60**	**100%**

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Data on the 60 participants pertaining to their teaching positions were gathered to determine their professional position. The analysis found that there is a wide variety of teaching positions, as evidenced by 35% of those who are Special Education Teacher I and 12% Special Education Teacher III. Other positions were as follows: Teacher I (20%), Teacher II (8%), Teacher III (15%), Master Teacher I (2%), Master Teacher II (5%), and Special Education Teachers at different levels indicating job opportunities for teachers specialized in this area. This distribution demonstrates the variations in the training of the respondents in terms of experience as well as knowledge of attitudes towards the use of AT in assisting students with disabilities.

In terms of the distribution of teaching positions among the respondents, it can be found that the biggest share of respondents works as Special Education Teacher I, 35%, which means that these respondents are most likely to be knowledgeable and skilled in their field. It could also make them better placed to implement AT into their classroom practice as their training matches the deficiency of students with a disability. However, a smaller number of respondents serving in less experienced in special education or broadly oriented positions, such as Teacher I (20%) or Teacher III (15%), might mean somewhat different results. This, however, does not mean that they cannot acquire and adapt to the use of AT; the level of exposure to the technologies and students' requirements might be considerably less than in the case of more experienced teachers with SPED specialization. However, the variety of teaching posts demonstrated here means that all teachers – whoever they are and whatever their title – may stand to gain from needs-led training focused on the most effective means to support their learners' needs through the use of technology.

Altogether, the results of the present study support the conclusions made in the current literature regarding the impact of differences on the use of assistive technologies. For instance, van Leeuwen et al. (2021) revealed that people with specific job requirements are likely to use HAT since they are professionals in particular areas. In a like manner, Clay (2023) noted that by reason of their task requirements, certain individuals are likely to use assistive technologies. Furthermore, research has pointed out that job content specificity and professional development are important in understanding, to what extent teachers adopt new technologies. The findings of this study presented that the specialized teacher, who belongs to Special Education Teacher III or Special Education Teacher I, is likely to use or promote the AT. However, it also suggests that non-specialist teachers like Teacher I may be struggling to acquire specific training or basically may not see the importance of such technologies in their teaching, therefore the need to ensure professional development can bridge such gap with adequate resources to support the kind of professional learning needed.

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5.1.3 Teacher Attitudes Toward the Use Of AT

The study further assessed the teacher-respondent's attitudes toward the use of AT using a 15-item survey questionnaire. From their responses, the following data were collected and analyzed using the weighted mean and standard deviation

Table 3.
The Attitude of Teacher-Respondents Toward the Use of AT

Indicator	WM	SD	Verbal Meaning
Assistive technology facilitates the presentation of the subject matter.	3.60	.4940	Strongly Agree
Assistive technology improves students' academic performance.	3.61	.4903	Strongly Agree
Assistive technology helps teachers to tailor instruction to the specific needs of students.	3.67	.4754	Strongly Agree
Students with special needs function maximally in the classroom with the use of assistive technology.	3.55	.5344	Strongly Agree
I am convinced that assistive technology plays an indispensable role in the teaching learning process.	3.60	.4940	Strongly Agree
I think a greater percentage of special education funds should be used to acquire assistive technologies	3.58	.5302	Strongly Agree
I can endeavor to improve my assistive technology competence for the benefit of students with special needs.	3.58	.4972	Strongly Agree
I am satisfied when I use assistive technology in the classroom.	3.58	.5302	Strongly Agree
Assistive technologies can facilitate communication in the classroom.	3.58	.4972	Strongly Agree
I believe assistive technology has an overall benefit for students with exceptionalities.	3.58	.5302	Strongly Agree
The availability of assistive technology in the class is very relevant.	3.58	.5302	Strongly Agree

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I feel assistive technology not stressful to obtain and therefore should be provided.	3.50	.5966	Strongly Agree
I feel assistive technology is not complicated and easy to use.	3.30	.5615	Strongly Agree
Utilization of assistive technology satisfies me and do not take too much of my personal time.	3.43	.5635	Strongly Agree
I can use assistive technology in my class because it is very helpful and not expensive.	3.30	.6189	Strongly Agree
Aggregate Mean	**3.54**		**Strongly Agree**

Legend: 3.25 - 4.00 Strongly Agree 2.50 - 3.24 Agree 1.75 - 2.49 Disagree 1.00 - 1.74 Strongly Disagree

The responses were therefore measured and summed up to give a total mean of 3.54, thus pointing out that there is a positive agreement that was noted while using AT on teaching and learning intervention. Among the identified indicators, agreement was impressively high and included the following: The respondents estimated the role of AT and agreed that it effectively supplements the presentation of subject matter in class (m=3.60); with the use of AT, the academic performance of students can be improved (m= 3.61); applying AT allows for differentiation of instruction with regard to the needs of students (m=3.67). These results show their understanding of the beneficial role of AT in the improvement of learning achievements of learners with disability.

The results carry important implications specifically for the adoption of assistive technology in learning contexts. If maintained, these positive attitudes suggest readiness for implementing AT with the potential to improve teaching-learning practices. However, the table shows that although teachers assert their confidence in the benefits of AT, responses to some of the key indicators, such as ease of use and cost-effectiveness, were rated moderate (3.10). Decoding these concerns through training and focusing on supporting teachers enhances their ability to use AT more positively, hence increasing the learning encounters of kids with exceptionalities. Also, the study supports the need for the availability and development of more funding for the implementation of AT resources, as was evidenced by the respondents' acknowledgment of the need to fund assistive technologies.

The findings of the research relating to teacher attitudes toward assistive technology are confirmed by several works. According to Gajić (2023), teachers' attitudes towards AT has an influence on their usage of the technology; the positive attitude towards the technology saw better performance in terms of student involvement and achievement. Along the same line, Maurya and Singh (2021) pointed out that the attitudes of teachers determine the involvement of AT in their practice and further pointed out that teachers with positive perceptions of the

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usefulness of ATs were more likely to incorporate these tools in their teaching. Moreover, Şahin et al., (2024) showed important evidence that revealed that teachers' perception regarding the usability and benefit of AT impacts their keenness to integrate them into teaching. As a whole, these works revealed that teacher predispositions played a significant part in positive practices of assistive technology within educational settings, which is in concordance with the current positive perception findings.

5.1.4 Teacher Use Of AT

The study also gathered data on the actual extent of AT usage among the teacher-respondents. The survey included a list of AT tools in which teacher-respondents can rate whether they frequently use it or not. From the data collected, the following analyses were revealed:

Table 4.
Extent of AT Usage

Indicators	WM	SD	Verbal Meaning
AT for writing	2.75	.9320	Seldom
AT for reading	3.07	.9719	Seldom
AT for math	2.98	.9477	Seldom
AT for listening comprehension	2.88	1.0266	Seldom
Academic and learning aids	3.23	.9088	Seldom
Assistive listening devices and environmental aids	2.71	1.0100	Seldom
Mobility aids	2.50	1.0333	Seldom
Aids for daily living	2.95	.9816	Seldom
Recreation and leisure aids	2.93	1.0062	Seldom
Prevocational and vocational aids	2.80	1.0218	Seldom
Environmental control aids	2.52	1.0332	Seldom
Computer access and instruction	3.20	.9708	Seldom
Visual aids	3.75	.6001	Frequently
Seating and positioning aids	2.87	.9994	Seldom
Desktop and laptop computers	3.35	.8198	Frequently
Mobile devices (includes smartphones and tablets)	3.03	.9737	Seldom
Chromebooks	1.98	.9828	Very Rarely
Text-to-speech (TTS)	1.80	.9169	Very Rarely
Dictation (speech-to-text)	1.93	1.0393	Very Rarely
Word prediction	2.17	1.0442	Very Rarely

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Optical character recognition (OCR)	2.03	1.0079	Very Rarely
Graphic organizers	2.58	1.0299	Seldom
Annotation tools	2.08	.9618	Very Rarely
Display control	2.13	1.0328	Very Rarely
Dictionaries and thesauri	2.57	1.0635	Seldom
Handwriting tools (ie, pencil grip)	3.22	.9037	Seldom
Keyboards and touchscreens	2.63	.9909	Seldom
Spellcheck and grammar check	2.47	1.0965	Very Rarely
Math notation tools	2.23	1.0146	Very Rarely
Electronic worksheets	2.23	1.1103	Very Rarely
Calculators (ie, talking calculators)	2.20	1.0544	Very Rarely
Graph paper	2.22	.9931	Very Rarely
Graphing tools	2.10	.9690	Very Rarely
Drawing tools	2.77	1.0146	Seldom
Equation-solving tools	2.02	1.0167	Very Rarely
Manipulatives	3.40	.8275	Frequently
Audio recorders	2.18	1.0655	Very Rarely
Sound field systems	2.05	.9816	Very Rarely
Noise-canceling headphones	1.81	1.0167	Very Rarely
Personal listening devices (PLD)	1.87	1.0328	Very Rarely
Captioning (ie, closed captioning on television)	2.20	1.0861	Very Rarely
Phonetic spelling software	2.00	.9915	Very Rarely
Variable speed recorder	1.80	.9169	Very Rarely
Videotaped social skills	2.07	.9892	Very Rarely
Aggregate Mean	**2.51**		**Seldom**

Legend: 3.25 - 4.00 Frequently 2.50 - 3.24 Seldom 1.75 - 2.49 Very Rarely 1.00 - 1.74 Never

The aggregate mean of the result was 2.51, so it was inferred that AT is used “seldom” in this educational setting. Concrete outcomes revealed that, for example, academic and learning aids (3.23) and mobility aids (2.50) were perceived as used quite often and very seldom, respectively, however, most of the categories of ATs, including writing, reading, and listening comprehension, were mentioned as being used seldom or very rarely. This implies a huge disparity between the perceived importance of AT and the extent of utilization of the tool in class.

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These results suggest that while teachers within the study appreciated the potential advantages of AT usage, adoption of these instruments is suboptimal. These findings also offset the benefits that AT can bring in reaching out to other learning-abled students, especially those with learning difficulties. The modest appropriation of the enlightening applications, for example, Text-to-speech and dictation apparatuses, infers that custodians may not have access to or the applicable fortitude to consolidate them into learning. Overcoming these barriers through education, training, and provision of better resource allocation and administrative backing could well help facilitate better AT integration and thus enhance the learning of children with learning difficulties.

Some research supports the conclusions made earlier regarding the low adaptation of assistive technology in learning environments. Gajić (2023) noted that while the teachers understand the significance of using AT, many of them face challenges in implementation because the development of this pedagogy has not provided them with adequate training along with the necessary materials. Similarly, Maurya and Singh (2021) concluded that although teachers have a positive perception toward AT proposing them as beneficial, lacks proper implementation due to the absence of systemic modifications. In addition, Şahin et al. (2024) argued that the availability of AT resources affects the use of ATs saying that schools must have resources and training to improve the use of technology in learning. Altogether, these studies emphasize the need for a shift between the positive attitude toward the use of the AT and the practice of it in education.

5.1.5 Learning Outcomes

The study further gathered data about the perceived learning outcomes of students with special needs. From the data collected, the following mean and standard deviation were calculated to assist in the analysis of the findings:

Table 5.
Learning Outcomes of the Students

Indicators	WM	SD	Verbal Meaning
I find that students in my class increase their level of learning when the assistive technology is applied.	3.53	.5031	Strongly Agree
Having chosen this particular technology category, I have realized significant improvement in the grades among the students with disabilities.	3.42	.5302	Strongly Agree

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Special needs students find ways of attaining their learning goals with the help of assistive technology.	3.47	.5031	Strongly Agree
I have realized much improvement in the manner in which the students are engaging in the learning process, particularly noting the aspect of participation as a result of using assistive technology.	3.40	.4940	Strongly Agree
Positive self-esteem is evident in the students due to the incorporation of assistive technology in my class.	3.48	.5039	Strongly Agree
Students show improvement in their communication skills when using. assistive technology	3.40	.5272	Strongly Agree
Students show more independence when they are using technological help.	3.45	.5017	Strongly Agree
It has been evident that the use of assistive technology has made learning to be more personalized to the student's needs.	3.50	.5042	Strongly Agree
Implementing the use of assistive technology in class improves students' performance in assessments.	3.51	.5039	Strongly Agree
Evaluation of learning outcomes and achievements in class and general performance has been boosted by the use of assistive technology.	3.40	.5907	Strongly Agree
Aggregate Mean	**3.46**		**Strongly Agree**

Legend: 3.25 - 4.00 Strongly Agree 2.50 - 3.24 Agree 1.75 - 2.49 Disagree 1.00 - 1.74 Strongly Disagree

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Critically, the overall mean score was 3.46, which endorses the teachers' perception that AT improves the learners' results. The highest individual scores correspond to statements about the increased student interest and individual approach to learning, which seems to show the educators' awareness of AT in improving their students' learning and experience for students with learning disabilities.

According to the analysis, the inclusion of AT in the educational process is a vital factor in the promotion of students' learning success. High consensus for the perceived value supports the notion that teachers are receptive to the use of AT, and it improves and enhances the way teachers teach their students. This underlines the need for continuing professional development and technical assistance to educators to enable them to use AT in a responsive manner. This not only increases the usage of AT, but students with disabilities are provided equal opportunities for learning, and their self-esteem is boosted.

The study by Baragash et al. (2019) emphasized the pleasant effect of AT including on skill improvement of students with disabilities and called to expand usage of the given technologies in special education. According to McNicholl & Desmond (2020), catering to AT needs results in conducive changes in academic self-efficacy, well-being, and engagement among students. Further, Şahin et al. (2024) enriched TAM with motivational constructs, proving that the perceived usefulness of the AT affected the intention of the teaching practices related to those technologies for the teachers. Altogether, those researches emphasize the importance of implementation of the AT for the improvement of students' achievements in the course of their education.

5.1.6 Attitude Towards the Use of Assistive Technology Vs Learning Outcome

Using the data gathered on the teacher's attitudes toward the use of AT and on the learning outcomes of the students with special needs, the study used Pearson correlation to establish whether the aforementioned variables are correlated and whether their relationship is significant.

Table 6.
Relationship between Attitude towards the use of assistive technology vs learning outcome

	r	Meaning	*p-value*	Decision	Remarks
Attitude Toward the Use of AT	.635	Positive	.000	Reject	Significant

Table 6 above focuses on the relationship between teachers' perceptions of the usage of Assistive Technology (AT) and the students' performance. On tests of significance, the

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coefficients r=.635 and p=.000 mean that there is a significant positive relationship between attitudes towards AT and performance.

The study has important practical and policy implications for educational practice. Finding a positive association between the teachers' attitudes toward AT and students' learning outcomes propounds the case for improving the support toward the AT environment to result in increased educational efficiency. This is why there is a need to encourage professional development with an emphasis on enhancing the knowledge of teachers in the use of AT. Further, the results support for provision of better and more effective AT resources and training because they are expected to lead to better performance of students especially students with disabilities.

Some of the earlier findings regarding the attitudes toward AT correlate with the current research findings concerning learning outcomes. Increasing positive attitudes of teachers towards AT are highly positively related to student engagement and achievement levels precisely on the role of educator perceptions in the process of integration of technology in the classroom, as Gajić (2023) discovered. Maurya and Singh (2021) also showed that the teacher's belief in AT means better learning outcomes among their students. In addition, according to Şahin et al. (2024), when any teacher assumes that AT is useful, the use of AT becomes more efficient hence increasing the students' performance. Taken together, these works support the important role of teacher attitudes in successful educational outcomes as found in significant measure with this study.

5.1.7 Use of AT Devices Vs Learning Outcomes

In addition to establishing a relationship between teacher attitudes and learning outcomes, the study also explored the relationship between the actual extent of AT usage and learning outcomes. Using Pearson correlation, the following data were obtained:

Table 7.
Relationship between Use of AT devices vs learning outcomes

	r	**Meaning**	***p-value***	**Decision**	**Remarks**
Usage of AT	.185	Positive	.168	Accept	Not Significant

The findings concerning the association between the use of AT devices and students' learning achievements are shown in Table 7. The obtained results show a positive relationship between the variables – the correlation coefficient r is equal to 0.185. The obtained p-values equal to 0.168 do not fulfill the requirement for statistical significance, and thus, the null hypothesis was accepted. This finding indicates that the extent of the AT device use has no significant relationship with academic achievement.

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The interpretation of these findings leads to the conclusion that the frequency and extent of AT usage implemented in special education programs for teachers does not have a direct correlation with students learning achievement of students with exceptionality. Interestingly, it was negative, albeit insignificant and thus, cannot be regarded as a pointer towards student performance. This could mean that other aspects of the AT, likr the type of AT used the manner in which it is delivered, specific needs of students, could be even more significant in influencing students' learning outcomes than the use of the technology. Furthermore, the negation of the study's result are due to the difficulties of implementing AT into the classrooms meaningfully to benefit learning of all students.

Studies supporting this area of research offer insights into this issue. Baragash et al. (2019) stated that, for example AT like Augmented Reality can assist in skill acquisition yet there is low access of special education to such assets and the success of this solution depends on proper integration. Fteiha et al. (2024) also assert that limitations including; insufficient preparing and backing to the educators limit the usefulness of AT, which can account the reason why the use of individual AT alone did not ideally enhance student results in this current study. In addition, Maurya & Singh (2021) identified that teachers acknowledge the concept of AT but have observed that integration is not as simple as usage – this needs training and technique which is relevant depending on the children they teach. These results indicate that the mere availability or use of AT is not enough if there is no contextual and technical appropriateness to enhance the students' learning effectively.

5.2 Conclusion

This research sought to investigate factors relating to teachers' attitudes, the extent of use of AT, and the perceived effects on students in special education. First, the research found that the majority of the respondents are married and have specialized positions in teaching SPED students. Furthermore, the results indicate that the teachers have a positive disposition towards the use of AT, with an understanding of its possibility of improving students' performance and complementing teachers' delivery. However, an apparent discrepancy was found between teachers' positive attitudes toward AT and actual practice, where the use of AT was rated low. This disparity points to a key issue: Although teachers recognize the utility of AT, it continues to be underutilized in classroom practice. To this end, continuous professional development, available information and resources, and the support of institutions to integrate AT into special education practices will be useful for children with exceptionalities

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Authors Contribution

The authors designed the study framework and developed methodology and data collection. The manuscript was drafted by them, and they jointly analyzed and interpreted the data, establishing clarity and coherence as they went.

Conflict of Interest

No conflict of interest related to this study is declared by the authors. There are no financial or personal relations between the researcher and the researched institution related to the research that could influence results, and they are based on objective data analysis.

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