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Assessing Multimedia Technology Use in Enhancing Learning Outcomes for Students with Special Educational Needs

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- Technology Acceptance Theory

Abstract: This study focuses on incorporating multimedia in special needs education, with the School of Special Needs in Kwara State, Nigeria, in view. It specifically examines how multimedia technology enhances learning outcomes for students with special educational needs. The study examines the introduction, benefits, and challenges of multimedia use in special needs education. The Technology Acceptance Model (TAM) and Piaget's theory of cognitive development were adopted to support the research work. A qualitative method was used to conduct interviews with five (5) informants. Semi-structured interview questions were administered to informants using purposive and snowball sampling approaches, and responses were analysed thematically. The results show a relatively high level of multimedia incorporation in the special needs education school used as the case study. In this study area, multimedia benefits for students with special needs include increased engagement and improved comprehension. However, barriers to its inclusion include infrastructure gaps, human and policy constraints, and the need for adaptive strategies. The study underlined the need for more frequent, up-to-date educator training; infrastructure improvements; and policy review to support the guided use of mobile learning devices and locally developed multimedia content. Educators' interest in making an impact should drive their need to improve, especially in ICT.

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INTRODUCTION

Multimedia technology in communication systems has gained, and continues to gain, ground in enhancing effective communication (Sousa et al., 2017). In this vein, Ray and Benigno (2022) conceptualize multimedia as an application that combines elements such as graphics, audio, and video to present ideas and make learning easier and faster. This connotes that multimedia involves multiple forms of media communication; however, according to İlhan

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and Oruç (2016) in the Turkish Language Society (TLS), multimedia is viewed as a platform in which a single material is combined with text, graphs, audio, and simulation. This buttresses the idea that multimedia involves the combination of different media communication platforms that are integrated into a single package.

Conversely, beyond the expression of the concept, multimedia has been a varying means of communication and a multiple platform of engagement; Raffat et al. (2015) define it as the representation of a multidimensional way of communication, and Schnotz and Lowe (2003, as cited in Sousa 2017) state that the term multimedia is the combination of multiple technical resources for the purpose of presenting information represented in multiple formats via multiple sensory modalities. This implies that multimedia can also be conceptualized in terms of its technological strength, as its ability to combine multiple means of communication depends on its technically packaged resources. Therefore, multimedia is a technological process that enables multiple or multidimensional means of communication.

Furthermore, Ray and Benigno (2022) note that advances and enhancements in technology have led to, and continue to drive, multimedia use, which in turn offers several communications and teaching methods, including PowerPoint presentations, documentary creation, and movie production. According to these scholars, this usage incorporates text, graphics, audio, video, etc. Therefore, in learning and study, any presentation involving audio and video clips is considered a multimedia presentation.

Another important area where multimedia has been considered effective, aside from communication, is education; it is a crucial area where learning occurs and improves day by day. Technological applications make learning more engaging and easier to understand. Defining multimedia for educational use, Sousa (2017) states that multimedia is a technological package that helps teachers/lecturers combine text, graphics, animation, and other media into one package for a comprehensive information presentation. This definition highlights multimedia's importance in education as an assistive, supportive tool for both teachers and learners.

Advances in computer speed and storage space have made multimedia commonplace today (Ray & Benigno 2022), making its incorporation into learning essential. Raja and Kumar (2010) argue that using multimedia in teaching is strategic because it combines multiple instructional techniques to engage students; different media are used during teaching and learning activities. According to these scholars, these media include materials that can be seen, heard, read, or spoken. However, Xuan et al. (2023) indicate that digital tools, such as tablets, software applications, video and audio tools, interactive whiteboards, and online platforms that reflect multimedia packages, are effective for educators in teaching delivery.

Jastaniyah (2017) identifies multimedia Technologies for learning as including instructional software, Enterprise Management Software and Student Information Systems, Global Positioning Systems, Classroom Administration, digital/Online Content, data warehouses, Interactive Whiteboards and LCD Projectors, Sound Enhancement, Smart Cards,

and Digital cameras. These learning-centered multimedia technologies suggest that multimedia is effective and tailored for Education and Education for all, including children with disabilities. Yuliyani et al. (2020) clearly note multimedia's advantage for self-study, providing a more engaging learning environment that helps individuals stay focused, avoid boredom, and follow instructions patiently. These scholars reiterate that, when used effectively, multimedia increases learning motivation, provides feedback, and supports individual control. With little or no teacher support, learners can still navigate learning effectively through multimedia-rich communication.

More broadly, multimedia is one of the most complex and versatile digital learning media for knowledge creation and for creating a sensory learning environment, which, in turn, helps students learn better by integrating information (Olufunke et al., 2022). These scholars argue that multimedia's strength lies in its ability to emphasize real-world experiences, making learning adapt to students' thought processes. Furthermore, learning can be fun, especially when media is used in isolation. This suggests that multimedia can create an authentic learning environment that sustains attention (Tajeri et al., 2017) and makes learning engaging, fascinating, and fun (Yang & Baldwin, 2020).

Chong (2019) argues that multimedia use in education increases student motivation and engagement, thereby improving knowledge assimilation (Radianti et al., 2020) and progressively enhancing learners' academic attainment (Tajeri et al., 2017). Furthermore, multimedia not only gives students opportunities to construct their own knowledge (Fatirul, 2020) but also improves students' learning outcomes (Lin & Lin, 2019). Abdul Samat and Abdul Aziz (2020) noted that using and engaging with multimedia in learning, teaching, and reading is useful because it combines different media elements that greatly help information processing and understanding.

Clark and Mayer (2003, as cited in Ong & Yahaya, 2022) corroborate that multimedia has made substantial contributions to knowledge, as it shows how the cognitive functions of processing visual and audio information can affect learning. Further, these scholars argue that combining pictures, audio, video, text, and spoken narration is critical to constructing multimedia learning objects; as such, practitioners need to critically assess multimedia components to avoid cognitive overload during and after the teaching exercise.

Consequently, Irika et al. (2023) argue that multimedia has greatly benefited classroom activities by ensuring the availability and accessibility of learning materials for both educators and learners. These scholars noted that using multimedia packages and internet-based facilities in the learning process has significantly increased students' effectiveness, creativity, and motivation. Similarly, Jastaniyah and Bach (2017) reveal that multimedia is useful for both educators and learners, as educators can easily access, download, upload, and share educational materials with students in a short period of time. Similarly, teachers and students can learn to use multimedia applications during lessons for topic presentation and lesson design.

One well-established advantage is that multimedia elements can enhance learning appropriately and effectively (Sousa et al., 2017; Abdul Samat & Abdul Aziz, 2020; Irika et al., 2023). While research studies examine multimedia use for learning, few have focused on how learners with special needs engage with multimedia learning tools. However, despite the obvious importance and use of multimedia in education, a major challenge in most schools is the lack of learning media that, in an ideal situation, would help overcome students staying less active and less interested in learning (Yudhie et al., 2022). With due consideration for learners' learning differences and deficiencies, multimedia technologies also vary in setup for specific purposes.

Clearly, different problems bedevil children, and the inability to do what they expect or pursue personal goals limits some children's ability and performance; this explains disability. Distinctively, disability for some children starts from birth. For others afterward (Khushaboo & Kavita, 2022), however, a standing emphasis according to UNICEF (2022) is that children with disabilities are diverse and are not homogeneous; some have different impairments ranging from reflection around race, age, sex, ethnicity, level of education, religion, geographical location, cultural beliefs, and socio-economic background. This shows that disability is not about deformity; rather, it is about deficiencies in ability, performance, and strength.

In contrast, Khushaboo and Kavita (2022) argue for defining disability from a special-needs perspective. Hence, according to these scholars, children with special needs are those who have a disability in some areas and need special support and care. Furthermore, the categorization of these children's disabilities determines their special needs, which could fall into categories such as physically disabled children, mentally disadvantaged children, and socially maladjusted children. Other distinct categorizations for children with special needs are visually impaired children, hard of hearing children, children with impaired speech, and mentally challenged children.

Similarly, another way to categorize special needs is by the consequence of an impairment. Malam and Malama (2021) note that this may include cognitive, physical, mental, sensory, emotional, and developmental impairments. Further supporting the categorization of children with special needs, Ringø and Emil (2025) reveal that this can be based on the type and number of disabilities, the cause, the degree, and the effect on the child's education. Some children have specific deficiencies such as reasoning, learning, spelling, calculating, reading, listening, and writing difficulties. However, the main defining characteristic of these children is that, for their learning difficulties, specialized education is mostly and importantly required to meet their needs (Neves et al., 2022)

Therefore, in educating these children, who are regarded as a special group with special needs, Malam and Malama (2021) indicate that various educational settings are available for children with special needs. In this regard, a special needs school is often the best option for addressing children's distinctive disabilities. This is a school that caters to students who have special educational needs as a result of their physical disabilities, low cognitive development,

and behavioral problems (Wyeth et al., 2023). Special schools are specifically structured and staffed to support children with special needs (Khushaboo & Kavita, 2022).

Children in special educational needs categories often struggle to acquire academic skills such as reading, spelling, writing, speaking, understanding, listening, thinking, or arithmetic (Neves et al., 2022); this is where multimedia becomes necessary and expedient. For children with special needs, Mavroudoglou (2023) argues that technology's positive effects have been clearer and more pronounced than for the general school-age population. This suggests that incorporating assistive technology is appropriate for children with special needs. This supports Wyeth et al.'s (2023) assertion that children with special needs usually require additional assistance and care in opportunities for learning, communication, mobility, interpersonal interactions, and relationship building; therefore, technology is increasingly becoming a strategy for supporting young children with special needs.

Distinctively, multimedia software and multimedia learning environments have been proven effective in helping children with disabilities develop skills across domains as varied as academic literacy and numeracy, life skills, and social interaction (Sousa et al., 2017). Also, different multimedia applications can be used to present disabled learners with the opportunity to adopt their own style of learning; as human brain learns using many senses such as sight, hearing or touch (Raja & Kumar, 2010).

Since the cognitive strength and ability of learners vary, Tajeri et al. (2017) in their study reveal that a multimedia approach to teaching is a strategy that comprises more than one instructional technique for teaching a particular unit; as such, different multimedia applications can be used to present disabled learners with visual, auditory, or kinesthetic experiences that help in adopting a personal style of learning. According to these scholars, the multimedia applications include educational media and instructional media. For educational media, audio and visuals such as videotapes, television, computers, and motion pictures, as well as regalia such as globes, specimens, models, and kits, can be used. At the same time, instructional media are categorized as projected and non-projected. Projected media include slides, transparencies, projectors, etc., and non-projected media include chalkboards, bulletin/magnetic boards, photographs, pictures, charts, etc. These are observed and identified multimedia elements that educators have used and continue to use to enhance learning and the general education of learners with special needs.

Interestingly, Mavroudoglou (2023) emphasizes that students with physical disabilities gain more educational access through assistive technology, such as eyelid switches or other communication devices that replace speech. Also, students with learning difficulties can achieve cognitive access by using appropriate PC software that enhances digital use of images or videos with written text. Israel et al.'s (2014) early work on supporting content learning through technology for students with disabilities reveals a different view of multimedia technologies as Assistive Technology (AT) and Instructional Technology (IT), respectively. These technologies offer a range of functions, such as speech recognition software, which is

highly beneficial for students with dysgraphia or dyslexia and is routinely recognized as AT for students with disabilities.

Because multimedia combines two or more media elements in a single format, it offers users distinct and undeniable benefits. The benefits of multimedia to special needs education have also been considered by scholars at different levels of observation. This study critically assessed the literature and findings from researchers who have done similar work on special needs children, especially on special needs education using multimedia. Khasawneh (2023) observed that using technology like multimedia greatly supports learning. Because visual aids support children with particular needs, such as students with special needs who struggle with abstract cognition and retention, instructional tools and media can be tailored to accommodate these challenges.

Astuti, Pertiwi, and Santoso (2023) also examine the effectiveness of multimedia-based learning materials for deaf students in online learning and find that hearing impairment affects language and academic outcomes. However, multimedia can take into account the theoretical and research bases of learning for this group. This helps them focus on the language and visual elements needed to understand the learning material. Therefore, these scholars reiterate that interactive multimedia tools can significantly improve reading skills among students with specific learning difficulties.

Also, Iyamuremye et al. (2023) found that using technological tools facilitates the process of mathematical exploration. They stressed that with these specialized approaches to teaching, most disabled learners can be helped to learn normally. Similarly, Joei & Noraffandy (2022) reveal that audiovisual contexts have become a new approach that supports learning and sharpens the analytical reasoning and rational social skills of special needs students. This examination shows that multimedia technology in learning can assist students with learning disabilities, as it benefits autistic students and demonstrates the educational potential of a multimedia system.

Despite the wide array of benefits multimedia offers in special needs education, there are also observable challenges. A prominent challenge is that the development of multimedia resources for this population remains limited because it is not considered commercially viable for the market, which has also hindered the integration of multimedia technology in special education classes (Neves et al., 2022). These scholars also note that the software is often too difficult for children with learning disabilities, and special education teachers often find it easier to demonstrate the process rather than have students engage with the multimedia programs themselves. Khan (2010), however, offers a different perspective: children with autism and Down's syndrome may not translate multimedia use into learning; rather, it may be an enjoyable moment when they are exposed to multimedia.

It is therefore necessary to examine learners' indifference to learning, and a key focus of this study is learners with special needs. Similarly, Kwara State has prioritized giving the less privileged a voice by establishing an educational environment that caters to the peculiarities

of individuals with special needs. However, incorporating multimedia tools for learners is increasingly important for assessment. Therefore, this study precisely assessed the use of multimedia technology in enhancing learning outcomes for students with special educational needs in Kwara State.

The following are the objectives of the study:

1. To examine the introduction/inclusion of multimedia in special needs education.
2. To examine the benefits of using multimedia in special needs education
3. To identify the challenges faced in the use of multimedia in special needs education.

Theoretical framework

Two theories were considered in this study. The first is the Technology Acceptance Model (TAM), developed by Fred Davis in 1989, and the second is Piaget's Theory of Cognitive Development, proposed by Jean Piaget in 1936. The Technology Acceptance Model (TAM) explains how users accept and use a particular technology. The model posits that two key factors, perceived usefulness and perceived ease of use, determine an individual's attitude toward adopting a technology, which in turn influences their behavioral intention and actual usage (Davis, 1989). In the context of special needs Education, TAM provides a relevant framework for understanding how educators and learners perceive multimedia tools such as audio-visual aids, animations, and interactive software. When teachers perceive multimedia as useful for enhancing instructional delivery and easy to integrate into classroom practice, they are more likely to adopt and use it effectively. Similarly, students with special needs are more likely to engage with multimedia technologies when these tools are accessible, user-friendly, and support their learning needs.

Applying TAM to this study, the level of multimedia incorporation observed in the selected school in Kwara State can be linked to educators' acceptance of these technologies. Challenges such as inadequate infrastructure, limited training, and limited access to updated tools may reduce both perceived usefulness and ease of use, hindering full adoption. Consequently, the model underscores the importance of capacity building, infrastructural development, and supportive policies in enhancing multimedia integration in special needs education.

Corroborating TAM, the study also draws on Piaget's Theory of Cognitive Development (Piaget, 1936). Piaget theorized that children progress through four stages of cognitive development: sensorimotor, preoperational, concrete operational, and formal operational (Piaget, 1952). Central to this theory is the concept of schema, the mental structures individuals use to organize knowledge. According to Piaget, learning occurs through assimilation, where new information is integrated into existing schemas, and accommodation, where existing schemas are modified to incorporate new experiences (McLeod, 2018).

In relation to special needs Education, Piaget's theory suggests that learners, regardless of their conditions, possess cognitive structures that can be developed through appropriate stimulation. Multimedia tools serve as instructional stimuli that enhance sensory engagement and support cognitive processing across developmental stages. For instance, audio-visual and interactive multimedia resources can support assimilation by linking new knowledge to familiar concepts, while also promoting accommodation by introducing novel learning experiences that reshape existing understanding.

Furthermore, multimedia-based instruction aligns with the principle that learning is more effective when multiple senses are engaged. As Paul (2016) notes, integrating audio, video, graphics, and animations in teaching enhances retention, encourages collaborative learning, and enables students to express knowledge in diverse ways. Thus, while TAM explains the acceptance and use of multimedia technologies, Piaget's theory provides insight into how such technologies support cognitive development and learning outcomes among students with special educational needs.

Together, these theories provide a comprehensive framework for understanding both the adoption and pedagogical impact of multimedia in special needs education.

RESEARCH METHOD

Research Design

This study used a qualitative case study design focused on understanding a particular group: learners with special needs. Therefore, the implementation of this design and method aligned with the research objectives of identifying and ascertaining the introduction of multimedia in special needs school education and exploring the benefits and challenges of multimedia use in special needs education.

Population

To confirm the research questions through a case study, the Kwara State School of Special Needs was used. This group was purposively selected to assess multimedia incorporation in their education.

Sampling Procedure and Techniques

Specifically, a semi-structured interview was conducted via WhatsApp with five (5) educators/instructors, in line with Creswell's (2012) recommendation for sample size and the point of saturation, which is usually between 5 and 25 participants. Informant consent was obtained, and confidentiality was ensured for the questions asked and the responses provided. The interview duration was flexible, as interaction was asynchronous and informants responded at their convenience. Purposive and snowball sampling approaches were used: one educator was consulted and purposively selected, and referrals to others were made via WhatsApp, where the interview questions were shared, due to the sensitivity and peculiarity of the educational setting and to reach saturation. The sampling technique

was adopted mainly to identify educators who are specifically aware of multimedia technology and may be using it. This explains the rationale for choosing the sampling method, as it is beneficial for studying a particular population where specific information is gathered to gain detailed insight.

Data Analysis

Thematic analysis was conducted to identify recurring patterns, themes, and insights from the qualitative data. In carrying out the analysis, the research question guided the entire process. The main themes reflect the research questions that emerged from the study objectives. At the same time, the sub-themes were identified from recurring patterns in responses to information questions collected in the field. Data analysis was done using AI and NVIVO for coding and graphical illustration, respectively. The coding process progressed from the interview protocol to responses; themes were formed from the responses, and sub-themes emerged from interviewees' responses, each with a pseudonym.

Validity

Validity was ensured by asking simple, direct, and unambiguous questions to a predetermined informant who was not included in the sampling process but shared characteristics similar to those of the sampled informants. Also, an expert knowledgeable in media technology guided the process of developing the interview questions.

Reliability

To ensure the dependability of this study, especially its findings, multiple analysts were used for research triangulation. Member checking was also conducted, as informants were given the findings and asked to discuss them to confirm their accuracy. Similarly, two coders were used to balance differences and positions among informants, ensuring accurate and consistent agreement.

FINDINGS

The thematic analysis below is derived from interviews with five informants from Kwara State School of Special Needs. The research objectives guided the questions posed to the informants. Therefore, findings are categorized into themes and sub-themes. Tables 1, 2, and 3 and Figures 1, 2, and 3 indicate the main themes, sub-themes, and sub-sub-themes that answered the study's aims based on each research objective.

Table 1. *Introduction/inclusion of multimedia in special needs education*

Sub- Themes	Sub- sub themes	Key Insight
1. Accessibility and incorporation	Incorporation of multimedia equipment	Projectors, computers, and video displays are introduced, but usage is inconsistent.
2. Barriers to effective incorporation	Lack of teacher training	Most educators lack the training needed to use multimedia effectively.

	Infrastructure challenges	Poor electricity supply and faulty solar systems hinder incorporation.

Source: Developed from the study's data

Theme one: Introduction/Inclusion of Multimedia in Special Needs Education

Sub- theme 1: Accessibility and Incorporation

The informants unanimously highlight the accessibility and incorporation of multimedia in special needs education for the study's target population.

Sub- sub theme 1: Incorporation of Multimedia equipment

All five Informants indicated that multimedia had already been introduced in their school, although their reflections varied in extent and means of use. Informant 1 indicated "the use of laptops, projectors and learning videos to aid learning for children with disabilities". Informant 2 revealed "the use of gadgets, such as computerized systems, televisions with video display systems, and interactive materials for rhymes and for recognition of objects". However, Informants 3, 4, and 5 stated that basic computer systems are available, with Informant 4 indicating they are not available to learners and Informant 5 noting that there are no ICT-trained teachers and that power problems disrupt the process.

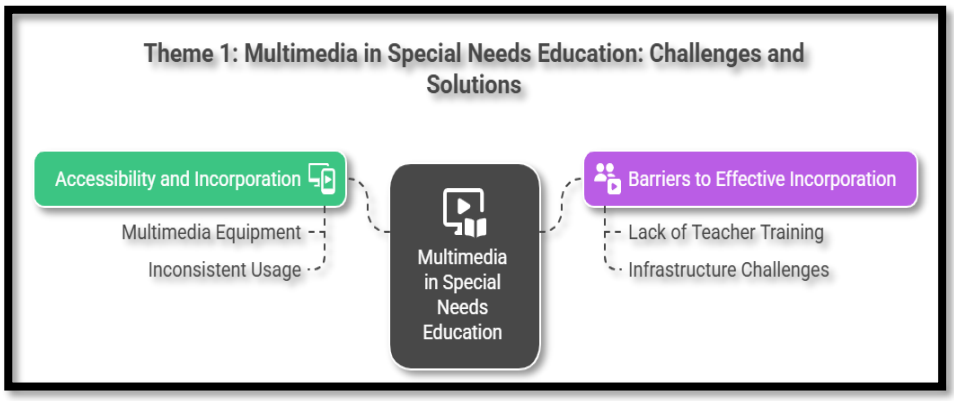


Figure 1. *Multimedia in Special Needs Education: Challenges and Solutions*

Sub-Theme 2: Barriers to Effective Incorporation

Contrasting viewpoints emerged among informants, asserting that the introduction of multimedia for special needs education has few barriers, which has limited its accessibility.

Sub-sub theme 1: Lack of Teacher Training

Informants 4 and 5 specifically noted that most teachers have little or no training in using multimedia equipment, which seriously constrains classroom learning.

Sub- theme 2: Infrastructural Challenges

Other issues cited by the informants include poor electricity and non-functional solar back-ups, which in turn affect the effective use of multimedia.

Theme Two: Benefits of Using Multimedia in Special Needs Education

Table 2. *Benefits of Using Multimedia in Special Needs Education*

Sub- themes	Sub–sub themes	Key insight
Increased Engagement	Enhance attention and focus.	Multimedia keeps learners focused and reduces distractions through visual appeal, such as cartoons, videos, and real-world representations.
	Active and keen participation	Multimedia encourages interaction, expression of ideas, and smooth teacher-learner relationships.
Improved Comprehension	Visual learning for better understanding	Learners comprehend better using images, visual aids, and demonstrations—especially beneficial for hearing-impaired or developmentally delayed students.

Source: Developed from the study's data

Sub- theme 1: Increased Engagement and Classroom Participation

When asked about the benefits of using multimedia in special needs education, some informants reached a clear consensus that multimedia enhances attention and focus and ensures active, keen participation.

Sub- sub theme 1: Enhance Attention and Focus

According to Informant 5, televised content draws learners' attention and keeps them eager to stay in class. Informant 4 also noted that multimedia keeps learners on the edge of their seats, minimizing distraction. This highlights multimedia's strength in keeping learners focused, particularly during learning, and it caters well to children with attention deficiency, ADHD, or autism.

Sub- sub theme 2: Active and Keen Participation

Informant 2 said that "multimedia helps students to express opinions, which means that the process of learning gets more interactive and autonomous". Informant 4 also noted that "multimedia enhances cordial interaction among teachers and learners."

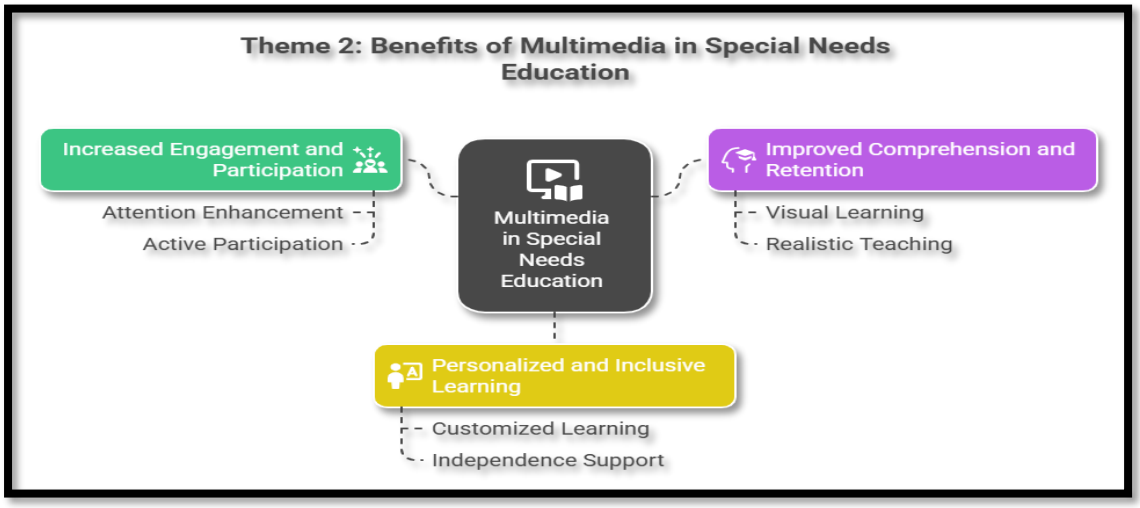


***Figure 2**. Benefits of Multimedia in Special Needs Education*

Sub- theme 2: Improved Comprehension and Retention

Continuing to underscore the benefits of multimedia in special needs education, informants highlight improved comprehension and retention.

Sub- sub theme 1: Visual Learning for Better Understanding

Informant 1 attributed pictures and videos greatly to improved understanding. Informant 3 stressed that deaf and hard-of-hearing children remember what they see more than what they hear. Informant 5 said visual aids that illustrate math lessons enhance comprehension. According to this informant, multimedia also serves visual learners, especially in special education, where students might be auditorily or cognitively impaired.

Sub- sub theme 2: Realistic and Simplified Teaching

Informant 3 revealed that "multimedia tools like graphical images and videos can make the teaching process easy when a real thing or procedure is presented. Informant 4 also said that it simplifies teaching and makes it more real. Experiential learning can be done using multimedia tools where abstract concepts can be visualized using real-life simulations or through dramatized real-life content."

Sub- theme 3: Personalized and Inclusive Learning

While some informants acknowledged benefits of multimedia use for special needs education, such as increased engagement and participation, improved comprehension and retention, and personalized and inclusive learning, these benefits were highlighted by informants.

Sub- sub theme 1: Customized Learning Experiences

It was noted by Informant 1 that "with multimedia, individualized learning is facilitated and independence can be increased. Multimedia can help learners to learn at their own pace; access their preferred formats (text/ video/ audio); replay on matters that they want".

Theme Three: Challenges Faced in the Use of Multimedia in Special Needs Education.

Table 3. *Challenges faced in the use of multimedia in special needs education*

Sub- themes	Sub- sub themes	Key Insight
Infrastructural Barriers	Poor electricity supply	Multimedia tools are underutilized because of inconsistent power and unreliable solar alternatives.
	Lack of devices and technical resources	Schools lack adequate gadgets, funding, and maintenance support.
Human and Policy Constraints	Insufficient teacher training	Many educators lack skills in multimedia or ICT integration.
	Lack of specialized content	Multimedia content specifically designed for students with special needs is limited.
Adaptive Strategies	Peer and one-on-one support	Teachers use peer tutoring and individualized support to help learners adjust to multimedia tools.

	Foundational ICT training for students	Teachers teach basic computer literacy and exam-preparation skills to improve digital fluency and reduce anxiety around tech use.

Source: Developed from the study's data

Sub theme 1: Infrastructural and Technical Barriers

Underscoring the challenges of multimedia use in special needs education, informants echo infrastructure as a key barrier.

Sub- sub theme 1: Poor and Unstable Electricity

Informants 2 and 3 cited electricity as a major constraint to the use of multimedia tools. Informant 2 called it "the poor/unstable electricity", and Informant 3 noted, "it is one of the greatest constraints. Operation of digital tools requires steady power supply".

Sub- sub theme 2: Lack of Devices and Technical Resources

The second Informant restricted herself to mentioning little multimedia equipment, financial mismanagement, and skill deficiencies in the technical field. The absence of applications and gadgets was also repeated by Informant 3. This shortage indicates poor financing and poor systemic execution of inclusive education programs in developing countries.

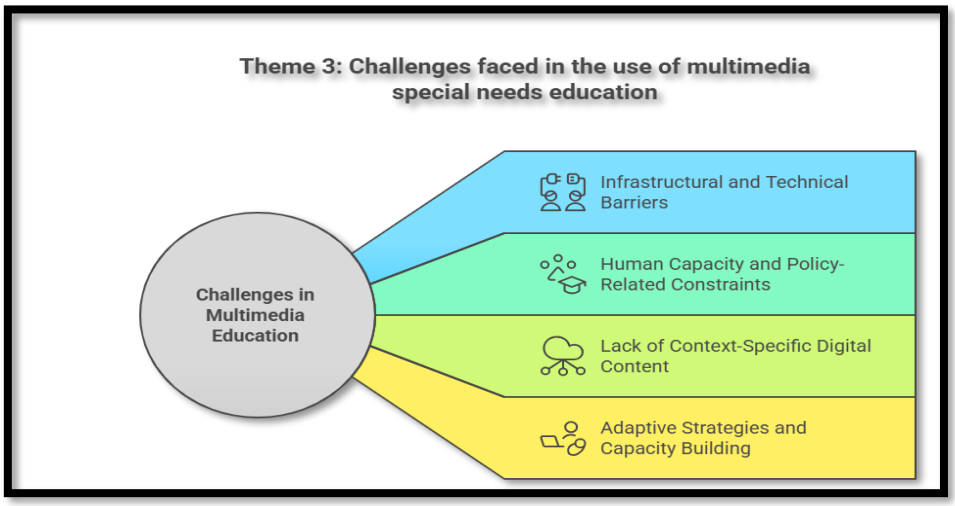


Figure 3. *Challenges faced in the use of multimedia special needs education*

Sub- theme 2: Human Capacity and Policy-Related Constraints

All five informants unanimously expressed that human capacity and policy-related constraints pose obvious challenges to the use of multimedia for special needs education.

Sub- sub theme 1: Insufficient Teacher Training

Those who took part in the research (Informants 1, 2, and 4) reported a lack of trained staff and technical expertise as an obstacle to efficient multimedia use.

Sub- sub theme 2: Policies on Device Use

Informants 4 and 5 mentioned that some policies forbid learners from using phones, even though apps like Kahoot could support educational activities. Low-cost assistive technologies: Mobile phones are becoming a widely used low-cost assistive technology in special Education.

Sub- sub theme 3: Lack of Context-Specific Digital Content

Informant 1 noted limited access to specialized content tailored to the needs of special learners. The absence of localized, disability-specific educational media reduces the effectiveness of available platforms.

Sub- theme 3: Adaptive Strategies and Capacity Building

In finalizing informants' responses to the challenges of multimedia use in special needs education, adaptive strategies and capacity building emerged.

Sub-sub-theme 1: Peer and one-on-one Support

Informant 1 *offers one-on-one guidance* or peer support to students struggling with multimedia tools. Informant 2 t*eaches basic digital skills* such as typing and document management and helps students prepare for computer-based tests (CBT). These strategies reflect low-tech, teacher-led approaches to bridging the digital gap.

Sub- theme 2: Foundation ICT Training for Students.

Informant 5's exam-preparation skills help prepare students ahead of time for examinations, while Informant 3's basic computer lessons improve digital literacy and reduce students' anxiety about using multimedia technology. These approaches reveal a deficiency in ICT integration that can easily undermine performance if not addressed.

DISCUSSION

The findings of this study imply a partially high level of incorporation of multimedia technologies in the special need's education of the study population. This aligns with the first construct of the Technology Acceptance Model (TAM), which explains acceptance; however, the findings also indicate that while the tools are available, knowledge of how best to manage the infrastructure acts as a constraint on utilization. Therefore, this also takes a pick on TAM in respect of perceived ease of use; acceptance or embrace does not necessarily equate to the full process of use. This aligns with Al-Azawei et al. (2022), who note that availability is not the only factor affecting the successful inclusion of multimedia in education; strategic factors such as teacher competence and learner access also matter. Moreover, Adebayo and Omolayo (2021) note that the availability of educational tools should not be confused with their proper use unless proper pedagogy training and curriculum adjustments are available. This factor is clearly presented in most responses, as informants reveal that proper training will support the use of multimedia for learning. This implies that applying multimedia tools without training can leave them underused or misused, and, in the end, learners with disabilities are less attended to.

Examining TAM further in line with the study's findings, perceived ease of use can be considered effective, while perceived usefulness can be challenging. In this study, the benefits of incorporating multimedia in special needs education include personalized and inclusive learning and customized learning experiences for learners. This supports Hamid et al.'s (2025) statement that, when learners with disabilities are empowered, personalized digital content supports independence through autonomy and an adaptive feedback loop. Learners tend to perceive multimedia as useful.

Conversely, perceived ease of use can be impaired by several factors beyond the attitudes of educators or learners. The study found that infrastructural and technical barriers, such as poor and unstable electricity and a lack of devices and technical resources, hinder the usefulness of multimedia technology. Also, regarding the lack of devices and technical resources, Adu-Gyamfi & Ofori-Ampong (2022) claim that teachers cannot provide customized learning to students because they cannot access the appropriate assistive technologies. In overcoming infrastructure constraints, adaptive strategies and capacity building can be considered. Kebritchi et al. (2017) recommend similar scaffolding strategies in low-resource settings, where direct instruction and peer collaboration can supplement the lack of advanced infrastructure.

Human capacity and policy-related constraints are also identified. While multimedia is established as useful, educators and learners must have the capacity and access to use it. Al-Azawei et al. (2022) clarify that, even though mobile learning tools have the potential to facilitate self-paced and gamified learning, the integration of those tools into the classroom environment. Furthermore, informants in this study raised the lack of context-specific digital content as a critical concern, as it can hinder learners and undermine the overall value of including multimedia for learners with special needs. Both educators and learners can become frustrated when digital content is not tailored to specific learners' needs.

The study also confirms that incorporating multimedia for children with special educational needs is beneficial. This, in turn, justifies paignet's theory of cognitive development. The findings reveal that multimedia tools serve as instructional stimuli that increase sensory engagement and participation. This supports Samatova and Rusli's (2025) view that multimedia can enhance visual and audio stimuli, reduce distractibility, and help students with cognitive and sensory differences stay focused longer. In addition, Hassanzadeh and Jafarigohar (2020) found that multimedia-supported learning environments can transform passive participants into active participants, particularly in inclusive settings where learners require different levels of support.

According to the study, multimedia also improves comprehension and retention through visual learning and realistic teaching; this supports Gyamfi and Ofori-Ampong's (2022) statement that visuals, simulations, and animations develop mental models to facilitate long-term memorization of abstract or complex issues**.** This supports personalized, inclusive, and independent learning, as emphasized by Chipangura & Aldridge (2019), Alhazmi (2024), Abdul Samat & Abdul Aziz (2020), and Hossain (2025). Finally, multimedia use for special needs can

support realistic, simplified teaching; Al-Azawei et al. (2022) state that it not only enhances conceptual clarity and critical thinking but also improves learning among special needs learners who receive multisensory input.

CONCLUSION

This study set out to assess the use of multimedia in special needs education. It clearly addressed a major area of technology, specifically multimedia, and how it is developed to suit all areas of education, which is especially important and assistive for special needs education. Because learners with special needs vary, it is worth stressing that multimedia can cater to them either collectively or individually.

Primary data from Kwara State School of Special Needs were assessed. Therefore, this study established the use of multimedia in special needs education, using the theoretical foundations of the Technology Acceptance Model and Paignet's theory. While previous studies have examined the benefits of multimedia in learning and teaching (Irika et al. 2023; Yuliyani 2020; Jastaniyah & Bach, 2017) and other studies on multimedia benefits in special Education (Mavroudoglou 2023; Sousa et al. 2017; Tajeri et al. 2017); little attention has been given empirically and in depth to assessing its use at a specific special needs education school and specifically in the geographical location of this study.

This study found significant evidence of partial, high use of multimedia in the study population. The study also found significant evidence of the benefits of multimedia use in special education; however, barriers and challenges remain to its use in the study area. This study recommends further practical, sociological, and policy attention, as a wide range of benefits remains to be explored by both educators and learners with special needs.

RECOMMENDATION

Based on the findings of the study, the following recommendations were made:

1. The government and private individuals should pay more attention to ensuring the availability and accessibility of multimedia in special needs education.
2. Educators' interest in making an impact should drive their need to improve themselves, especially in ICT.
3. Funds available for special needs schools should be adequate for procuring needed gadgets, training educators, and maintaining gadgets.

Also, this study's implications for future research should focus on distinctive categories of special needs children and their use of multimedia, rather than incorporating all categories into one study. This is believed to allow for explicit study of multimedia use and, in turn, clearly open up ground for improvement.

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