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Perceived Impact of Assistive Technologies on Learning Outcome on Physical Disabilities in Secondary School Students in Gwer-West Local Government Area of Benue State.

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ABSTRACT

This study examined the perceived impact of assistive technologies on learning outcomes of students with physical disabilities among secondary schools within Gwer-West Local Government Area of Benue State. Guided by two research questions and five hypotheses, the study adopted a descriptive survey research design. The target population comprised 970 students across seven government grant-aided secondary schools in the study area, from which a sample of 200 students was drawn using appropriate sampling techniques. Data were collected using a researcher-developed instrument titled Assistive Technologies and Learning Outcomes of Physical Disabilities Questionnaire *(ATLOPDQ)*. Descriptive statistics (mean and standard deviation) were employed to address the research questions, while Chi-square statistics were used to test the hypotheses at the 0.05 level of significance. Findings indicated that assistive technologies such as text-to-speech systems and educational applications were perceived to significantly enhance the learning outcomes of students with physical disabilities. The study concluded that the integration of digital assistive technologies contributes positively to inclusive education in the area. It was recommended that school administrators should implement text-to-speech software across digital platforms and integrate relevant educational applications into the curriculum to promote accessibility and academic achievement among students with physical disabilities.

INTRODUCTION

In recent years, assistive technologies have become vital in enhancing education for students with physical disabilities, particularly in under-resourced regions like Gweru-West Local Government Area (Akoikpam, 2022). By integrating technology into classrooms, educators may develop innovative and adaptable learning methods that better support students with diverse needs (Zain, 2020). Digital tools not only facilitate greater participation for students facing physical challenges but also encourage education systems to incorporate information technology into their teaching strategies (Timotheou, 2022). The shift toward digital education is transforming traditional learning, emphasizing accessibility, engagement, and personalization rather than simply replacing conventional methods (Zou, 2025). Moving forward, fostering an inclusive digital education system requires early digital skills training and widespread access to technology and internet resources (Navas-Bonilla, 2025). Modern digital education may offers students dynamic resources such as videos, interactive modules, and online databases that enrich the learning experience beyond traditional textbooks (Itodo, 2023). Teachers who embrace these tools may create more inclusive and effective classrooms (Yadav, 2024).

Assistive technologies are tools, devices, and systems that help people with disabilities overcome everyday challenges. These technologies support independence, help people take part in daily activities, and improve their overall quality of life. Assistive technology includes a wide range of solutions from simple tools like special eating utensils and

communication boards to advanced devices such as electric wheelchairs, voice recognition software, and brain-computer systems (Okafor, 2023). These technologies are designed to meet different needs, such as helping people who have trouble moving, seeing, hearing, thinking, or speaking (Muthu, 2023). The main goal of assistive technology is to close the gap between what a person can do and what their environment expects them to do, making it possible for them to do things that might otherwise be hard or impossible (Yenduri, 2023). Assistive technology is not just about devices it also focuses on the person using it. It takes into account their specific needs, preferences, and goals, as well as where and how the technology will be used (Thakur & Han, 2021). In education, assistive technology is especially important. It helps students with disabilities access learning materials, take part in classroom activities, and show what they know (Papadopoulos, 2024). For example, students with dysgraphia a writing disorder can use assistive technology to help with writing tasks (Yenduri, 2023). Technology like text-to-speech and educational app improves learning for physically challenge and encourage such students to stay motivated (Chikopela, 2022).

Text-to-Speech (TTS) software converts written text into spoken words, empowering students with visual impairments, dyslexia, or reading difficulties (Oji, 2018). By enabling auditory processing of digital content, TTS enhances accessibility across learning platforms. For students with physical disabilities like cerebral palsy or muscular dystrophy, it reduces dependence on manual reading and writing, fostering greater engagement (Omale, 2020). It also aids learners with cognitive disabilities such as autism or ADHD by reinforcing comprehension through multi-sensory input (Felix, 2019). Chung (2021), found that TTS accommodation increased participants' reading speed (words per minute), with two of four students showing measurable gains in Lexile assessment scores. Similarly, Oklo (2020) highlighted TTS as a critical compensatory tool particularly at postsecondary levels improving fluency, content retention, and self-efficacy in independent learning. These findings emphasize the urgent need for targeted training and technological resources, especially in underserved regions like Gwer-West, where such tools can bridge educational gaps and create inclusive learning environments.

Educational apps are dynamic digital tools that transform learning through interactive content like quizzes, games, and multimedia (Omale, 2019). Designed to cater to diverse learning styles, these apps provide personalized feedback and accessibility features, making education more inclusive (Ogbeh, 2018). They serve as powerful supplements to classroom instruction, enabling self-directed learning and addressing educational disparities. For students with physical disabilities, apps break barriers by incorporating features like text-to-speech, adjustable fonts, and assistive touch, ensuring equitable access to learning materials (John, 2021). Similarly, for learners with cognitive disabilities, apps leverage adaptive games, multimedia, and tailored interfaces to enhance comprehension and retention. Jagostick (2020) found that platforms like Picaa significantly improved foundational skills language, math, environmental awareness, autonomy, and social abilities among students with special educational needs. These findings align with Aaron (2019), who posits the growing role of augmented reality (AR) technology in education, particularly in challenging subjects like Physical Education (PE). For students with learning difficulties, PE often poses unique hurdles, but AR-enhanced apps are proving instrumental in making such subjects more accessible and engaging.

Learning outcomes are the specific knowledge, skills, and attitudes that students are expected to show after completing a learning activity, such as a lesson, course, or program. They help measure how well students have learned and can apply what they were taught (Irianto, 2021). Clearly written learning outcomes are important because they help teachers plan what to teach, how to teach it, and how to assess student learning. A good learning outcome explains what a student will know or be able to do and should be easy to measure (Chatterjee & Corral, 2017). Learning outcomes also help students understand the purpose of the course and what is expected of them by the end (Orr., 2022). Educational goals, sometimes called terminal objectives, describe the general qualities and abilities students should have when they graduate. These goals are based on the values and priorities of the school (Muse 2024). Objectives break down these broad goals into specific, measurable outcomes that students are expected to achieve (Haruna 2023). However, creating learning outcomes can be open to interpretation, which may lead to differences in how they are used by different teachers or programs (Davis, 2003). Learning outcomes should focus on what students can observe and do. They usually include an action verb and describe a clear topic or skill (Tatum, 2019). Good learning outcomes can be used to create assignments or exam questions.

The action verbs used should match the level of teach required (Gibson, 2007). It is important that the learning outcomes, teaching methods, and assessments all work together to support the same learning goals (Chatterjee & Corral, 2017).

Physical disabilities include a wide range of conditions that affect a person's ability to move, control their body, or carry out everyday tasks. These disabilities can make it hard for individuals to take part in normal daily activities. They may be caused by genetic factors, birth defects, injuries, illnesses, or aging and each case can result in different kinds of physical challenges (Bhatt, 2022). People with physical disabilities may experience problems like weak muscles, poor coordination, limited movement, balance issues, or reduced senses. These difficulties can vary from mild to severe, such as complete paralysis (Robinson, 2022). As a result, physical disabilities can greatly affect a person's independence, ability to work, social life, and overall well-being (Mutele, 2024). However, disability is not only about the physical condition itself. Environmental factors, public attitudes, and the availability of support or assistive devices also play a big role in shaping the experience of living with a disability (Kochtitzky, 2021). It's important to remember that people with disabilities are not all the same they have different needs, preferences, and life experiences. This means that care and support should be personalized (Oliver, 2023). Physical disability is usually defined as a long-term problem that makes it hard to perform major daily activities (Wong, 2022). To fully understand physical disability, it's helpful to know the difference between impairment**,** disability**,** and handicap (Chhabra, 2016; Davis & Davis, 2020). Impairment is the actual physical problem, such as weak muscles or missing limbs (Babalola, 2020). Disability is the difficulty in doing certain tasks because of the impairment. Handicap refers to the social disadvantage caused by barriers in society like inaccessible buildings or negative attitudes that limit full participation in community life (Goering, 2015).

Statement of Problem

Many students transitioning to secondary education encounter significant challenges in adapting to the demanding academic environment, often leading to a gap between expected and actual performance. This discrepancy results in increased physical and cognitive disabilities, reduced motivation, and heightened anxiety, all of which negatively impact academic success (William 2019). Despite efforts to enhance study habits and time management skills, students frequently struggle with the fast-paced learning environment, which impedes their ability to reach their full academic potential. Consequently, it is crucial to investigate and develop effective strategies to support these students in overcoming these challenges and achieving a successful adjustment to secondary education (Ujah 2018).

Personal experience showed an increase in the cases of physical and cognitive disabilities among students in secondary school, especially in areas of learning difficulties and behavioral challenges. Parents, teachers, guidance counselors, school administrators, and the general public are all worried about this troubling trend. Parents blame teachers for not providing sufficient individualized support and resources. Teachers blame the government for inadequate funding and support services. Governments, in turn, blame parents for not being more proactive in seeking help and supporting their children's needs at home. It is on this ground that the researcher in investigating the perceived impact of text-to-speech and educational app on learning outcome of children with physical disabilities among secondary school students in Gwer-West Local Government.

Purpose of the Study

The purpose of this study is to investigate the percieved impact of text-to-speech and educational app on learning outcome on physical disabilities among secondary school students in Gwer-West Local Government Area.

1. determine the perceived impact of text-to-speech on learning outcome of physical disabilities of students in Gwer-West Local Government Area.

2. ascertain the perceived impact of educational apps on learning outcome of physical disabilities of students.

Research Questions

The following research questions are raised to guide this study:

1. What is the perceived impact of text-to-speech on learning outcome of physical disabilities of students in Gwer-West Local Government Area.

2. What is the perceived impact of educational apps on learning outcome of physical disabilities of students?

Hypotheses

The following null hypotheses are formulated to be tested at 0.05 level of significance.

1. There is no significant perceived impact of text-to-speech on learning outcome of physical disabilities of students in Gwer-West Local Government.

2. There is no significant perceived impact of educational apps on learning outcome of physical disabilities of students..

METHODOLOGY

This study adopted descriptive survey research design. The area of this study was Gwer-West Local Government area of Benue State. The population of the study was 970 students from the existing 7 Special Government Secondary Schools in Benue State. The sample consisted of 200 students from secondary school in Gwer-West Local Government Area of Benue State. Multi-stage sampling technique was used for the study, A researcher self-structured questionnaire titled: "Text-to-Speech, Educational App and Learning Outcome on Physical Disabilities Questionnaire (TSEALOPDQ)" The instrument has a 4-point rating scale with the response mode of Strongly Agree (SA) 4, Agree (A) 3, Disagree (D) 2 and Strongly Disagree (SD) . The structured questionnaire developed by the researcher was subjected to scrutiny by the research supervisor. The researcher was assisted by 2 research assistants to administer the questionnaire in schools. Descriptive statistics of mean scores and standard deviation was used to answer the research questions. Lower and upper boundaries 0.01 – 1.00 = SD, 1.01-2.00 = D 2.01 – 3.00 = A, 3.01 – 4.00 = SA, was used for decision making to answer the research questions. The Chi-Square was used to test hypotheses at 0.05 confidence level.

Research Question One: What is the perceived impact of text-to-speech on learning outcome of physical disabilities of students in Gwer-West Local Government Area of Benue State

Table 1: Mean and Standard Deviation of the Perceived Impact of Text-to-Speech on Learning Outcome of Physical Disabilities of Students in Gwer-West Local Government Area of Benue State

Item No	Item Description	SA	A	D	SD	$\bar{x}$	Std	Decision
1	Text-to-speech helps improve reading skills	95	99	4	0	3.32	0.47	SA
2	Text-to-speech enhances comprehension for learners with physical disabilities	76	84	38	0	3.19	0.73	SA
3	Text-to-speech promotes independence in learning for physically disabled students	77	91	27	3	3.22	0.73	SA

4	Text-to-speech reduces learning barriers caused by physical challenges	63	81	21	33	2.88	1.04	SA
5	Text-to-speech increases engagement in academic activities	123	65	6	4	3.55	0.66	SA
	Average Mean and Standard Deviation	**86.8**	**84**	**19.2**	**8.0**	**3.23**	**0.73**	SA

Lower and upper boundaries0.01 – 1.00 = SD, 1.01-2.00 = D 2.01 – 3.00 = A, 3.01 – 4.00 = SA, will be used for decision making to answer the research questions.

Table 1 shows that the mean score of the five items are 3.32, 3.19, 3.22, 2.88, and 3.55 with their corresponding standard deviation of 0.47, 0.73, 0.73, 1.04 and 0.66 indicating that the respondent strongly agreed that text-to-speech helps improved reading skills, enhances comprehension for learners with physical disabilities, promotes independence in learning for physically disabled students, reduces learning barriers caused by physical challenges and increases engagement in academic activities. The cluster mean of 3.23 and standard deviation of 0.73 shows that the responded strongly agreed that text-to-speech has perceived impact on learning outcome of physical disabilities students in Gwer-West Local Government

Research Question Two: Perceived Impact of educational app on learning outcome of physical disabilities of students in Gwer-West Local Government Area of Benue State

Table 2: Mean and Standard Deviation of the Perceived Impact of Educational App on Learning Outcome of Physical Disabilities of students in Gwer-West Local Government Area of Benue State

Item No	Item Description	SA	A	D	SD	$\bar{x}$	Std	Decision
11	Educational apps provide accessible content for learners with physical challenges	120	63	12	3	3.52	0.68	SA
12	Promote collaboration between physically disabled students and their peers	72	105	18	3	3.24	0.68	SA
13	Enable customized learning experiences	76	102	20	0	3.28	0.64	SA
14	Improve motivation and participation in class activities	118	55	21	4	3.45	0.76	SA
15	Offer adaptive tools for individual needs	63	82	35	19	2.95	0.93	SA
	Average Mean and Standard Deviation	**89.8**	**81.4**	**21.2**	**5.8**	**3.29**	**0.74**	SA

Lower and upper boundaries0.01 – 1.00 = SD, 1.01-2.00 = D 2.01 – 3.00 = A, 3.01 – 4.00 = SA, will be used for decision making to answer the research questions.

Table 2 presents the mean scores for the five items are 3.52, 3.24, 3.28, 3.45, and 2.95, with corresponding standard deviations of 0.68, 0.68, 0.64, 0.76, and 0.93. These results indicate that respondents strongly agreed that educational apps provide accessible content for learners with physical challenges, promote collaboration between physically disabled students and their peers, enable customized learning experiences, improve motivation and participation in class activities and offer adaptive tools for individual needs. The cluster mean of 3.29 and a standard deviation of 0.74 shows that the responded strongly agreed that educational app has perceived impact on learning outcome of physical disabilities students in Gwer-West Local Government

Hypothesis One: There is no significant perceived impact of text-to-speech on learning outcome of physical disabilities of students in Gwer-West Local Government Area of Benue State

Table 3: Chi-Square Test of the Perceived Impact of Text-to-Speech on Learning Outcome of Physical Disabilities of Students in Gwer-West Local Government Area of Benue State

Opinion	**Observed N**	**Expected N**	**Df**	**Level of Sign**	**Chi-Square Cal**	**P. Value**	**Decision**
Strongly Agree	86.8	49.5	3	0.05	638.87	0.00	Rejected
Agree	84	49.5					
Disagree	19.2	49.5					
Strongly Disagree	8.0	49.5					

Table 6 reveals chi-square (χ^2) =, at638.87Df **= 3**; **P = 0.00 < 0.05**. Since the probability value of **0.00** is less than the alpha level of **0.05**, this shows that the null hypothesis, which states that stext-to-speech on learning outcome has no significant impact on physical disabilities of students, is rejected. This implies that text-to-speech does have a significant perceived impact on physical disabilities of students

Hypothesis Two: There is no significant perceived impact of educational apps on learning outcome of physical disabilities of students in Gwer-West Local Government Area of Benue State

Table 4: Chi-Square Test of the perceived impact of educational apps on learning outcome of physical disabilities of students in Gwer-West Local Government Area of Benue State

Opinion	Observed N	Expected N	Df	Level of Sign	Chi-Square Cal	P. Value	Decision
Strongly Agree	89.8	49.5	3	0.0.5	540.09	0.00	Rejected
Agree	81.4	49.5					
Disagree	21.2	49.5					
Strongly Disagree	5.8	49.5					

Table 8 reveals chi-square (χ^2) =, at **540.09Df = 3**; **P = 0.00 < 0.05**. Since the probability value of **0.00** is less than the alpha level of **0.05**, this shows that the null hypothesis, which states that educational app has no significant impact on learning outcome of physical disabilities of students is rejected. This implies that educational app does have a significant percieved impact on learning outcome of physical disabilities of students

DISCUSSION OF FINDINGS

The results from hypothesis one showed that text-to-speech has perceived impact on learning outcome of physical disabilities of students in Gwer-West Local Government. This implies that text-to-speech help improved reading skills, enhanced comprehension for learners, and promotes independence in learning. This finding agrees with Chung (2021), who indicated an increased level of words read per min at the end of each accommodation condition. Comparison of pre- and posttest achievement on the Lexile assessment showed that two of the four participants increased their reading scores. This finding also agrees with Oklo (2020), who revealed that overall, TTS software is commonly used as a compensatory tool (mainly at the postsecondary level), has assisted in students improving reading speed, fluency, and content retention, resulted in increased student self-efficacy in reading abilities and independent learning, and that there is a significant need to allocate training and technological resources to support students.

The result from hypothesis two shows educational app has perceived impact on learning outcome of physical disabilities. This implies that educational apps provide accessible content for learners with physical challenges, promote collaboration between physically disabled students and their peers and improve motivation and participation in class activities. This finding agrees with Jagostick (2020), who revealed that learning platform *Picaa* is associated with positive effects in the development of learning skills for children who have special educational needs, observing that the basic skills (language, math, environmental awareness, autonomy and social) have been improved. This finding also agrees with Aaron (2019), who revealed that students with learning difficulties, which will find out the trends in the development of AR technology in the last few years in education, especially Physical Education (PE). The PE subject is often assessed as one of the subjects which are difficult for children with learning difficulties to follow.

CONCLUSION

The study investigated the perceived impact of text-to-speech and educational app on learning outcome on physical disabilities among secondary school students in Gwer-West Local Government Area of Benue State. The findings revealed that:

1. Text-to-speech had perceived impact on learning outcome of physical disabilities of students in Gwer-West Local Government Area of Benue State.

2. Educational apps had perceived impact on learning outcome of physical disabilities of students in Gwer-West Local Government Area of Benue State.

Recommendations

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