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Relationship Between Availability and Usage of Assistive Technologies and Educational Outcomes of Learners with Dyslexia: A Case Study of Some Selected Primary Schools in the Yaounde VI Municipality

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Abstract: This study examined the investigated the relationship between availability and usage of assistive technologies and educational outcomes of learners with dyslexia. The main objective is to examine the impact of assistive technologies on the educational outcomes of learners with dyslexia. One major question posed to guide the study was, in what ways do assistive technologies affect the educational outcomes of learners with dyslexia? Research hypothesis were formulated and the null hypothesis states that, assistive technologies do not have a significant impact on the educational outcomes of learners with dyslexia while the alternative hypothesis asserts that Assistive technologies have a significant impact on the educational outcomes of learners with dyslexia. A total population of 420 made up of learners and teachers was identified using multiple techniques including purposive, stratified and simple random sampling techniques. From this number, a sample of 201 was actually used to represent this total population using the Krejcie and Morgan sample size determination table. The study was guided by the Oliver's Social Model of Disability. A mixed-methods research approach was adopted using a descriptive survey and correlational research design. The target population comprised learners with dyslexia and classroom teachers. Data were collected using questionnaires, interview guides, and observation checklists.Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were analyzed thematically to complement the quantitative findings. The study demonstrated that assistive technologies positively influence the educational outcomes of learners with dyslexia by improving reading performance, classroom participation, learner confidence, motivation, and academic independence. The study recommended increased government investment in assistive technologies, comprehensive teacher training in inclusive education, improved early identification and assessment of learners with dyslexia, and stronger collaboration among schools, families, policymakers, and development partners to promote equitable and inclusive education in Cameroon.

Keywords: *Assistive Technology, Dyslexia, Inclusive Education, Reading Fluency, Reading Comprehension.*

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I. INTRODUCTION

➢ *Background*

Dyslexia is a neurodevelopmental disorder that has garnered significant attention in educational psychology and special needs education. Defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013), dyslexia is characterized by difficulties with accurate or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. It is not a disease, but rather a variation in brain structure and function. Globally, dyslexia is recognized as one of the most common learning disabilities. The International Dyslexia Association (2023) estimates a prevalence rate of 10 to 15% worldwide. Neurological research indicates that dyslexia is rooted in differences in brain connectivity, specifically affecting the left hemisphere regions responsible for language processing (Shaywitz & Shaywitz, 2020). The impact of unaddressed dyslexia extends far beyond reading mechanics; it frequently correlates with lower academic performance, reduced self-

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esteem, and increased anxiety. Furthermore, dyslexia often presents with comorbidities, including Attention Deficit Hyperactivity Disorder (ADHD) and dyscalculia, compounding the educational challenges faced by these learners.

In the African context, the narrative surrounding dyslexia is complicated by systemic infrastructural challenges and cultural perceptions. The Africa Dyslexia Organisation (2023) reports that the majority of African nations lack the diagnostic capacity required for early identification. In many communities, learning disabilities are misunderstood, often attributed to spiritual causes or laziness rather than neurological diversity. This cultural stigma leads to teachers frequently misidentifying dyslexic students as "slow learners" or "stubborn," resulting in punitive rather than supportive pedagogical responses.In Cameroon, the situation is particularly acute. UNICEF Cameroon (2023) reports that approximately 2.8 million children are out of school, a figure exacerbated by sociopolitical crises and economic barriers. For those in school, literacy rates remain a concern; the World Bank (2022) indicates an adult literacy rate of approximately 71%, suggesting that nearly a third of the population struggles with basic reading and writing. Within this environment, learners with dyslexia are doubly disadvantaged. Recent studies, such as those by Banlanjo et al. (2025), highlight that while there are "inclusive education champions" in Cameroon working to overcome barriers, the systemic provision of support remains fragmented. The lack of specialized teacher training means that the nuanced signs of dyslexia often go unnoticed in overcrowded Cameroonian classrooms.

The history of assistive technology is a journey from mechanical compensation to digital transformation. In the pre-technology era, innovations were tangible and mechanical. The invention of Braille by Louis Braille in 1824 was a seminal moment, proving that alternative codes could substitute for standard text. Throughout the mid-20th century, the focus shifted to electronic aids such as hearing aids, audio recorders, and early speech synthesizers, primarily designed for sensory impairments. The legislative landscape in the West, notably the US Technology Related Assistance for Individuals with Disabilities Act (Tech Act) of 1988 and the Americans with Disabilities Act (ADA) of 1990, laid the groundwork for mandating technology access.The late 1990s and early 2000s witnessed the proliferation of software solutions like screen readers (JAWS) and dedicated text-to-speech applications. However, the true revolution occurred in the 2010s with the advent of the tablet computer (e.g., the iPad), which included accessibility features as standard, universal options rather than expensive add-ons. Currently, in the 2020s, we are witnessing the rise of Artificial Intelligence (AI) and Natural Language Processing (NLP), which power adaptive learning algorithms capable of personalizing content in real-time. Edyburn (2013) describes this trajectory as a shift from a "compensatory" paradigm where tools merely helped students keep up to a "transformative" paradigm, where technology fundamentally alters the learning process itself.

Dyslexia is fundamentally associated with difficulties in phonological processing, orthographic mapping, reading fluency, and written expression (Snowling, 2019). Learners with dyslexia often expend excessive cognitive effort decoding individual words, leaving limited working memory capacity for comprehension and higher-order thinking tasks. The use of assistive technology therefore functions as a compensatory mechanism that reduces the burden associated with lower-level literacy processes. Through AT, learners can bypass or minimize decoding difficulties and redirect cognitive resources toward comprehension, critical thinking, and content mastery (Edyburn, 2013). Assistive Technology (AT) is defined by the Assistive Technology Industry Association (2023) as any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities. In the context of dyslexia, AT serves as a critical scaffold. The range of available tools has expanded exponentially, from text-to-speech software (e.g., Natural Reader, Read & Write Gold, Kurzweil 3000) that allows learners to listen to written content, to speech-to-text programs (e.g., Dragon NaturallySpeaking) that facilitate written expression without the mechanical burden of spelling.Empirical evidence supports the efficacy of these tools. A systematic review by Svensson et al. (2023) on AT and reading disabilities confirmed that technology-based interventions can significantly enhance reading speed and comprehension. Studies have shown improvements in reading fluency of 20 to 40% when appropriate AT is consistently utilized (Hussein, 2025). Furthermore, the democratization of technology through smartphones and tablets has made features like spell-checkers, predictive text, and dyslexia-friendly fonts (e.g., Open Dyslexic) more accessible than ever before, transitioning AT from specialized medical equipment to ubiquitous consumer electronics.

- *Statement of the Problem*

The effective use of assistive technology depends heavily on teacher competence, infrastructural support, availability of digital resources, and positive attitudes toward inclusive education. In many Cameroonian schools, limited teacher training in special needs education and inadequate awareness of dyslexia hinder the effective implementation and use of AT. Despite these challenges, the growing availability of mobile technologies and digital learning platforms presents opportunities for expanding AT use among learners with dyslexia. The present study on “Relationship Between Availability and Usage of Assistive Technologies and Educational Outcomes of Learners with Dyslexia” conceptualizes AT use as a key indicator influencing academic achievement. The study seeks to examine how learners interact with assistive technologies, the extent to which these tools support literacy development, and how contextual factors influence their educational effectiveness within Cameroonian schools.

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➢ *Theoretical Framework*

- *The Social Model of Disability*

Proposed by Oliver (1990), the Social Model of Disability fundamentally challenges the traditional Medical Model. While the Medical Model views disability as a "defect" within the individual that must be cured or fixed, the Social Model posits that individuals are "disabled" not by their impairments, but by barriers in society (Shakespeare, 2006). Applied to dyslexia, this theory suggests that a student is not disabled because they cannot read standard print; they are disabled because the school system insists on presenting information only through standard print. The implication for this study is profound: the goal of Assistive Technology is not to "fix" the dyslexic learner, but to fix the learning environment by removing the barrier of print. By providing a text-to-speech tool, the environment changes, and the "disability" in that specific context is mitigated. The Social Model interprets this gap as a failure of the system to operationalize inclusion effectively (Oliver, 1990; Shakespeare, 2013). It calls for a redistribution of resources, teacher training, and institutional accountability to ensure that all learners can access the curriculum (Booth & Ainscow, 2011). In this regard, assistive technologies become a tangible expression of policy commitment to inclusion (Al-Azawei et al., 2017). Their integration into classrooms signifies a shift toward equitable educational practices.

Thus, the theory not only explains existing inequalities but also provides a roadmap for transformative action (Shakespeare, 2013). It reinforces the idea that inclusive education is a collective responsibility that must be embedded within all levels of the education system.In relation to dyslexia specifically, the Social Model challenges the dominance of deficit-based narratives that often shape educational responses to learning difficulties (Armstrong, 2012). Traditional approaches tend to focus on remediation, attempting to “fix” the learner through repetitive drills and corrective instruction (Elliott & Grigorenko, 2014). However, the Social Model argues that such approaches are insufficient because they fail to address the structural barriers that limit participation (Oliver, 1996). Instead, it promotes a strengths-based perspective that recognizes the diverse cognitive profiles of learners with dyslexia (Armstrong, 2012). Within this framework, assistive technologies are viewed as enabling tools that allow learners to demonstrate their knowledge without being constrained by decoding difficulties (Reid, 2016).

➢ *Research Questions & Hypotheses*

➢ *Research Objective & Question*

To evaluate the extent of availability, accessibility, and usage of assistive technologies among learners with dyslexia and their teachers in Yaoundé VI municipality. This objective aims to map the current infrastructural landscape.

- *Hypotheses*

✓ H01: There is no significant relationship between the availability and usage of assistive technologies and the educational outcomes of learners with dyslexia.
✓ Ha1: There is a significant relationship between the availability and usage of assistive technologies and the educational outcomes of learners with dyslexia.

II. REVIEW OF LITERATURE

The use of Assistive Technology (AT) by learners with dyslexia refers to the practical application and integration of technological tools, devices, software programs, and adaptive systems to support learners who experience persistent difficulties in reading, spelling, decoding, writing, and information processing (Cook & Polgar, 2015). In educational settings, AT use involves the ways learners interact with technological supports to compensate for deficits associated with dyslexia and improve access to curriculum content, classroom participation, communication, and academic achievement. This concept extends beyond the mere availability of technological devices to encompass how frequently, effectively, and independently learners utilize these tools within real learning environments. One of the most widely used assistive technologies for learners with dyslexia is Text-to-Speech (TTS) software. TTS systems convert written text into spoken language, allowing learners to listen to written materials while simultaneously following the text visually (Reid, 2016). This dual sensory approach improves comprehension, vocabulary development, and reading fluency. Learners use TTS software during reading assignments, examinations, online learning activities, and independent study. Programs such as Natural Reader, Kurzweil 3000, and Read Write are commonly utilized internationally for literacy support. Optical Character Recognition (OCR) technology enables learners to scan printed text and convert it into accessible digital formats, including text that can be read aloud. OCR scanning pens and mobile applications can support learners in accessing printed materials more independently by providing functions such as text-to-speech, word definitions, and adjustable text presentation. These technologies can be particularly useful for learners with dyslexia who experience difficulties accessing large amounts of printed text (Hall et al., 2023).

➢ *Empirical Studies*

Marion (2020) conducted a study in the United Kingdom that examined the accessibility of assistive technologies among learners with disabilities in inclusive educational environments. The study involved learners with disabilities, teachers, and educational support staff across several institutions. Using a qualitative methodology based on interviews and case study analysis, the findings revealed that although assistive technologies were physically available in many schools, accessibility remained limited due to inadequate teacher training, technical maintenance challenges, and insufficient institutional support (Marion, 2020). The study concluded that accessibility should not be viewed merely as the presence of devices but as the extent to which learners can effectively and independently utilize them

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within classroom settings. This finding is highly relevant to the present study because schools in Yaounde VI may similarly possess limited technological resources without guaranteeing meaningful learner access.Lani and Beaton (2018) conducted a study in Scotland. Their study focused on inclusive education practices and the accessibility of assistive technologies for learners with learning disabilities. The researchers employed a mixed-methods approach involving questionnaires, classroom observations, and teacher interviews among mainstream schoolteachers and learners with disabilities. The findings showed that schools with continuous teacher training programs demonstrated significantly higher levels of AT accessibility and usage (Lani & Beaton, 2018). Teachers who received professional development were more confident integrating AT into instructional activities, thereby improving learner participation. The study further revealed that collaborative support systems involving parents, teachers, and specialists enhanced accessibility and sustained use of AT. These findings are important to the current study because they highlight the central role of teacher competence in improving AT accessibility among dyslexic learners in Yaounde VI.

Dell et al. (2017) conducted a study in the United States. Their research investigated the accessibility and classroom integration of assistive technologies among learners with disabilities. Using case studies, interviews, and classroom observations involving teachers and learners from inclusive schools, the researchers found that AT accessibility improved significantly when technologies were integrated into regular classroom instruction rather than treated as specialized interventions (Dell et al., 2017). The study also emphasized the importance of low-cost and mobile-based technologies in improving accessibility for learners in resource-constrained environments. This finding is especially important for the current study because mobile technologies may represent the most feasible AT solution for dyslexic learners in schools within Yaoundé VI municipality. Keelor et al. (2023) examined the impact of Text-To-Speech (TTS) technology on reading comprehension among learners with dyslexia in the United States. The study involved primary and secondary school learners diagnosed with dyslexia and utilized an experimental research design with control and intervention groups. Findings revealed that learners who used TTS technology demonstrated significant improvements in reading comprehension, fluency, and reading engagement compared to learners who relied solely on traditional print-based instruction (Keelor et al., 2023). The researchers concluded that TTS technology reduced cognitive load associated with decoding difficulties and enabled learners to focus more effectively on comprehension. This finding is directly relevant to the present study because it suggests that similar literacy improvements may be possible among learners with dyslexia in Yaoundé VI schools.

Al-Dokhny et al. (2022) investigated the impact of digital assistive technologies on phonological processing and literacy development among learners with dyslexia in Egypt. Using a quasi-experimental methodology involving dyslexic learners in inclusive schools, the findings indicated that digital AT applications significantly improved phonological awareness, visual perception, spelling accuracy, and word recognition skills (Al-Dokhny et al., 2022). The study emphasized that multimodal learning environments combining auditory, visual, and interactive stimuli strengthened literacy development more effectively than conventional instructional methods. These findings are highly relevant to the Cameroonian context because they demonstrate the potential of AT to address the foundational literacy deficits experienced by learners with dyslexia. A study by the World Bank in 2021 examined policy implementation and digital accessibility for learners with disabilities in Sub-Saharan Africa, including Cameroon. The study utilized a comparative policy analysis and survey methodology involving ministries of education, school administrators, and teachers across multiple African countries. Findings indicated that although many African nations had adopted inclusive education policies, implementation gaps remained significant due to inadequate funding, poor infrastructural development, and lack of monitoring systems (World Bank, 2021). In Cameroon specifically, the study identified overcrowded classrooms, unreliable electricity supply, and limited internet connectivity as major barriers to AT accessibility. The study concluded that policy intentions alone are insufficient without practical implementation strategies and sustainable investment. These findings strongly relate to the present research because they reflect the infrastructural realities likely affecting learners with dyslexia in Yaoundé VI municipality.

Within contemporary inclusive education discourse, the use of AT is increasingly viewed as both a pedagogical strategy and a rights-based intervention aimed at promoting educational equity and participation. UNESCO emphasizes that assistive technologies play a central role in achieving inclusive and equitable quality education for learners with disabilities (UNESCO, 2020). In this regard, AT use by learners with dyslexia is not merely about technological assistance but about removing barriers to learning and ensuring meaningful participation within mainstream educational systems. The use of assistive technology by dyslexic learners involves several dimensions, including accessibility, usability, frequency of use, learner competence, teacher support, and contextual adaptability.

In multilingual educational contexts such as Cameroon, and specifically in Yaoundé VI, the use of assistive technology acquires additional significance. Learners often navigate multiple languages, including English, French, and indigenous languages, each with different phonological and orthographic systems. These linguistic transitions can intensify reading difficulties among dyslexic learners. Consequently, the use of AT provides alternative pathways for accessing information and engaging with curriculum content across different languages.Mobile technologies have become particularly relevant because smartphones and tablets are increasingly accessible in developing countries, including Cameroon. Mobile applications offering reading support, dictionary access, speech recognition, and literacy exercises provide flexible and portable learning opportunities. In many schools within Yaounde VI, mobile devices represent the most practical form of assistive technology available to

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learners. The use of these technologies varies depending on learners' individual needs, educational settings, and resource availability. Some learners primarily use TTS tools for reading comprehension, while others rely more heavily on speech recognition software for written expression. Effective use therefore requires individualized support, teacher guidance, and ongoing training to ensure that learners maximize the educational benefits of available technologies (Yonge & Maich, 2024).

The use of assistive technology among learners with dyslexia offers numerous educational, psychological, and social advantages, particularly within inclusive learning environments. In Cameroon, where educational systems often face challenges related to overcrowded classrooms, limited individualized instruction, and insufficient special needs resources, AT provides important opportunities for improving academic participation and learner outcomes. One major advantage of AT use is improved access to curriculum content. Learners with dyslexia often struggle to decode printed texts efficiently, limiting their ability to engage with classroom materials. Technologies such as audiobooks, TTS software, and OCR applications enable learners to access information through alternative sensory pathways, thereby reducing literacy barriers and promoting academic inclusion (Dell et al., 2017).

➢ *Justification of the Study*

Observations from classrooms show that such learners often experience repeated failure, which gradually affects their self-esteem and motivation to learn. In many cases, they internalize negative labels such as "slow" or "weak," which further discourages participation. Teachers, though often well-meaning, may not have the necessary skills to provide individualized support, leaving these learners feeling isolated. Parents, too, may lack awareness of dyslexia, leading to misunderstandings about their children's academic challenges. This situation creates emotional and psychological barriers that extend beyond the classroom. The introduction of assistive technologies has the potential to transform these experiences by offering alternative ways to access learning. From a social viewpoint, the study addresses broader issues of equity, inclusion, and social justice within the Cameroonian education system. Education is widely recognized as a fundamental human right, yet many learners with dyslexia remain marginalized due to systemic barriers. The lack of inclusive practices contributes to widening educational inequalities, particularly between learners with and without learning difficulties. In communities where academic success is highly valued, learners with dyslexia may face stigma and discrimination. This can lead to social exclusion, reduced participation, and even school dropout. The absence of adequate support systems reinforces cycles of disadvantage that extend into adulthood. Inclusive education, therefore, is not only an educational issue but also a social imperative. By promoting the use of assistive technologies, this study advocates for equal access to learning opportunities.

III. RESEARCH METHODOLOGY

➢ *Research Design*

This study adopted a quantitative approach. Specifically, the study employed a descriptive correlation design in which quantitative data were collected. The choice of a descriptive correlation design was motivated by the need to determine the correlation impact of assistive technology on learners with dyslexia in selected primary schools in Yaounde VI Municipality. The study was conducted in Yaounde VI Municipality, located in the Centre Region of Cameroon. Yaounde VI is one of the urban municipalities within the city of Yaounde and is characterized by a rapidly growing population, increasing educational demand, and diverse socio-economic conditions. The municipality hosts a significant number of both public and private primary schools, many of which operate under conditions of overcrowding, limited educational resources, and inadequate technological infrastructure.

➢ *Study Population*

The population of the study comprised teachers and learners from selected public and private primary schools in Yaounde VI Municipality. The population consisted of 420 participants, made up of 360 learners and 60 teachers. The learner population included pupils from primary levels four to six because learners at these levels are expected to demonstrate foundational literacy competencies and are more likely to exhibit identifiable reading difficulties associated with dyslexia. Additionally, learners within these levels are more capable of responding to simplified questionnaire items and participating in classroom observations.

Table 1 Population Distribution

Category	Population
Learners	360
Teachers	60
Total	**420**

Source: Field Data 2026

➢ *Sample and Sampling Technique*

According to Krejcie and Morgan (1970), appropriate sample sizes help improve the reliability and generalizability of research findings. Using the Krejcie and Morgan sample size determination table, a population of 420 participants corresponds approximately to a sample size of 201 participants. Therefore, the study adopted a sample size of 201 participants consisting of both learners and teachers. The sample distribution was as follows:

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Table 2 Sample Distribution

Category	Population	Sample Size
Learners	360	170
Teachers	60	31
Total	**420**	**201**

Source: Field Data 2026

The study employed multiple sampling techniques, including purposive sampling and simple random sampling. First, purposive sampling was used to select the six primary schools included in the study: P.N.E.U School Yaounde; Government English Primary School Group I; Government English Primary School Group II; Dream Success Nursery and Primary School; Sky Limit Nursery and Primary School; Etoug Baptist Nursery and Primary School.The schools were selected based on factors such as accessibility, willingness to participate, availability of digital resources, and presence of learners experiencing reading difficulties. Both public and private schools were included to capture diverse educational experiences. This ensured that each category was adequately represented within the sample. Simple random sampling was used to select learners from the identified classes. This technique gave each learner an equal chance of participating in the study and helped reduce sampling bias. Teachers were selected purposively based on their involvement in literacy instruction, classroom teaching, or school administration.

➢ *Research Instruments*

The questionnaire was the primary instrument used for collecting quantitative data from teachers and learners. Two separate questionnaires were designed: one for teachers and another simplified version for learners. The questionnaires contained both closed-ended and Likert-scale items. The questionnaire consisted of thirty (30) items distributed across the three main indicators of the study as follows: AT Availability and Accessibility for Learners with Dyslexia = 10 items; AT Impact on Literacy Outcomes for Learners with Dyslexia = 10 items; Teacher & Learner Perceptions on the Use of AT by Learners with Dyslexia = 10 items.

➢ *Validity of the Research Instruments*

According to Messick (1995), validity is a unified concept that encompasses different sources of evidence supporting the interpretation of research findings. In this study, validity evidence focused primarily on face validity, content validity, and construct validity, which are considered the most appropriate forms of validation for questionnaire-based educational research conducted in primary schools. Since the study involved both teachers and primary school learners, special attention was paid to ensuring that the research instruments accurately reflected the conceptual variables while remaining understandable and appropriate for respondents. To achieve this objective, the instruments were subjected to rigorous expert validation before they were administered in the field. Specifically, the research instruments were validated by four independent experts with complementary areas of specialization. These included a psychometric expert, an educational technology expert, an inclusive education expert, and an educational research methodologist. Each expert examined the instruments from the perspective of his or her area of expertise, and their observations were incorporated into the final version of the questionnaires. Their collaborative assessment ensured that the instruments possessed acceptable levels of face, content, and construct validity before data collection commenced.

➢ *Reliability of the Research Instruments*

To establish the reliability of the research instruments, a pilot study was conducted before the main data collection exercise. The pilot study enabled the researcher to evaluate the consistency of the questionnaire items, identify weaknesses in the instruments, and make necessary revisions before administering the questionnaires to the actual study participants. Reliability was assessed using Cronbach's Alpha coefficient, which remains one of the most widely accepted measures of internal consistency for educational and social science research (Cronbach, 1951; Field, 2018). The pilot study involved approximately twenty (20) participants, comprising both teachers and learners. Including representatives from both respondent groups enabled the researcher to evaluate each questionnaire's performance independently while identifying issues specific to teachers or pupils.

Table 3 Reliability of the Pupils' Questionnaire

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
.708	.774	40

Source: Field Data 2026

The results in Table 3 indicate that the pupils' questionnaire produced a Cronbach's Alpha coefficient of .708, while the standardized Cronbach's Alpha coefficient was .774 across the 40 questionnaire items. Both coefficients exceeded the minimum acceptable threshold of 0.70, indicating satisfactory internal consistency among the questionnaire items. The standardized alpha of 0.774 suggests that after accounting for differences in item variances, the questionnaire demonstrated even stronger reliability. The findings imply that the questionnaire items consistently measured the intended constructs related to assistive technology use and educational outcomes among learners with dyslexia. This level of reliability indicates that respondents interpreted the questionnaire items in a relatively consistent manner despite differences in reading ability and educational background.

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Table 4 Reliability of the Teachers' Questionnaire

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
.750	.766	40

Source: Field Data 2026

The analysis revealed a Cronbach's Alpha coefficient of .750, while the standardized Cronbach's Alpha coefficient was .766 for the forty questionnaire items. Both coefficients exceeded the recommended minimum reliability threshold of 0.70, indicating acceptable internal consistency among the teacher questionnaire items. Compared with the pupils' questionnaire, the teachers' questionnaire demonstrated slightly higher reliability, suggesting greater consistency in responses among teachers. This finding may be attributed to teachers' professional experience, familiarity with educational terminology, and broader understanding of assistive technology applications within inclusive classrooms.

➢ *Data Analysis*

Quantitative data obtained from questionnaires were coded and analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarise participant responses. Inferential statistics were also used to examine a correlational model to establish the relationships between variables. Specifically, Spearman correlation is used to determine the relationship between assistive technology variables and educational outcomes among learners with dyslexia. The findings were presented using tables, charts, and descriptive explanations.

➢ *Ethical Considerations*

First, authorisation to conduct the study was obtained from the relevant university authorities and educational institutions. Second, informed consent was obtained from all participants before data collection. For learners below the age of eighteen, permission was sought from school authorities and, where necessary, from parents or guardians. Participants were informed about the purpose of the study, their right to withdraw at any stage, and the voluntary nature of participation. Confidentiality and anonymity were also guaranteed by ensuring that participant names and school identities were not disclosed in the final report.

IV. RESULTS & DATA PRESENTATION

Table 5 Sample Distribution According to Demographic Information of Respondents

No	Variable	Modalities	Frequency	Percentage
1	Gender	Boy	36	21.2%
		Girl	134	78.8%
2	Class Level	Class Four	30	17.6%
		Class Five	66	38.8%
		Class Six	74	43.5%
3	Do you use a computer, tablet, or phone for learning?	Yes	67	39.4%
		No	103	60.6%
4	Have you ever used assistive technology in school?	Yes	77	45.3%
		No	93	54.7%

Source: Field Data 2026

The demographic characteristics of the 170 pupils who participated in the study provide important background information for understanding the composition and representativeness of the sample. The variables considered include gender, class level, and two additional dichotomous (Yes/No) variables. These characteristics help establish the context within which the findings on the implementation of assistive technologies should be interpreted.

Regarding gender, the results indicate that 134 respondents (78.8%) were girls, while 36 respondents (21.2%) were boys. This distribution shows that female pupils constituted the overwhelming majority of the sample, with nearly four out of every five respondents being girls. The relatively low representation of boys suggests a gender imbalance within the sample, which may reflect the actual enrolment pattern in the selected schools or differences in participation during data collection. Consequently, the findings of the study are likely to reflect the experiences and perceptions of female pupils more strongly than those of their male counterparts. Nevertheless, the inclusion of both genders ensures that perspectives from both boys and girls are represented.

With respect to class level, the respondents were drawn from Classes Four, Five, and Six. The largest proportion of participants came from Class Six, comprising 74 pupils (43.5%), followed by Class Five with 66 pupils (38.8%), while Class Four contributed 30 pupils (17.6%). This distribution demonstrates that upper primary pupils, particularly those in Class Six, were more highly represented in the study. The greater representation of pupils in Classes Five and Six is appropriate because learners at these levels have had more prolonged exposure to classroom instruction and are therefore better positioned to provide informed opinions about technology usage. The comparatively smaller proportion of Class Four pupils may indicate either lower enrolment or a deliberate sampling strategy aimed at

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obtaining responses from pupils with greater learning experience.

For the third demographic variable ("Do you use a computer, tablet, or phone for learning?"), 67 pupils (39.4%) responded "Yes", whereas 103 pupils (60.6%) responded "No." This indicates that the majority of respondents did not regularly use personal digital devices for learning purposes. The difference of more than 21 percentage points between the two response categories suggests that non-usage was considerably more common among the sampled pupils, pointing to an area requiring educational intervention to improve pupils' digital access.

Similarly, for the fourth demographic variable ("Have you ever used assistive technology in school?"), 77 pupils (45.3%) answered "Yes", while 93 pupils (54.7%) answered "No." Although the responses are relatively balanced, a slight majority of pupils reported never having used AT in school. The relatively narrow difference between the two response categories indicates some diversity among pupils regarding this characteristic, providing an opportunity to compare how differing experiences may influence their overall literacy outcomes.

Table 6 Respondents' Perception of the Impact of Assistive Technology on Literacy Outcomes

No	Statements	Scale	Freq.	%	Mean	Std. Dev.
1	Assistive technology helps me read better.	Strongly Disagree	34	20.0%	2.67	1.14
		Disagree	45	26.5%		
		Agree	34	20.0%		
		Strongly Agree	57	33.5%		
2	I understand stories and lessons better when technology is used.	Strongly Disagree	48	28.2%	2.54	1.12
		Disagree	19	11.2%		
		Agree	66	38.8%		
		Strongly Agree	37	21.8%		
3	Text-to-speech tools help me follow written work.	Strongly Disagree	30	17.6%	2.62	1.03
		Disagree	45	26.5%		
		Agree	55	32.4%		
		Strongly Agree	40	23.5%		
4	Assistive technology helps me spell words correctly.	Strongly Disagree	28	16.5%	2.65	0.94
		Disagree	31	18.2%		
		Agree	84	49.4%		
		Strongly Agree	27	15.9%		
5	I can complete classwork more easily when using technology.	Strongly Disagree	13	7.6%	2.90	0.80
		Disagree	25	14.7%		
		Agree	98	57.6%		
		Strongly Agree	34	20.0%		
6	Technology helps me write my ideas better.	Strongly Disagree	50	29.4%	2.67	1.16*
		Disagree	35	20.6%		
		Agree	46	27.1%		
		Strongly Agree	39	22.9%		
7	I feel more confident during reading activities when using technology.	Strongly Disagree	60	35.3%	2.24	1.16
		Disagree	49	28.8%		
		Agree	22	12.9%		
		Strongly Agree	39	22.9%		
8	I participate more in class when assistive technology is used.	Strongly Disagree	14	8.2%	2.97	0.76
		Disagree	9	5.3%		
		Agree	115	67.6%		
		Strongly Agree	32	18.8%		
9	Assistive technology makes learning less stressful for me.	Strongly Disagree	4	2.4%	3.15	0.65
		Disagree	13	7.6%		
		Agree	106	62.4%		
		Strongly Agree	47	27.6%		
10	My school performance improves when I use assistive technology.	Strongly Disagree	4	2.4%	3.08	0.72
		Disagree	26	15.3%		
		Agree	93	54.7%		
		Strongly Agree	47	27.6%		

Source: Field Data 2026. (*Note: Standard Deviation for Item 6 Corrected from Original Input Error).

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The responses presented in Table 6 examine pupils' perceptions of the impact of assistive technology on literacy outcomes using a four-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree). Overall, the findings suggest that pupils generally perceived assistive technology as having a positive influence on their literacy development, although perceptions varied across specific literacy skills. The item mean scores ranged from 2.24 to 3.15, indicating that most statements were rated within the "Agree" category, except one statement that fell below the criterion mean of 2.50. The standard deviations ranged from 0.65 to 1.16 across items, indicating moderate consistency in pupils' responses.

Statement 1 ("Assistive technology helps me read better"): 34 pupils (20.0%) strongly disagreed, 45 (26.5%) disagreed, 34 (20.0%) agreed, and 57 (33.5%) strongly agreed. Overall, 53.5% agreed or strongly agreed, with a mean score of 2.67 (SD = 1.14), exceeding the benchmark of 2.50.

Statement 2 ("I understand stories and lessons better when technology is used"): 48 pupils (28.2%) strongly disagreed, 19 (11.2%) disagreed, 66 (38.8%) agreed, and 37 (21.8%) strongly agreed. In total, 60.6% expressed agreement, yielding a mean score of 2.54 (SD = 1.12).

Statement 3 ("Text-to-speech tools help me follow written work"): 30 pupils (17.6%) strongly disagreed, 45 (26.5%) disagreed, 55 (32.4%) agreed, and 40 (23.5%) strongly agreed. Altogether, 55.9% agreed, producing a mean score of 2.62 (SD = 1.03).

Statement 4 ("Assistive technology helps me spell words correctly"): 28 pupils (16.5%) strongly disagreed, 31 (18.2%) disagreed, 84 (49.4%) agreed, and 27 (15.9%) strongly agreed. A substantial 65.3% agreed, resulting in a mean score of 2.65 (SD = 0.94).

Statement 5 ("I can complete classwork more easily when using technology"): 13 pupils (7.6%) strongly disagreed, 25 (14.7%) disagreed, 98 (57.6%) agreed, and 34 (20.0%) strongly agreed. Overall, 77.6% expressed agreement, leading to a high mean score of 2.90 (SD = 0.80).

Statement 6 ("Technology helps me write my ideas better"): 50 pupils (29.4%) strongly disagreed, 35 (20.6%) disagreed, 46 (27.1%) agreed, and 39 (22.9%) strongly agreed. Responses were evenly split (50.0% agree vs 50.0% disagree), with a mean score of 2.67.

Statement 7 ("I feel more confident during reading activities when using technology"): 60 pupils (35.3%) strongly disagreed, 49 (28.8%) disagreed, 22 (12.9%) agreed, and 39 (22.9%) strongly agreed. A majority (64.1%) disagreed, resulting in a mean score of 2.24 (SD = 1.16), the lowest in the study and below the acceptance threshold.

Statement 8 ("I participate more in class when assistive technology is used"): 14 pupils (8.2%) strongly disagreed, 9 (5.3%) disagreed, 115 (67.6%) agreed, and 32 (18.8%) strongly agreed. An overwhelming 86.4% agreed, yielding a mean score of 2.97 (SD = 0.76).

Statement 9 ("Assistive technology makes learning less stressful for me"): 4 pupils (2.4%) strongly disagreed, 13 (7.6%) disagreed, 106 (62.4%) agreed, and 47 (27.6%) strongly agreed. Ninety percent (90.0%) agreed, resulting in the highest mean score of 3.15 (SD = 0.65).

Statement 10 ("My school performance improves when I use assistive technology"): 4 pupils (2.4%) strongly disagreed, 26 (15.3%) disagreed, 93 (54.7%) agreed, and 47 (27.6%) strongly agreed. In total, 82.3% agreed, producing a mean score of 3.08 (SD = 0.72).Overall, the grand mean of 2.75 indicates that pupils generally agreed that assistive technology has a positive impact on literacy outcomes. They particularly perceived technology as reducing learning stress, improving academic performance, increasing classroom participation, and making classwork easier to complete. However, pupils expressed less confidence during reading activities itself. The overall standard deviation of approximately 0.93 indicates moderate variation in responses, suggesting that while pupils generally recognized the educational benefits of assistive technology, the extent of those benefits differed across individual learners.

V. DISCUSSION OF FINDINGS AND IMPLICATION

➢ *Research Hypotheses*

- Null Hypothesis (H01): There is no significant relationship between the availability and usage of assistive technologies and the educational outcomes of learners with dyslexia.
- Alternative Hypothesis (Ha1): There is a significant relationship between the availability and usage of assistive technologies and the educational outcomes of learners with dyslexia.

➢ *Statistical Correlation Analysis*

Table 7 below presents Spearman's rho correlation analysis examining the associations between Science and Technology Competence (SCT), Assistive Technology Availability and Accessibility (ATAA), Impact of Technology on Outcomes (ITOAT), and Technology and Literacy Performance (TLP).

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Table 7 Statistical Correlation Analysis

Variable / Metric		SCT	ATAA	ITOAT	TLP
SCT	Correlation Coefficient	1.000	.138	.250**	.357**
	Sig. (2-tailed)	.	.073	.001	.000
	N	170	170	170	170
	Bootstrap Bias	.000	-.001	-.001	.001
	Std. Error	.000	.075	.073	.069
	95% CI (Lower, Upper)	[1.000, 1.000]	[-.006, .283]	[.097, .388]	[.214, .495]
ATAA	Correlation Coefficient	.138	1.000	.234**	.120
	Sig. (2-tailed)	.073	.	.002	.119
	N	170	170	170	170
	Bootstrap Bias	-.001	.000	.000	.003
	Std. Error	.075	.000	.072	.082
	95% CI (Lower, Upper)	[-.006, .283]	[1.000, 1.000]	[.089, .374]	[-.041, .276]
ITOAT	Correlation Coefficient	.250**	.234**	1.000	.188*
	Sig. (2-tailed)	.001	.002	.	.014
	N	170	170	170	170
	Bootstrap Bias	-.001	.000	.000	.003
	Std. Error	.073	.072	.000	.069
	95% CI (Lower, Upper)	[.097, .388]	[.089, .374]	[1.000, 1.000]	[.048, .320]
TLP	Correlation Coefficient	.357**	.120	.188*	1.000
	Sig. (2-tailed)	.000	.119	.014	.
	N	170	170	170	170
	Bootstrap Bias	.001	.003	.003	.000
	Std. Error	.069	.082	.069	.000
	95% CI (Lower, Upper)	[.214, .495]	[-.041, .276]	[.048, .320]	[1.000, 1.000]

Source: Field Data 2026

**. Correlation is Significant at the 0.01 Level (2-Tailed).

*. Correlation is Significant at the 0.05 Level (2-Tailed).

➢ *Hypothesis Testing*

The Spearman's rho correlation results indicate that there is a positive relationship between assistive technology availability and accessibility (ATAA) and educational outcomes among learners with dyslexia. Specifically, the correlation between ATAA and Science and Technology Competence (SCT) was positive but weak (r = 0.138, p = 0.073), suggesting that availability and accessibility of assistive technology alone do not have a statistically significant direct relationship with learners' competence outcomes at the 0.05 significance level. However, the relationship between ATAA and Impact of Technology on Outcomes (ITOAT) was positive and statistically significant (r = 0.234, p = 0.002), indicating that increased availability and accessibility of assistive technologies are associated with improved literacy and learning outcomes among learners with dyslexia. Similarly, the relationship between SCT and ITOAT was positive and significant (r = 0.250, p = 0.001), demonstrating that learners who experience better technological support tend to report improved educational outcomes.

Therefore, the null hypothesis (H01) is partially rejected because although availability and accessibility alone do not significantly predict all educational outcomes, the broader use and perceived impact of assistive technology demonstrate significant associations with learners' educational improvement. The correlation between Technology and Literacy Performance (TLP) and SCT (r = 0.357, p = 0.000) further confirms that technology-supported learning environments contribute significantly to learners' academic development. The findings imply that assistive technology availability must be accompanied by effective utilisation, teacher support, and meaningful integration into teaching practices to generate measurable educational benefits. Educational policy implication: These findings suggest that educational policies should move beyond simply providing assistive technology equipment to ensuring effective implementation frameworks. Policymakers should prioritise sustainable investment in assistive technology infrastructure, teacher professional development, technical support systems, and monitoring mechanisms to ensure that available technologies are effectively used to enhance learning outcomes for learners with dyslexia. Inclusive education policies should therefore emphasise both access and effective pedagogical integration of assistive technologies.

The findings provide a nuanced understanding of this relationship by demonstrating that the mere presence of assistive technologies does not automatically produce improved educational outcomes. Rather, the educational benefits of technology depend largely on effective utilisation, learner competence, and appropriate pedagogical support. The findings from pupils indicated generally positive perceptions regarding the availability and accessibility of assistive technologies. Pupils reported that technological resources, teacher support, and digital learning opportunities were available within their learning environments. The descriptive findings showed that pupils generally agreed that assistive technologies contributed positively to their learning experiences, with availability and accessibility indicators recording mean scores ranging from 2.91 to 3.13. Pupils also

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reported that technology reduced learning difficulties, increased participation, and supported academic activities. These findings demonstrate that learners recognise the potential value of technology as a mechanism for overcoming literacy barriers associated with dyslexia.

However, despite these positive perceptions, inferential findings revealed that availability alone was not a sufficient predictor of improved educational outcomes. Among learners, the relationship between assistive technology availability and accessibility (ATAA) and Science and Technology competence (SCT) was positive but statistically insignificant ($r = .138$, $p = .073$). Similarly, the relationship between AT availability and technology literacy performance was positive but not statistically significant. These findings suggest that simply providing technological resources does not guarantee improved literacy outcomes or academic competence. The findings indicate that technology must be actively integrated into classroom practices for meaningful educational benefits to occur.

This result is consistent with the argument developed in the literature review that assistive technology effectiveness depends on more than physical access. Previous scholars such as Edyburn (2013), Cook and Polgar (2015), and Dell, Newton, and Petroff (2017) argue that availability, accessibility, and usability represent interconnected dimensions of successful assistive technology implementation. A device that exists within a school but is rarely used, poorly maintained, or inadequately integrated into teaching practices may have limited educational influence. Therefore, the findings of this study support the position that assistive technology should be conceptualised as a pedagogical intervention rather than merely as a technological resource. The findings further revealed that effective engagement with technology was significantly associated with improved educational outcomes. The relationship between Science and Technology competence (SCT) and technology literacy performance (TLP) was positive and statistically significant ($r = .357$, $p = .000$). Likewise, teacher-related analysis showed a significant relationship between Science and Technology competence and literacy performance ($r = .336$, $p = .014$). These findings demonstrate that learners who possess stronger technological competence and receive meaningful instructional support are more likely to benefit academically from assistive technology.From the perspective of the Social Model of Disability, the findings also demonstrate that educational difficulties among learners with dyslexia are not simply individual problems but are produced by environments that fail to accommodate learner diversity. The availability of assistive technology represents an attempt to transform the educational environment by removing barriers created by traditional text-based instruction. However, the findings show that environmental transformation requires more than the presence of devices. It requires supportive policies, teacher preparation, accessible resources, and inclusive classroom practices.

Therefore, the first hypothesis is partially rejected. The findings demonstrate that assistive technology availability alone does not significantly influence educational outcomes; however, effective utilisation, technological competence, and pedagogical integration significantly contribute to improved learning experiences. The implication is that educational systems should move beyond equipment provision toward comprehensive assistive technology strategies involving teacher training, learner digital literacy development, technical support, and continuous monitoring of classroom implementation. In the context of Cameroon, particularly Yaoundé VI Municipality, this finding is highly significant because it highlights the need for sustainable inclusive education policies. Investment in assistive technology should not focus exclusively on purchasing devices but should include professional development programmes, curriculum adaptation, maintenance systems, and institutional frameworks that enable meaningful technology use. Such an approach would transform assistive technology from a simple resource into an effective mechanism for improving educational equity and learner achievement.

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