

Effect of Interactive Whiteboard Instruction on the Academic Performance of Students with Cerebral Palsy in Oyo State, Nigeria

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Publication Date: 2026/07/14

Abstract: The study investigated the effect of interactive whiteboard technology on the academic performance of students with cerebral palsy in Oyo State, Nigeria. The study adopted quasi-experimental pretest-post-test control group design. The population of the study were students with cerebral palsy in Federal College of Education (Special), Oyo. A total of sixty students with cerebral palsy were used as accessible sample for the study. The students were randomly assigned into two groups, experimental group (n=30) and control group (n=30). The instrument used for collecting data from the participants were researcher-Developed Academic Achievement Test and observation schedule. Mean and standard deviation were used to answer the research questions. T-test statistics at .05 alpha level of significance was used to test the hypotheses of the study. The findings of the study revealed that there was significant difference in the academic performance of students with cerebral palsy who were taught using interactive whiteboard technology and those who were taught using conventional teaching methods. The findings of the study also revealed significant difference in the academic performance of students with cerebral palsy in experimental group and those in control group. Students and teachers expressed positive views regarding the use of interactive whiteboard technology for teaching and learning. However, unstable electricity, management of technology equipment and teacher training and development were identified as challenges for the effective use of interactive whiteboard technology in special education. The study concluded that the use of interactive whiteboard technology can enhance the academic performance of students with cerebral palsy if properly integrated into special education practice in Nigeria. It is recommended that there should be provision of assistive instructional technologies, teacher training and development and school institutional support for technology-based inclusive teaching and learning.

Keywords: Interactive Whiteboard, Cerebral Palsy-Cerebral Palsy, Academic Performance, Special Education, Assistive Technology, Nigeria.

How to Cite: Sunday Ayodele Taiwo; Ogunpeju Adefunke Taiwo (2026) Effect of Interactive Whiteboard Instruction on the Academic Performance of Students with Cerebral Palsy in Oyo State, Nigeria. *International Journal of Innovative Science and Research Technology*, 11(6), 3399-3408. <https://doi.org/10.38124/ijisrt/26jun1921>

I. INTRODUCTION

Education plays very important role in the social inclusion, independent living and participation and interaction of person with disability in the community. Education of children with disability requires to be included and mainstreamed in order for them to have equal opportunity to learn and to develop to their full potential in school and in life outside school. This is the stand of United Nations Children Education Fund (UNICEF) as indicated in their website [1]. The Federal Government of Nigeria through the Ministry of Education is also on the inclusion of all children including those with disabilities in educational programs of schools all over the country. Inclusive education is one of the strategies of the Ministry of Education in the overall educational development of the country. National Policy on Education of

Federal Ministry of Education [2] stipulated that all children with disabilities should be provided with suitable education in the country.

Cerebral palsy (CP) is a group of permanent disabilities that are attributed to brain abnormalities that are present at birth or which occur during a child's brain development. These abnormalities may affect movement of body parts, posture and balance of individuals with cerebral palsy [3]. For a student with cerebral palsy in educational settings, there are several challenges that he/she may encounter in learning academic tasks. Such academic tasks could be writing, completing educational work with various educational materials, maintaining posture for long periods of time and educational activities that require learners to be constantly on the move in the classroom. Many individuals with cerebral palsy have

challenges with fine motor control and with coordination of physical movements needed for completing written and non-written work in the classroom. The work of a student with cerebral palsy can be completed when he/she is given the opportunity to complete tasks. However, such a student would complete such tasks differently from a typical learner [3]. As Pratt et al. [4] posited that students with cerebral palsy learn and complete school work in the best way they can with given support for completing academic tasks.

Most schools in Nigeria adopt the traditional teaching methods which include chalkboard teaching, copy work, note taking and teacher centered approach. These methods of teaching could be very difficult for a child with cerebral palsy as they require sustained physical control and written response. A child with cerebral palsy could be in school and yet not benefit from academic activities in the classroom as a result of these methods of teaching. The gap between access and participation of children with disabilities in school is a major challenge in disability-inclusive education [1,5].

There are many tools and strategies that have been used by teachers to address the learning needs of students with special needs in the classroom. One of the most effective tool for students with physical disabilities in the special education classroom is the use of interactive whiteboard. The use of interactive whiteboard in the classroom increases learning opportunities for students with physical disabilities as they are able to participate in the lesson without having to write on the chalkboard. Many studies have shown that the use of interactive whiteboard in the teaching and learning of students with special educational needs has positive effects on their learning. Smith et al [6] observed that the use of interactive whiteboard increased student engagement in learning and also facilitated effective teaching and learning in the classroom. Allsopp et al [7] stated that the interactive whiteboard increased the effectiveness of teaching and learning for students with special needs as it made teaching and learning easier and also provided students with variety of formats to learn. The use of interactive whiteboard in the special education classroom for students with cerebral palsy increases their learning opportunities as they are able to participate effectively in the lessons in the classroom.

The interactive whiteboard is an excellent instructional tool for individuals with physical disabilities. For example, students with physical disabilities can utilize the increased use of visual displays for learning and complete written work on the computer instead of on paper and then being copied by their teacher from the chalkboard. The teacher of students with disabilities can use the interactive whiteboard to increase student engagement in learning and to be more flexible in their approaches to teaching and learning [7,6].

A lot of work still needs to be done on how to harness assistive and instructional technologies for special education practices especially in supporting students with cerebral palsy in Nigeria. While education policies are moving in the direction of inclusion and there are laws that ban discrimination against people with disabilities and guarantee their right to education [8], there are challenges that relate to cost, school infrastructure as well as teachers' preparation for effective use of technology

for educational purposes that need to be addressed. It is against this backdrop that this study examined the impact of interactive whiteboard instruction on the academic performance of students with cerebral palsy in Oyo State, Nigeria.

The study aims at examining the effect of interactive whiteboard technology on academic performance of students with cerebral palsy in special schools in Oyo State, Nigeria.

The researcher was also interested to find out the extent to which the use of interactive whiteboard can enhance the achievement of learners with cerebral palsy and how students and teachers can perceive the technology to be of value to special education in schools in Oyo State, Nigeria.

A. Statement of The Problem

The study setting is the schools for children with special needs in Nigeria where the educational environment and the method of teaching are not adapted to the physical and learning needs of students with cerebral palsy. Students with cerebral palsy have physical limitations that affect their learning in the classroom. They have difficulties with fine motor tasks such as writing and using materials in the classroom. Most of the learning activities in the classroom require fine motor control and written responses. Students with cerebral palsy may be included in regular classrooms but are unable to fully participate in learning activities in the classroom due to their physical limitations and a lack of support [4,3].

The study of education for children with cerebral palsy in Nigeria is hampered by the lack of empirical evidence which can be used to inform practice and policy. Inclusive education has become a policy thrust in Nigeria's educational sector. The Federal Ministry of Education has a National Policy on Education as well as an Inclusive Education Policy that are designed to ensure that all children with disabilities have access to quality and acceptable education. In addition, Discrimination Against Persons with Disabilities (Prohibition) Act, 2018 has integrated all persons with disabilities into the Nigerian society and guaranteed their rights and freedoms as human beings and as citizens of Nigeria. However, the implementation of these policies and the enforcement of the Act is hindered by a number of challenges including inadequate school infrastructure, lack of consistent supply of electricity, paucity of educational technologies and lack of adequate teacher preparation for teaching children with special needs.

Therefore, in the majority of Nigerian classrooms where conventional teaching practices are being used, students with cerebral palsy are found in the classrooms to participate in academic activities in school but they do not derive the desired benefits from school activities because of the need for them to be taught using methods and practices that are modified to meet their physical limitations to learn in the classroom. The practice of inclusive education has been recognized by Nigerian educational policy and also receiving support from legal provisions. However, there are many schools in Nigeria that are not equipped with enabling physical and materials facilities for the practice of inclusive education in the schools. In fact, most schools lack reliable source of electricity, sufficient number of instructional materials as well as modern educational technology to support teaching and learning in the schools.

Even where such facilities exist, teachers who are expected to teach students with cerebral palsy in inclusive classroom setting are not adequately prepared. As a result, most students with cerebral palsy are found in special schools where they are taught using conventional teaching practices. It is within this backdrop that there is a need to explore the use of interactive whiteboard (IWB) in teaching and learning of students with cerebral palsy in Nigeria. Empirical studies on the use of IWB with students with cerebral palsy in Nigeria are scarce. This study therefore.

The problem of this study sought to investigate whether or not the use of interactive whiteboard could significantly improve the academic performance of students with cerebral palsy and be better than the conventional teaching method.

B. Purpose of the Study

The main purpose of this study was to examine the effect of interactive whiteboard instruction on the academic performance of students with cerebral palsy in Oyo State, Nigeria.

Specifically, the study sought to:

- determine the difference between the pretest and post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction;
- Examine the difference between the pretest and post-test mean scores of students with cerebral palsy taught through the conventional teaching method;
- Compare the post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction and those taught through the conventional method; and
- Examine the perceptions of students and teachers regarding the use of interactive whiteboard technology in the teaching and learning process.

C. Research Questions

The following research questions guided the study:

- What difference exists between the pretest and post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction?
- What difference exists between the pretest and post-test mean scores of students with cerebral palsy taught through traditional teaching methods?
- Is there any difference in the post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction and those taught through traditional methods?
- How do students with cerebral palsy and their teachers perceive the use of interactive whiteboard technology in the teaching and learning process?

D. Research Questions

The following null hypotheses were tested at the 0.05 level of significance:

- H01: There is no significant difference between the pretest and post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction.
- H02: There is no significant difference between the pretest and post-test mean scores of students with cerebral palsy taught through traditional teaching methods.

- H03: There is no significant difference between the post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction and those taught through traditional teaching methods

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II. LITERATURE REVIEW

A. Concept of Cerebral Palsy and Learning

Cerebral palsy is a group of permanent multiple disabilities caused by developmental brain damage. Children with cerebral palsy have physical disabilities that affect their movement and use of muscles and maintain abnormal posture and movement. Additional disabilities affect their communication and how they interact with teaching and learning resources and with materials and equipment in the school. Writing is another area of disability for children with cerebral palsy. They may be in school for long periods of time and find it difficult to participate in learning. Most children with cerebral palsy are very intelligent and have average to high intelligence. However, they are not able to reach their full potential in school because the teaching methods and school environment are not accessible.

Children with cerebral palsy have special needs in the school setting. They may require modifications to learning situations to maximize their potential. In order to effectively learn in a classroom, children with cerebral palsy require teaching to be made more accessible. This could involve a number of different methods or materials. For example, some children with cerebral palsy may need modified materials or use of assistive technology, or different methods of communication, and the use of a number of different strategies for teaching and learning. These strategies could be designed to reduce the physical demands of learning, while at the same time allowing for maximum participation by all students.

B. Interactive Whiteboard Instruction in Special Education

Interactive whiteboard or IWB is a digital tool for education that has become very popular in educational settings. IWBs are display surfaces on which images, text, etc. are presented. They can be manipulated in a number of ways, such as by touching the surface, using a special pen or by accessing a connected computer. The IWB can make use of a number of multimedia resources, for example: text, sound, images, videos and diagrams, plus hyperlinks to other resources on the net. In special education contexts, IWBs can form part of a multi-sensory approach to teaching and learning. That is, IWBs can be used to present information in a number of formats in order to make learning more accessible. For example, written information can be presented in a very large format in order to draw attention to it. Students with special needs can also have repeated explanations of learning points presented to them via

the IWB in order to check their understanding. Perhaps most importantly of all, IWBs can be used to ensure that all students in a classroom are able to participate in lessons.

Further evidence regarding the interactive whiteboard's potential is emerging in terms of how it can create an even more interactive and dynamic learning environment. A number of studies including that of Glover, Wright, and Lester [9] identified how effective use of IWBs can improve the teaching and learning for all students. Such use of IWBs can serve as a focus for teaching and learning and can serve to increase interaction between the teacher and students and also between students. However, the work of Smith, Higgins and Wallace [6] went on to stress the point that the value of IWBs will be dependent upon the effective pedagogy which is employed. The mere projection of images onto an IWB does not constitute effective use of this technology. It is of particular relevance to individuals with a disability as it can also support access to learning in a number of ways, most notably by reducing a learner's dependence on note taking and by increasing visual clarity. In addition, the use of IWBs also has the potential for learners to revisit material in a variety of formats. This is particularly relevant to individuals with a disability, such as those studied in this work, who have difficulties with participation in classroom activities as a result of their cerebral palsy.

The use of interactive whiteboard by students with cerebral palsy and other disabilities can aid them in accessing information and reduce their dependence on others for note taking. It can also make learning more visual and enable students to access information in different formats. Allsopp and his colleagues [7] in their study on use of technology by teachers of students with disabilities reported that teachers viewed the use of interactive whiteboard technology very positively as it increased participation and flexibility in teaching and learning for students with disabilities in special schools. The technology can, therefore, be very beneficial for students with cerebral palsy in special schools as it can be used to enhance their participation in classroom for effective learning.

Technology and Disability Education in Nigeria
Technology and Disability Education in Nigeria. Although Disability Education and the use of technology to support people with disabilities are topics that are receiving a lot of awareness and exposure nowadays, the implementation and use of these technologies in special needs education in many schools in Nigeria are still very far from what the policies on inclusive education are promoting due to lack of funds, paucity of infrastructure as well as the lack of training and awareness on how to use these technologies to support learning and teaching of students with special needs in the classrooms.

Adepoju and Adepoju [10] acknowledged that ICT holds a lot of promise for learners with special needs in Nigeria, however, there are challenges that are hindering the effective use of ICT for special needs education in Nigeria. Oyewusi and Adepoju [11] in their study noted that information technology can enhance learning outcomes for individuals with special needs where it is meaningfully integrated into the instructional practices of the education system. Ogbondah and Abosi [12]

noted the challenges of special needs education in Nigeria such as inadequate facilities, dearth of personnel with the requisite skills to manage children and youths with special needs and the lack of effective implementation of policies for inclusive education in Nigeria.

However, while technology-assisted instruction in general has the potential of achieving educational objectives in Nigeria's educational landscape, there is need for institutional readiness. In special needs education in Nigeria, very few local researches have focused on the use of technology to support the learning of people with specific disabilities in special schools. This study examines the use of interactive whiteboard in special education in Nigeria. The focus is on cerebral palsy learners in special schools across the country.

C. Effect of Interactive Whiteboard on Academic Performance

The use of the interactive whiteboards (IWBs) in the classroom has become an important tool in educational settings around the world and there is an increasing body of research which reports on its use and the effects that it has on student engagement and academic performance.

A quasi-experimental study was conducted by Shi et.al. [13] in order to investigate the relationship between academic self-efficacy, academic press and learning achievement of first-year college students in China in an IWB-based learning environment. The results of the study revealed that students learning in an IWB-based learning environment showed higher levels of academic press and self-efficacy than their counterparts in a traditional learning environment. However, there was no significant difference in the learning achievements of the two groups of students. Thus, while IWBs can foster a more engaging learning environment for students, their impact on learning achievement is still to be investigated.

A similar study was carried out by Ajelabi [14] in investigating the effects of IWBs on the academic performance of undergraduate students. The study was of a pre-test, post-test control group design. Participants for the study consisted of 54 students. The results revealed that there was no significant difference in the academic performance of students taught using IWBs and those taught using the conventional methods. However, students taught using IWBs showed increased level of engagement and interaction with instructional materials than their counterparts taught using the conventional methods. This implies that IWBs do not have any effect on the academic performance of students but can increase their motivation to learn.

There are many techniques that can increase the motivation of the students in the classroom to learn. For example, the use of IWBs in a study found that it increased the motivation of a group of sophomore students in a statistically significant way. The study that was conducted by Özerbas, [15] consisted of an experimental group and a control group. The experimental group used IWBs in their lessons, whilst the control group used a computer projector to display images for their lessons. The study found that the students who used the IWBs had higher motivation than the students in the control group. This study was particularly relevant to students with

special needs as they require more engagement in the classroom.

Fang et.al. [16] suggested a model to teach with IWBs in a self-learning network environment. A study on how to apply multimedia in traditional classroom to establish an interactive and collaborative learning environment could also support the use of IWBs with students with cerebral palsy in order to stimulate their learning and to encourage them in learning.

In summary, technology has the potential of enhancing learning and it is hoped that future research will look into the positive use of IWBs in the educational settings of students with special needs. The potential of IWBs in enhancing the learning of students with cerebral palsy in particular needs to be investigated in order to ensure that they are able to reach their full potential in academic terms.

D. Theoretical Framework

The theoretical framework of this study is anchored on the principles of inclusive educational design and multi-sensory approaches to teaching and learning. The multi-sensory approaches are based on the fundamental principle that learning is enhanced when more than one sense is used to teach for understanding. Therefore, multi-sensory teaching and learning approaches in schools are based on the notion that learning is better when more than one sense is used to teach for understanding.

Many of the challenges that students with cerebral palsy face in a classroom are based upon the manner in which most educational programs are structured. In many instances, a student with cerebral palsy may be very intelligent, yet because of the special needs of the student, they are not able to realize their full potential in the classroom. An Interactive Whiteboard in the classroom can be a powerful tool for overcoming some of the special needs of students with cerebral palsy by presenting information of appropriate size on the screen, the use of a variety of different media to present ideas, and the reduction of handwriting and work on the board for students.

III. METHODOLOGY

A. Research Design

The study employed quasi-experimental pretest-post-test control group design. It compared the students who utilized interactive whiteboard for learning with the ones who were taught using the conventional methods of teaching. The subjects of the study were the students who formed the experimental group and the control group.

The quasi-experimental approach was chosen for this study because students in this study were drawn from special education classrooms in a school. Thus, full randomization is not feasible for such a study without possibly disrupting normal way of organizing classes in the school. Thus, the quasi-experimental method was chosen so that chosen design could be used to investigate what can happen when students with cerebral palsy learn using interactive whiteboard technology as against those taught using conventional method of teaching and learning.

B. Population of the Study

The study was conducted at the Federal College of Education (Special), Oyo, a center where disability and special education is being taken seriously and persons with disabilities are being provided with opportunities for access to education by learning interactions with individuals who have different disabilities including physical disability, sensory defect, learning disability, speech and language defect, mild intellectual disability and cerebral palsy.

C. Area of the Study

The population under study in this research consisted of all students with cerebral palsy in Federal College of Education (Special), Oyo. There was a total of 60 cerebral palsy learners in the institution during the study period.

D. Sample and Sampling Technique

The sample size for the study was 60 students with cerebral palsy. Because the accessible population was manageable, the researchers used the entire accessible population. Purposive sampling was first used to identify students who met the study conditions. Thereafter, the participants were assigned into two groups: 30 students in the experimental group and 30 students in the control group. Attention was given to pretest performance and observable learner characteristics in order to reduce major imbalance between the groups.

E. Instrumentation

The main tool for data collection for this study was a Researcher-Developed Academic Achievement Test. This test contained 30 items which were all selected from parts of the curriculum for the age group of learners studied in this work. All items were intended to test learners' knowledge, comprehension, and application of information and concepts they learned in class prior to the study.

The classroom behaviors of students were observed using an observation schedule to observe if students were attending to lessons, participating in lessons, responding to teaching and showing visible interest in lessons, etc. The perceptions of students and teachers regarding use of interactive whiteboard technology were also collected using a perception guide.

F. Validity and Reliability of the Instrument

All the instruments were validated for face and content validity by special educationists, curriculum developers, developers of instructional materials and other experts in measurement and evaluation in education. Experts' comments on the items were utilized to make necessary amendments on the items to make them clear, relevant and adequate for children with cerebral palsy.

Reliability of the achievement test for the measurement of academic performance of students was ensured as the researcher carried out a pilot study on similar group of learners with cerebral palsy in a school, and the results were quite satisfactory and hence were used for the study. Similarly, the reliability of observation schedule for measuring learners' classroom behaviors was ensured through inter-rater agreement during the recording of the behaviors of the learners in the classrooms.

G. Procedure for Data Collection

The data for the study were collected at three stages of the study. They were collected before the study (pre-intervention stage), during the study (intervention stage) and after the study (post-intervention stage). At the pre-intervention stage, all the participants were administered the academic achievement test (researcher-developed test). The results from the test were used to compare the pretest performance of both the experimental group and the control group. In the intervention stage, the experimental group was taught on how to use the interactive whiteboard to learn while the control group was taught using the conventional method of teaching. The lessons for both groups were on same topic. The lessons for the experimental group were presented in an interactive and multimedia format. The contents of the lessons were presented in an enlarged format and were made to be visible to all learners. The lessons also included visual aids that were used to support the teacher's explanation. The lessons were also interactive lessons in which all learners were given the opportunity to respond to questions asked by the teacher. The experimental group also made use of the touch-sensitive feature of the interactive whiteboard. On the other hand, the control group was taught using the conventional method of teaching and learners made use of the board for taking notes and doing exercises. At the post-intervention stage, all the participants were administered the academic achievement test (researcher-developed test) to compare their performance after the intervention.

The study took the duration of time for the experimental group of learners to cover the contents of study for the study. Lessons were delivered to the learners with cerebral palsy in both groups of study. The researcher observed their participation and their reactions to lessons in both groups. The researcher also collected the results of the post-test of the Academic Achievement Test administered to both groups of learners with cerebral palsy after they had completed study of the contents of study for the study.

H. Method of Data Analysis

To answer the questions of the study, mean and standard deviation will be presented in a table to compare the pretest and post-test academic performances of learners with cerebral palsy in both groups. T-test will be calculated to compare the two groups on the post-test of academic performance of the students. The null hypotheses will be tested at .05 alpha level of significance.

IV. RESULTS

This section presents the findings of the study in line with the research questions and hypotheses.

➤ Research Question 1

What difference exists between the pretest and post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction?

Table 1: Pretest and Post-Test Mean Scores of Students with Cerebral Palsy Taught with Interactive Whiteboard Instruction

Group	N	Test	Mean	SD	Mean Difference
Experimental Group	30	Pretest	41.27	8.14	
Experimental Group	30	Post-test	68.43	7.26	27.16

Table 1 shows that the experimental group had a pretest mean score of 41.27 and a post-test mean score of 68.43, giving a mean gain of 27.16. This indicates substantial improvement among students taught with interactive whiteboard instruction.

➤ Research Question 2

What difference exists between the pretest and post-test mean scores of students with cerebral palsy taught through traditional teaching methods?

Table 2: Pretest and Post-Test Mean Scores of Students with Cerebral Palsy Taught Through Traditional Teaching Methods

Group	N	Test	Mean	SD	Mean Difference
Control Group	30	Pretest	40.93	7.88	
Control Group	30	Post-test	49.17	8.02	8.24

Table 2 indicates that the control group had a pretest mean score of 40.93 and a post-test mean score of 49.17, giving a mean gain of 8.24. This shows that the conventional method also produced improvement, though at a lower level.

➤ Research Question 3

Is there any difference in the post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction and those taught through traditional methods?

Table 3: Comparison of Post-Test Mean Scores of Students Taught with Interactive Whiteboard Instruction and Those Taught Through Traditional Methods

Group	N	Mean	SD	Mean Difference
Experimental	30	68.43	7.26	19.26
Control	30	49.17	8.02	

Table 3 reveals that the experimental group outperformed the control group in the post-test by a mean difference of 19.26. Research Question 4

How do students with cerebral palsy and their teachers perceive the use of interactive whiteboard technology in the teaching and learning process?

Table 4: Summary of Participant Perceptions of Interactive Whiteboard Instruction

S/N	Perception Item	Response Trend
1	Interactive whiteboard lessons were more interesting than regular lessons	Mostly positive
2	The enlarged visual display helped students follow the lesson more easily	Mostly positive
3	Audio-visual presentation improved understanding of lesson content	Mostly positive
4	Students were more willing to participate during interactive whiteboard lessons	Mostly positive
5	Teachers found the technology useful for explaining difficult concepts	Positive
6	Initial operation of the board required extra teacher effort	Positive but cautious
7	Power supply and equipment management were major challenges	Negative concern
8	Students wanted more lessons delivered with the interactive whiteboard	Mostly positive

The table shows that both teachers and students responded favourably to the use of the interactive whiteboard, though practical concerns were also raised.

Test of Hypotheses

➤ *Hypothesis 1:* There is no significant difference between the pretest and post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction.

Table 5: t-Test Analysis of Pretest and Post-Test Mean Scores of Students Taught with Interactive Whiteboard Instruction

Variable	N	Mean	SD	t	df	p-value	Decision
Pretest	30	41.27	8.14	13.42	58	0.000	Reject H01
Post-test	30	68.43	7.26				

Since the p-value is less than 0.05, the null hypothesis was rejected. There was a significant difference between the pretest and post-test scores of students taught with interactive whiteboard instruction.

➤ *Hypothesis 2:* There is no significant difference between the pretest and post-test mean scores of students with cerebral palsy taught through traditional teaching methods.

Table 6: t-Test Analysis of Pretest and Post-Test Mean Scores of Students Taught Through Traditional Teaching Methods

Variable	N	Mean	SD	t	df	p-value	Decision
Pretest	30	40.93	7.88	4.08	58	0.000	Reject H02
Post-test	30	49.17	8.02				

Since the p-value is less than 0.05, the null hypothesis was rejected. There was a significant difference between the pretest and post-test scores of students taught through traditional methods.

➤ *Hypothesis 3:* There is no significant difference between the post-test mean scores of students with cerebral palsy taught with interactive whiteboard instruction and those taught through traditional teaching methods.

Table 7: t-Test Analysis of Post-Test Mean Scores of Students Taught with Interactive Whiteboard Instruction and Those Taught Through Traditional Methods

Group	N	Mean	SD	t	df	p-value	Decision
Experimental	30	68.43	7.26	9.73	58	0.000	Reject H03
Control	30	49.17	8.02				

Since the p-value is less than 0.05, the null hypothesis was rejected. There was a significant difference between the post-test scores of the two groups, in favour of the experimental group.

V. DISCUSSION

In the study, it was observed that students with cerebral palsy who were taught with the aid of interactive whiteboard had higher post-test scores than their counterparts taught with the conventional teaching approach. Thus, interactive whiteboard teaching could be a more effective tool for enhancing academic performance of students with cerebral palsy in special and regular schools in Nigeria.

This study found that students who were taught using an interactive whiteboard scored higher on the post-test than students who were taught using the conventional method of

teaching. Allsopp and his colleagues [7] noted that the use of interactive whiteboard technology can support students with disabilities as well as classroom participation and that it can also support teachers in planning and delivering lessons. Amaker [17] also found that students with disabilities who were taught using an interactive whiteboard scored higher on measures of academic achievement than did students with disabilities who were taught using conventional teaching methods. The use of interactive whiteboards in the classroom can support pedagogy and Glover and his colleagues (2007) found that the use of interactive whiteboards in the classroom supported a more visually oriented method of teaching as well as a more active method of teaching and learning. Thus, the interactive whiteboard is particularly suited for students with cerebral palsy.

In conclusion, findings from this study were consistent with majority of technology and special education studies

conducted in Nigeria. As noted in the studies of Adepoju and Adepoju (2017), information and communication technology resources were very relevant for effective teaching and learning of students with special needs in Nigeria, despite paucity of access to these resources. Oyewusi and Adepoju [11] in a recent study noted that technology can enhance learning outcomes of students with special needs when technology is properly integrated into their instructional programs.

On the other hand, there were noticeable improvements in the performance of learners in the control group. This finding therefore supports the fact that the conventional method of teaching and learning was not ineffective in the classroom. It also depends on the way the lessons were organized and presented to the learners. Furthermore, it showed that the conventional teaching did not meet some of the special needs of students with cerebral palsy in the study. Their learning barriers could be addressed by technology in teaching and learning.

This study supports the findings of Smith et al. [6] who concluded that the use of interactive whiteboard technology can facilitate a more interactive classroom and lead to a better teaching and learning environment. Temple [18] explained that smart classroom technologies increase learner engagement in learning especially when the learning content is visual and participatory in nature. Thus, the interactive whiteboard in the learning environment of students with cerebral palsy made the learning environment more accessible and responsive to their learning needs.

On the other hand, some researchers have expressed concern regarding the use of interactive whiteboards in educational settings. For instance, Gray et al. [19] noted that the value of interactive whiteboards in terms of quality learning depends on how teachers use them. Thus, interactive whiteboards should not be confined to display of materials for learners to view on the board. The existing special education in Nigeria is bedeviled with a number of structural impediments such as lack of necessary facilities for learners with special needs, inadequate number of trained special education teachers as well as weak implementation of relevant special education policies and programs in schools. Therefore, although interactive whiteboards have been found to be effective in some cases, their sustained use and positive effects in the instructional process of special education in Nigeria would depend on the existing infrastructure to support their use, the ability of schools to sustain the proper maintenance of such technology as well as the technical competence of special education teachers to effectively integrate their use in their instructional practices.

The qualitative data obtained from the study generally showed positive perception on the part of students and teachers towards the use of interactive whiteboard technology for teaching and learning in special education. For instance, the findings of the study revealed that the students who were taught using the technology were of the view that their learning experiences were made more interesting, interactive and easy to grasp than they were before. Similarly, the

teachers who were taught how to use the technology were of the view that their teaching and learning experiences were greatly enhanced by the use of the technology as it led to increased learners' participation in class. Allsopp and his co-authors [7] posited that the positive perception of any technology is critical to increasing learner engagement in learning activities that are facilitated by such technology. However, some challenges were identified by the study. These challenges include the challenge of power supply, challenge of handling equipment and the challenge of teachers' familiarity with the use of interactive whiteboard technology for teaching and learning in classroom. These challenges are real and affect the adoption and utilization of instructional technology in the educational system of Nigeria.

In summary, using the interactive whiteboard in special education for students with cerebral palsy has great potential in Nigeria's educational settings. The successful use of the technology in teaching and learning will depend on more than just having equipment to teach with which to teach. A teacher who is competent in using technology for teaching and learning is required. A conducive learning environment to learn in with necessary infrastructure to support learning is required. A school that is committed to supporting the use of technology in teaching and learning is required. A learning environment which is to be facilitated by all to allow access to learning by all is required.

VI. CONCLUSION

This study examined the effect of interactive whiteboard supported teaching on the academic performance of students with cerebral palsy in Oyo State, Nigeria. Results showed that students who were taught using the interactive whiteboard performed better than their counterparts who were taught using the conventional method of teaching. Students in the experimental group had higher post-test mean score and greater learning gain than students in the control group. Hence, interactive whiteboard supported teaching could be an effective strategy to enhance academic performance of students with cerebral palsy.

On the other hand, the conventional way of teaching the students with cerebral palsy is not ineffective as it enhanced their learning outcome in terms of their post-test scores even though the extent of improvement recorded by them was low compared to what the Interactive Whiteboard technology taught them.

Using Interactive Whiteboards to Great Effect for Students with Cerebral Palsy in Nigeria's Schools requires school management to make adequate support structures available for teachers to use technology effectively in the classroom. Such support structures should include, but not be limited to, quality teacher training, stable electricity to power up the classroom computers, quality technical assistance, adequate administrative support etc.

RECOMMENDATIONS

Based on the study's findings, several recommendations are made.

- Interactive Whiteboard should be a part of learning for students with cerebral palsy in special schools and centers all over Nigeria.
- Government and educational agencies should provide greater funding for assistive instructional technologies in special schools and inclusive institutions.
- Teachers in special education should receive regular training on the pedagogical use of interactive whiteboards and related classroom technologies.
- School administrators should establish maintenance and technical support structures for educational technology.
- Address the electricity and infrastructure challenges in technology use in Nigerian schools through institutional and policy support.
- Future studies on the use of technology in special education in Nigeria should involve larger samples, be conducted in more institutions and involve more disability groups.
- Investigate how long students with cerebral palsy retain what they learned in class, the subjects students with cerebral palsy can learn using interactive whiteboard technology and how teachers can be taught to competently use the technology for teaching and learning.

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