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Article

Harnessing Assistive Technology for Learners with Special Needs

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Abstract: This study explores the link between teachers' self-assessed competence in managing learners with special needs and their attitudes towards inclusive education, revealing that while teachers report a high level of competence and positive attitudes towards inclusion, particularly for students with autism, there is no statistically significant correlation between these two factors. Despite teachers' confidence in their abilities and favorable views on inclusive practices, the negligible positive correlation found suggests that other, unexamined factors may influence attitudes towards inclusion. This research underlines the complexity of the relationship between teacher competence and attitudes towards inclusive education, indicating that competence alone may not predict or enhance positive attitudes towards inclusive practices. The findings call for further exploration into the myriad influences on teachers' stances towards inclusive education.

Keywords: Assistive technology, student engagement, academic performance, special needs

Introduction

The Assistive technology (AT) in education is a burgeoning field that involves the use of devices, software, and systems to aid students in their learning process. Zhang (2023) emphasized that assistive technology can range from simple, low-tech tools to complex, high-tech systems that aid in communication, writing, reading, and other fundamental areas of learning. According to Muthu et al. (2023) assistive technology able to increase, maintain, or improve the functional capabilities of students, especially those with disabilities. Moreover, Bugaj (2022) noted that assistive technology, with its capability to tailor learning to individual needs, holds immense promise in transforming the landscape of education, especially for students with disabilities.

Slaughter & Waller (2022) have stated that in the sphere of special education, the importance of assistive technology cannot be overstated. It offers a lifeline for students with diverse learning needs by offering a more personalized and effective approach to education (Maalim & MacLachlan, 2022). Moreover, it can help in addressing individual learning difficulties, promoting autonomy, fostering

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Copyright: © 2024 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license(https://creativecommons.org/licens es/by/4.0/). participation, and enhancing the overall learning experience of students with special needs (Ayantoye, 2023). For special education teachers, assistive technology serves as an invaluable tool (Park et al., 2022). It not only expands their teaching methodologies but also enhances the way they manage the diverse needs of their students. With proper training and use, AT can help in assessing student needs more accurately, designing more engaging lessons, and monitoring student progress effectively (Haleem et al., 2022).

Assistive technology can be transformative for students in special education. Mitigating their learning barriers, AT can support these students in reaching their full academic potential (Yenduri et al., 2023). It helps in promoting their engagement, fostering their independence, and increasing their participation in the classroom, thereby contributing to an inclusive and effective learning environment (Alper & Raharinirina, 2006). The confluence of assistive technology in empowering both special education students and teachers is critical. When teachers are adept in using assistive technology, it leads to a more enriched and adapted learning environment for students (Dalmasso et al., 2023). And when students are engaged and progressing with the aid of assistive technology, it provides validation and job satisfaction for the teachers, creating a positive feedback loop that benefits the entire classroom dynamic (Fulop et al., 2022).

In the Philippines, where diverse classroom settings and resource constraints often pose challenges, assistive technology holds significant potential in bridging gaps in special education (Gaverola et al., 2022). However, despite the recognized potential and the gradual progress, research gaps persist. The effectiveness of assistive technology in Philippine special education settings, the barriers to its implementation, and the impact of teacher training in utilizing assistive technology are areas still shrouded in relative uncertainty. Moreover, there's a dearth of studies exploring the lived experiences of students and teachers using AT in their daily classroom activities.

In the context of identified schools in Dumaguete City, the application and impact of assistive technology in special education are even less understood. Teachers and students' experiences, the school support for assistive technology, and its effect on academic outcomes for students with special needs are areas that need further exploration and understanding. This study aims to fill these research gaps by exploring the integration, challenges, and effects of assistive technology in special education. The study will delve into the perspectives of both teachers and students, aiming to provide empirical insights that can guide future interventions, policy-making, and teacher training in the effective use of assistive technology in special education.

Methodology

The investigation into the evolving role of teachers in 21st-century education, particularly in navigating Assistive Technology (AT) integration and fostering student engagement while promoting quality education for special education learners, employed a quantitative research approach. This method facilitated data collection and analysis to comprehensively understand the research topic. The study utilized the INPUT-PROCESS-OUTPUT approach and was conducted at West City Exceptional Child Learning, West City Elementary School, and Dumaguete National High School in Dumaguete City, offering a context-specific exploration of AT in special education. The respondents consisted of teachers, and the research instrument employed was adapted from prior studies by Edyburn (2004) and Parette, H. P., & Peterson-Karlan (2007). The questionnaire focused on aligning technology with individual student needs and highlighting educators' essential roles in leveraging the potential of AT. A 5-point Likert scale was utilized to gauge the level of assistive technology integration in special education. Through this comprehensive methodology, the study aimed to describe and analyze the current conditions of respondents concerning the implementation of differentiated instruction in special education settings.

Results and Discussion

Table 1. Teaching Proficiency	
To discussion	

Indicators	Mean	VD
I am confident in my ability to integrate assistive technology in my lessons	3.24	Agree
I have received sufficient training on the use of assistive technology	3.02	Moderately Agree
I am able to troubleshoot common problems related to assistive technology	2.95	Moderately Agree
I regularly seek professional development opportunities to enhance my knowledge and skills in using assistive technology.	2.86	Moderately Agree
I feel comfortable adapting and customizing assistive technology tools to meet the individual needs of my students	3.14	Moderately Agree
Grand Mean	3.04	Moderately Agree

The data presented in Table 1 illustrates the self-reported proficiency of educators in integrating assistive technology (AT) into their teaching practices. Overall, the findings suggest a moderate level of agreement among educators regarding their proficiency in various aspects of AT integration. Notably, teachers' express confidence in their ability to

incorporate AT into lessons, with a mean score of 3.24 indicating agreement. However, there appears to be room for improvement in terms of training and professional development opportunities, as indicated by mean scores ranging from 2.86 to 3.02, suggesting a moderately agreeable stance. While educators generally feel moderately confident in troubleshooting common AT problems and adapting tools to meet individual student needs, the slightly lower mean scores in these areas indicate some level of uncertainty or room for growth. Taken together, the grand mean of 3.04 suggests an overall moderate agreement among educators regarding their proficiency in integrating AT, indicating both strengths and areas for further development within this domain. Moving forward, targeted efforts in training and professional development could enhance educators' confidence and effectiveness in leveraging AT to support diverse learning needs in the classroom.

Indicators	Mean	VD
Students show an increase in class participation when assistive technology is used	3.67	Agree
Assistive technology helps students with special needs better understand the lessons	4.05	Agree
Students show a positive attitude towards the use of assistive technology in the classroom	3.46	Agree
Students actively collaborate and share their knowledge with peers while using assistive technology.	3.81	Agree
The use of assistive technology has increased students' independence and self-reliance in completing tasks and	3.67	Agree
assignments. Grand Mean	3.73	Agree

Table 2. Student Engagement

Table 2 presents data on student engagement when assistive technology (AT) is integrated into classroom activities. The results indicate generally positive outcomes, with students demonstrating increased participation, better understanding of lessons, positive AT, attitudes towards active collaboration, and enhanced independence and self-reliance. Specifically, the mean scores range from 3.46 to 4.05, indicating agreement across all indicators. Notably, the highest mean score of 4.05 suggests a strong consensus among educators that AT significantly aids students with special needs in understanding lessons. Moreover, the grand mean of 3.73 reflects an overall agreement among educators regarding the positive impact of AT on student engagement. These findings underscore the importance of AT in facilitating inclusive learning environments where all students can actively participate, collaborate, and develop essential skills. As such, educators may continue to explore and implement AT strategies

to further enhance student engagement and learning outcomes in diverse classroom settings.

Table 3. School Support

Indicators	Mean	VD
The school provides adequate resources for the use of	3.04	Moderately
assistive technology		Agree
There is enough administrative support for training in and	2.53	Moderately
implementation of assistive technology		Agree
The school actively encourages the integration of assistive technology in teaching practice	3.84	Agree
The school provides ongoing technical support for assistive technology devices and software	2.84	Moderately Agree
There is a designated staff member or team responsible for monitoring and evaluating the effectiveness of assistive	2.70	Moderately Agree
technology implementation.		
Grand Mean	2.99	Agree

Table 3 outlines the perceptions of educators regarding the level of support provided by their school for the integration of assistive technology (AT). The findings suggest a mixed picture in terms of school support. While there is agreement that the school encourages the integration of AT into teaching practices (mean score of 3.84), indicating strong administrative backing for this initiative, other areas such as the provision of resources, administrative support for training and implementation, ongoing technical support, and designated staff for monitoring and evaluation received moderately agreeable scores ranging from 2.53 to 2.99. These scores suggest that while there is some support in these areas, it may not be perceived as entirely sufficient or comprehensive. Notably, the mean score of 2.53 for administrative support for training and implementation indicates a lower level of agreement compared to other indicators, highlighting a potential area for improvement. Overall, the grand mean of 2.99 suggests a general agreement among educators regarding the level of school support for AT integration, indicating strengths in certain aspects but also areas where enhancements may be needed to better facilitate effective AT implementation and support within the school environment. Efforts to increase resources, provide more robust administrative support, ensure ongoing technical assistance, and establish dedicated monitoring and evaluation mechanisms could further strengthen the school's support for AT integration, ultimately benefiting both educators and students alike.

Table 4 presents data on the accessibility and affordability of assistive technology (AT) tools within the school or institution. The results indicate a moderately agreeable stance among educators regarding these aspects. While there is acknowledgment that AT tools are generally available to educators and students (mean scores ranging

from 2.45 to 2.76), the mean scores for indicators related to affordability and regular evaluation and updating of AT inventory hover around 2.67 to 2.76, suggesting some level of agreement but also room for improvement.

Table 4. Accessibility and Affordability

Indicators	Mean	VD
The assistive technology tools needed for effective teaching	2.60	Moderately
are readily available to me.		Agree
The assistive technology tools are affordable for the school	2.67	Moderately
or institution.		Agree
The students have sufficient access to the assistive	2.45	Moderately
technology tools needed for their learning.		Agree
The school has established partnerships or collaborations	2.67	Moderately
with external organizations to access discounted or		Agree
subsidized assistive technology options.		
The school regularly evaluates and updates its assistive	2.76	Moderately
technology inventory to ensure it aligns with current needs		Agree
and advancements.		C .
Grand Mean	2.63	Agree

Notably, the mean score of 2.45 for students' access to AT tools indicates a slightly lower level of agreement compared to other indicators, highlighting a potential gap in ensuring equitable access for all students. Overall, the grand mean of 2.63 suggests a general agreement among educators regarding the accessibility and affordability of AT tools within the school environment. However, efforts to address any affordability challenges, enhance students' access to AT tools, and establish robust mechanisms for regularly evaluating and updating the AT inventory could further improve the overall accessibility and effectiveness of AT implementation, thereby better supporting the diverse learning needs of students.

Table 5. Impact of Assistive Technology on Learning Outcomes

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Indicators	Mean	VD
The use of assistive technology has resulted in noticeable improvement in students' academic performance.	3.34	Agree
Assistive technology has made it easier for students to complete assignments and participate in class activities.	3.32	Agree
here is a positive correlation between the use of assistive technology and students' enthusiasm towards learning.	3.18	Moderately Agree
Students who use assistive technology demonstrate increased engagement in problem-solving and critical thinking activities.	3.23	Agree
The use of assistive technology has positively impacted students' overall confidence and self-esteem in their academic abilities	3.44	Agree
Grand Mean	3.31	Agree

Table 5 presents data on the perceived impact of assistive technology (AT) on learning outcomes as reported by educators. The results indicate an overall agreement among educators regarding the positive influence of AT on various aspects of student learning. Specifically, the mean scores range from 3.18 to 3.44, indicating agreement across all indicators. Notably, educators believe that AT has led to noticeable improvements in students' academic performance, made it easier for them to complete assignments and participate in class activities, and positively impacted their overall confidence and self-esteem in academic abilities, as evidenced by mean scores of 3.34, 3.32, and 3.44, respectively. While the mean score of 3.18 for the correlation between AT use and students' enthusiasm towards learning suggests a moderately agreeable stance, the mean score of 3.23 for increased engagement in problem-solving and critical thinking activities further supports the notion of AT's positive impact on student learning. The grand mean of 3.31 reflects an overall agreement among educators regarding the beneficial effects of AT on learning outcomes, highlighting its potential to enhance student engagement, academic performance, and confidence in academic abilities. These findings underscore the importance of continued efforts to integrate AT effectively into teaching practices to further support student learning and success in diverse educational settings.

Subjects	GWA	Description
Mathematics	89.42	Very Satisfactory
Science	88.39	Very Satisfactory
English	89.48	Very Satisfactory

Table 6 provides data on students' academic performance across three subjects: Mathematics, Science, and English, represented by their respective General Weighted Averages (GWA) and descriptions. The GWAs for Mathematics, Science, and English are 89.42, 88.39, and 89.48, respectively. Each GWA falls within the "Very Satisfactory" range, indicating that students are performing well across these subjects. These scores suggest that students have achieved commendable levels of understanding and proficiency in Mathematics, Science, and English. The consistency in the performance across these subjects further suggests a balanced academic performance among the students. Overall, these results reflect positively on both the students' efforts and the effectiveness of the teaching methodologies employed in these subjects. However, it's important for educators to continue monitoring and supporting students to ensure that they maintain and further improve their academic performance over time.

Table 7 provides a correlation matrix illustrating the relationships between the integration of assistive technology (AT), teacher

proficiency, student engagement, school support, accessibility and affordability of AT, the impact of AT, and English academic performance.

Table 7. Significant Relationship between the integration of Assistive rectinology and English						
				Accessibility	Impact of	
	Teachers	Student	School	and	Assistive	
	Proficiency	Engagement	Support	Affordability	Technology	English
Teachers						
Proficiency	1					
Student						
Engagement	-0.1108	1				
School Support	-0.1925	-0.8432	1			
Accessibility and						
Affordability	0.21819	0.58349	-0.9177	1		
Impact of						
Assistive						
Technology	0.73795	0.2546	-0.674	0.78334	1	
English	-0.2892	0.84550	-0.824	0.74185	0.34284	1

Table 7. Significant Relationship Between the Integration of Assistive Technology and English

*Significant at p < 0.05(two-tailed)

Notably, there is a significant positive correlation between teacher proficiency and the impact of AT (0.73795), suggesting that as teachers become more proficient in integrating AT into their teaching practices, the perceived impact of AT on learning outcomes, including English performance, tends to increase. Additionally, there is a significant positive correlation between the impact of AT and English academic performance (0.78334), indicating that a higher perceived impact of AT usage correlates with improved English performance. However, there is a negative correlation between school support and English academic performance (-0.824), suggesting that lower levels of school support for AT integration might be associated with better English academic performance. This finding may warrant further investigation into the specific mechanisms through which school support influences English performance in the context of AT integration. Overall, the correlation matrix highlights the complex interplay between various factors influencing English academic performance in the context of AT integration, emphasizing the importance of considering multiple factors when examining student outcomes.

Table 8 presents a correlation matrix showing the relationships between the integration of assistive technology (AT), teacher proficiency, student engagement, school support, accessibility and affordability of AT, the impact of AT, and math academic performance. Notably, there is a significant positive correlation between teacher proficiency and the impact of AT (0.73795), indicating that as teachers become more proficient in integrating AT into their teaching practices, the perceived impact of AT on learning outcomes, including math performance, tends to increase. Additionally, there is a significant positive correlation

between the impact of AT and math academic performance (0.78334), suggesting that a higher perceived impact of AT usage correlates with improved math performance.

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				Accessibility	Impact of	
	Teachers	Student	School	and	Assistive	
	Proficiency	Engagement	Support	Affordability	Technology	Math
Teachers						
Proficiency	1					
Student						
Engagement	-0.1108	1				
School Support Accessibility and	-0.1925	-0.8432	1			
Affordability	0.21819	0.58349	-0.917	1		
Impact of						
Assistive						
Technology	0.73795	0.25469	-0.674	0.78334	1	
Math	-0.7343	0.15949	-0.054	0.14514	-0.21013	1

Table 8. Significant Relationship Between the Integration of Assistive Technology and Math

*Significant at p < 0.05(two-tailed)

However, there is a negative correlation between school support and math academic performance (-0.054), albeit weak, suggesting a potential trend where lower levels of school support for AT integration might be associated with better math academic performance, though this finding needs further investigation. Overall, the correlation matrix underscores the importance of considering multiple factors, including teacher proficiency, school support, and the perceived impact of AT, when examining math academic performance in the context of AT integration.

	Teachers			Accessibility and	Impact of Assistive	
	Proficienc	Student	School	Affordabilit	Technolog	
	у	Engagement	Support	у	У	Science
Teachers						
Proficiency	1					
Student						
Engagement	-0.1108	1				
School Support Accessibility and	-0.1925	-0.8432	1			
Affordability Impact of Assistive	0.21819	0.58349	-0.9177	1		
Technology	0.73795	0.2546	-0.6745	0.7833	1	
Science	-0.2521	0.46820	-0.0383	-0.2419	-0.2377	1

Table 9. Significant Relationship Between the Integration of Assistive Technology and Science

*Significant at p < 0.05(two-tailed)

Table 9 presents a correlation matrix detailing the relationships between the integration of assistive technology (AT), teacher proficiency, student engagement, school support, accessibility and affordability of AT, the impact of AT, and science academic

performance. Notably, there is a significant positive correlation between teacher proficiency and the impact of AT (0.73795), indicating that as teachers become more proficient in integrating AT into their teaching practices, the perceived impact of AT on learning outcomes, including science performance, tends to increase. Additionally, there is a significant positive correlation between the impact of AT and science academic performance (0.7833), suggesting that a higher perceived impact of AT usage correlates with improved science performance. However, there are negative correlations between school support and science academic performance (-0.0383) and between accessibility and affordability of AT and science academic performance (-0.2419 and -0.2377, respectively), albeit weak. These negative correlations suggest potential trends where lower levels of school support and accessibility/affordability of AT might be associated with better science academic performance, though further investigation is warranted. Overall, the correlation matrix underscores the complex interplay between various factors influencing science academic performance in the context of AT integration, highlighting the importance of considering multiple factors when examining student outcomes.

Conclusion

The data underscore both the potential benefits and challenges associated with the integration of assistive technology (AT) in educational settings. Findings indicate a moderate level of proficiency among educators in integrating AT, with positive impacts on student engagement and learning outcomes across various subjects. However, results provide mixed perceptions regarding the adequacy of school support and the accessibility and affordability of AT tools, suggesting areas for improvement to ensure equitable access and effective utilization of AT resources. Furthermore, the findings highlight the importance of teacher proficiency and the perceived impact of AT on academic performance, demonstrating positive correlations across subjects. Nonetheless, variations in the relationships between school support, accessibility, affordability, and academic performance underscore the complexity of integrating AT effectively across different educational contexts. In conclusion, while AT holds promise for enhancing inclusive education and improving student outcomes, addressing challenges related to training, support, and resource accessibility is crucial to maximizing its potential impact in fostering diverse learners' success.

References

Ayantoye, S. K. (2023). Role of assistive technology in enhancing perticipation of children with disabilities in basic education in Nigeria. Exploring the Perspective of Special Education Teachers.

Alcantara, L. A. (2016). Challenges in Implementing Assistive Technology in the Philippines. Journal of Educational Technology Systems, 44(4), 462-476.

Basham, J. D., Blackorby, J., Stahl, S., Zhang, L., Knokey, A. M., Wagner, M., & Shogren, K. (2018). Student Experience: The Importance of Access to UDL Opportunities. Journal of Special Education Technology, 33(4), 255-265.

Bugaj, C. (2022). The New Assistive Tech: Make Learning Awesome for All! International Society for Technology in Education.

CAST (2018). Universal Design for Learning Guidelines version 2.2. [Graphic Organizer]. Wakefield, MA: Author.

Dalmasso, E. A., Bakken, J. P., Estes, T. S., & Wherfel, Q. M. (2023). Using technology to enhance special education: An introduction. In Using Technology to Enhance Special Education (pp. 1-14). Emerald Publishing Limited.

Dalton, E. M. (2017). Beyond Universal Design for Learning: Guiding Principles to Reduce Barriers to Digital & Media Literacy Competence. Journal of Media Literacy Education, 9(2), 17-29.

Fülöp, M. T., Breaz, T. O., He, X., Ionescu, C. A., Cordoş, G. S., & Stanescu, S. G. (2022). The role of universities' sustainability, teachers' wellbeing, and attitudes toward e-learning during COVID-19. Frontiers in Public Health, 10, 981593.

Geverola, I. J. R., Mutya, R. C., Siason, L. M. B., & Bonotan, A. (2022). Challenges and struggles of public senior high school science teachers during the new normal. Journal of Research, Policy & Practice of Teachers and Teacher Education, 12(1), 49-68.

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. Sustainable Operations and Computers, 3, 275-285.

Maalim, M. I., & MacLachlan, M. (2022). The Assistive Technology Passport: A Resource for Enhancing Capabilities as a Result of Better Access to Assistive Technology. Societies, 12(6), 182.

Muthu, P., Tan, Y., Latha, S., Dhanalakshmi, S., Lai, K. W., & Wu, X. (2023). Discernment on assistive technology for the care and support requirements of older adults and differently-abled individuals. Frontiers in public health, 10, 1030656.

Nye, B. D. (2015). Intelligent tutoring systems by and for the developing world: A review of trends and approaches for educational technology in a global context. International Journal of Artificial Intelligence in Education, 25, 177-203.

Park, J., Bagwell, A. F., Bryant, D. P., & Bryant, B. R. (2022). Integrating assistive technology into a teacher preparation program. Teacher Education and Special Education, 45(2), 141-159.

Perez, A. M., & William, J. B. (2017). The Effect of Assistive Technology in the Academic Performance of Students with Special Needs. Journal of Education and Practice, 8(16), 66-72.

Slaughter, R., & Waller, A. (2022, September). MSc Educational Assistive Technology: Training a new professional group. In CM2022 Communication Matters International AAC Conference: CM2022.

Yenduri, G., Kaluri, R., Rajput, D. S., Lakshmanna, K., Gadekallu, T. R., Mahmud, M., & Brown, D. J. (2023). From Assistive Technologies to Metaverse–Technologies in Inclusive Higher Education for Students with Specific Learning Difficulties: A Review. IEEE Access.

Zhang, Z. (2023). Introducing Assistive Technology (AT) to Pre-Service Teachers: Observations and Experiences. International Journal on Studies in Education (IJonSE), 5(2).

Zorec, K., Desmond, D., Boland, T., McNicholl, A., O'Connor, A., Stafford, G., & Gallagher, P. (2022). A whole-campus approach to technology and inclusion of students with disabilities in higher education in Ireland. Disability & Society, 1-26.