

INNOVATIVE USE OF MULTIMODAL TOOLS FOR READING PROFICIENCY AMONG STUDENTS WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER

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Abstract

Generally, many children of school age experience challenges with concentration, sitting still and following directions in class. Children with Attention Deficit Hyperactive Disorder (ADHD) tend to exhibit these challenges in more outrageous manners. These tendencies can be more frequent with them and tend to have a significant impact on their learning abilities. Regrettably, this situation is yet to receive adequate attention as many of the children involved are not identified and accorded the necessary learning environments. However, researches abound that buttress the efficacy of the use of multimodal tools in the classroom for effective language/cognitive development of children with ADHD. This study therefore focuses on investigating the extent visual supports can impact on the reading proficiency of students with ADHD, particularly by aiding in attention, organization and task completion as visual cues can provide a concrete reference point for such children. The study adopted a quasi-experimental design. A sample size of twenty-eight out of four hundred students diagnosed with ADHD formed the population of the study. A randomized controlled design was employed with the treatment group receiving visual support through the use of multimodal tools and the control group receiving traditional instructions. Descriptive statistical mean and simple percentages were used to interpret the results which showed that the students in the treatment group demonstrated a significant proficiency in the reading and comprehension tasks. This suggested the valuable contribution of multimodal tools for students with ADHD. The study recommended innovations in the classrooms for inclusivity of children with ADHD.

KEYWORDS: Innovation, Visual support, Reading Proficiency, ADHD

Introduction

The 21st century has globally witnessed tremendous innovations in all spheres of human endeavor which education is paramount. Many developed nations, have through technological innovations in vocational systems mapped out strategies for curbing any challenges that would pose difficulty to meet up with the 21st Century's competencies. Whereas many nations have made giant strides with reference to education in innovations in the area of inclusivity in teaching/learning, Nigeria as a nation is still grappling to key into the movement at a snail's pace.

Language learning and its teaching in Nigeria being a major professional industry in education sector is still at its minimum level of functionality. With particular reference to the

teaching of English as a second language in Nigeria, decades of the enterprise have, however, seemed to create more and more problems if not frustrating results for both the learner and the teacher as the products of years of such teaching and learning efforts at any given tier of Nigeria's education industry demonstrate regrettable proficiency levels that belie their trainings. According to Anyanwu (2015:404) Second language learning and its teaching have become a major professional preoccupation of many linguists and grammarians in the country from primary, through the secondary to the University levels, and yet there are lingering inaccuracies of speech, grammar and calligraphy among learners (and among teachers too).

Suffice it to say that language learning as an integral segment /unit of education in the nation's academia needs innovations from the basic level for optimum improvement and learning outcomes. Thus, the government, language personnel and stakeholders should embark on formulation of school language policies that would gear toward establishing a modern and innovated learning environment, especially for children at basic level of education to ensure solid foundation that would carry them through higher levels of education. It is the extant situation of language teaching and learning in our various schools that gave the haunch of this study. The predominance of traditional language classrooms in most of our schools has adverse effects on the learners' progress. A typical instance is a traditional language classroom accommodating both children with disabilities and the neuro-typical ones. This type of learning environment exists in most public schools, where there is no school language policy and advocacy to engender innovative uses of new technological teaching gadgets that would cater for the children with such neuro-developmental disorders as Attention- Deficit Hyperactivity Disorder, Autism Spectrum Disorder, Dyslexia etc. where some policies exist, implementation becomes a problem. It is against this backdrop that the study, aimed to investigate the efficacy of Multimodal tools for reading proficiency of students with ADHD in mainstream schools with the view of establishing inclusive learning that would foster and improve the learning outcomes of these children to enable them to be at par with their peers in the language classroom.

Conceptual Review / Theoretical Review

The review of some relevant concepts that form the integral part of this study is quite expedient for clarity and comprehension. They are as follows:

Attention Deficit Hyperactive Disorder (ADHD)

This is a neuro-developmental condition marked by enduring tendencies of inattention, hyperactivity, and impulsivity, which often pose difficulties in educational settings. (Sarwar, 2023). In line with Drechsler et al,(2020), teaching children with Attention Deficit and Hyperactive Disorder (ADHD) correctly is essential in language classroom. Despite advances in educational research, there continues to be a relevant gap in both understanding and addressing the specific needs of these children in language teaching environment. According to Wikipedia 2012:1 ADHD is a developmental disorder that is characterized by the existence of attention problems and hyperactivity, with each behaviour occurring infrequently alone. Also, NIMH (2012) sees ADHD as one of the most common childhood disorders that manifest itself by way of difficulty in staying focused, inability to pay attention and difficulty controlling behaviour. The situation can continue through adolescence and adulthood. The child with ADHD is known to have a short attention span, hyperactive and frequently engages in impulsive behaviour.

Pertaining to prevalence rate of ADHD, approximately 5.29% to 7.1% of pupils globally suffer from ADHD, which is often regarded as a genetic illness (Evans et al., 2018; Neudecker et al., 2019; Young & Smith, 2017). ADHD activities frequently result in social and academic challenges that impact a student's ability to operate in the classroom (DuPaul& White 2004). In addition to not reaching their full academic potential, students with ADHD are more likely to (a) receive a lower grade, (b) drop out of school, and (c) be less likely to seek postsecondary education. Other disruptive behavior disorders like conduct disorder and oppositional defiant disorder (ODD) are exhibited by 50–60% of students with ADHD. Depression is one of the other coexisting illnesses with ADHD that might make a child's problems worse (Reiff&Tippins, 1974).

The National Policy on Inclusive Education in Nigeria (2003) is built on the premise that it is more profitable for students with special needs to have a mixed experience in the classroom in order for them to be more successful in social interaction, leading to a successful life. The implication is that students with disabilities are to be taught in the regular classroom whenever possible, rather than placed in a special education class or private school (Reiff&Tippins, 1974). These include students who have difficulty in areas such as reading comprehension, written language, note taking, rote learning, completing assignments, study skills.

Multimodality

Multimodality is currently a popular academic topic with visual literacy becoming the hallmark of the twenty-first century (Forceville 2007). With the widespread use of digital technology, the internet, and multimedia, language is no longer considered the only factor in meaning-making. According to Lim (2004), meaning is created in our multimodal society by combining semiotic resources. The goal of multimodality is to highlight the variety of semiotic resources that are employed in communication as well as the relationships among them. Ohler (2009) asserts that "the new hallmark of literacy is the ability to read and write multiple forms of media and integrate them meaningfully." emphasizing the creation of new knowledge. Viewing is further considered very important in learning as what is seen is often hardly forgotten, unlike what is heard. The use of multimodal tools therefore, provides students with the avenue to doing things with enthusiasm.

Innovations

Innovation in the context of this study refers to systematic program that is novel and unique. In simple term, innovation in the language classroom is a deliberate attempt to move educational practices and / or teaching strategies from its traditional approach to new ways. Innovation is aimed at improving the quality of existing practices in language classroom as it serves as the driving force in creating more enabling learning environment and inclusivity in language teaching and learning. According to Mkpaet. al. 2012, its importance cannot be overemphasized as it not an accidental occurrence but a deliberate effort to bring changes by integrating old and new ideas. Besides, studies have shown that greater gains accrue when language instruction moves away from the traditional approach of learning to more innovative ones. Hence, it becomes expedient to employ the innovative methods of imparting knowledge to students in order to churn out products that would meet the global standards academically, socially and technologically.

Reading Proficiency

Reading proficiency refers to a person's ability to read text accurately, fluently, and with understanding. It involves the application of the necessary expertise of knowledge and skills by the individual. To gain proficiency, one needs painstaking efforts to achieve the set goal. In the case of reading, proficiency can be attained when one is able to recognize words and sound them out correctly in addition to reading smoothly with appropriate speed,

expression, and minimal errors. Reading proficiency is essential for academic success, communication, and lifelong learning. It further entails understanding the meaning of words and phrases and grasping the meaning of the text, making connections, and drawing conclusions. It varies by age and educational level, with higher proficiency allowing individuals to read complex texts and extract deeper meaning effectively.

Reading is receptive and expressive language skills. It is also a process of getting meaning from the printed symbols while proficiency requires students' ability to read and understand information, communicate one's thoughts, ideas, feelings and experiences. Hence, Golden et. al (2001) stated that reading is the interpretation of written materials. They further explain that this interpretation is based on the ability of the reader to understand the purpose of the author as well as what the author is saying. In related development, teachers of the students' with ADHD often face challenges of inculcating reading culture in them, imparting them with improved and proficient reading skills for better learning outcomes. It is expedient to state that the most important thing about reading proficiency is comprehension for reading competence, and therefore, the benchmark for assessing the students' with ADHD under study currently.

Theoretical Framework

The study is hinged on Lev Vygotsky's (1993) Social Constructivist Learning Theory which emphasizes the importance of social interaction and collaboration in the process of learning. The underlying premise is the knowledge that multimodal tools can facilitate learning among ADHD children. It suggests that learners can construct meaning making through interactions with the More Knowledgeable Others (MKOs) like the teachers, tools, parents, peers and technological tools. This social constructivist approach establishes a crucial paradigm shift as today's literacy encourage the audience not just to be passive consumers but active contributors to their own digital experiences. (Asselin and Moayeri 2011). It further reiterates that knowledge can be co-constructed through multimodal tools which promote a sense of ownership and agency over their learning. Vygotsky's learning theory provides real world scenarios through multimodality which help ADHD children to engage in authentic, context dependent reading experiences. Above all, multimodality facilitates a sense of collaboration needed to captivate the attention of children with ADHD.

In this theory, the child is responsible for the construction of knowledge, through the interaction of new ideas (Major and Mangope, 2012). The learner thus feels able to introduce his/her own content into the classroom. Tinzman (1998) believed that “technology use tends to foster collaboration among students in the classroom”. The use of visual supports in teaching motivates, fascinates, stimulates interest, appeals to all the senses and facilitates interaction and critical thinking among ADHD learners. It is based on the foregoing that the researchers set out to examine and advocate the use of multimodal tools for teaching reading skills among ADHD students

Statement of the Problem

With so many school-age children being identified with Attention Deficit and Hyperactive Disorder (ADHD), many teachers feel ill-prepared to handle these students in their classrooms and as such, the students are either ignored or left addicted with medications as the only way of managing them. The study sought the use of visual supports to enhance learning and behavioral modifications in children with ADHD, especially in their reading skills. It fills a gap in literature by providing innovative ways of assisting children with ADHD to be active participants in the classroom thereby reducing their hyperactivity.

Objectives of the Study

The objectives of the study are to ascertain to what extent children identified with ADHD can improve their reading skills through the use of visual support.

- i. To examine in what ways visual supports facilitate reading skills in ADHD students.
- ii. To explore in what ways visual supports assist recall in ADHD students
- iii. Investigate the extent to which visual support enhances the performances of students with ADHD in reading skills.
- iv. To investigate the effectiveness of multimodal tools with ADHD students

Research questions

The study was guided by four research questions. These include:

- i. In what ways do visual supports facilitate reading skills in children with ADHD?
- ii. In what ways do visual supports assist recall in ADHD students?

- iii. To what extent does the use of visual supports enhance the performances of students with ADHD?
- iv. To what extent was the use of multimodal tools effective in the reading skills of ADHD students?

Methodology

The study investigated the effect of visual support on the reading habits of children with ADHD. A quasi-experimental design consisting of a control group and an experimental group was employed in the study. Both groups were subjected to a randomized pre-test and post-test sessions. The pre-test was conducted before the instructional phase and the post-test was administered after instructional phase to assess the changes in the reading habits before and after the interventions. The performances of both the control and the experimental groups were analyzed based on the post-test scores. The Population of the study comprised 400 students diagnosed with ADHD in some government schools in Owerri Municipal. These students were **purposively** selected to exclude those with severe ADHD symptoms or significant hearing and visual impairments. A sample size of 28 children aged 6-13 years were recruited for the study. (The reason for choosing this age group and not a younger age group is to enable them to interpret pictorial visualizations involved in the study. Their parents also gave consent for their children's participation. A random sampling technique was used in assigning the 28 students into groups A and B using numbered papers. Each group had equal number. Both groups were initially given a 10-minutes orientation on reading skills. Next, each group was split into two for the experiment.

Data presentation and Analysis

The **control group** was exposed to traditional instruction of reading from a written text. They were told that they will read the text passage and answer the questions that followed. No further introductory session was offered to the students in this group as they will not be using any pictorial intervention.

Pre-reading tasks

Stage –I: The researchers instructed the students that they will be given a passage of a written text where they will be expected to answer the questions that followed.

Phase-II: During the Tasks Performance

Stage (i): The students quickly scanned through the text initially.

Stage (ii): They read through the text slowly for comprehension.

Post Reading Tasks Session

Stage (i). The students answered the comprehension questions that followed.

Stage (ii). Their scripts were assessed and graded.

Table 1. Reading Comprehension Test Scores for the Control group

Control group	Pre test score %	Post test score %	%Change
1	50	57	7
2	61	69	8
3	70	74	4
Average	60.3	66.6	6.3

Pre-reading tasks for the Experimental group

Before the data collection began, students in the experimental group received a one-to-one introductory session from the researchers to ensure that they understood the purpose of the intervention, and were clear on what was expected of them. This was achieved by giving the children one example of a word matching a word with a picture to ensure they could identify same.

Stage (i): The researcher showed the students pictures and asked them to match them with the corresponding words. Stage (ii). The students scanned through a page with pictures and matched them with specific objects. Stage (iii). The researcher asked the students to focus on a particular picture for while and maintain attention on it. The pictures kept them enthralled, and reduced their activity rate.

Phase-II during the tasks

Stage (i): The researchers provided the students with a short passage to read accompanied pictures and cartoons based on the story. Stage ii. The researchers used pictures to support decoding of unfamiliar word.

Post reading tasks

Stage (i):Students could recall specific pictures of objects from the story.

Stage (ii):Students were able to match words fromthe passage using pictures or visual aids and assisted by the researchers.

Stage (iii). Students could answer the comprehension questions that followed.

Table 2: Reading Comprehension Task for the Experimental group

Tests	Pre test score %	Post test score %	% Change
1	52	75	23
2	65	80	15
3	68	90	22
Average	61.6	81.6	20

Table 3: Survey Responses on Reading Recall

Tests	Pre test response %	Post test response %	Change %
1	44	68	44
2	50	80	35
3	60	94	34
Average	51.3	80.6	37.6

Table 4: Enhanced Performance

Tests	Pre test observation %	Post test observation %	Change %
1	36	68	32
2	31	77	46
3	24	81	57
Average	30.3	75.3	45

Table 5: Multimodal Tools Evaluation

Evaluations on	Positive	Negative	Remarks
Easy to Use	70	30	Accepted
Effectiveness	67	33	Accepted
Collaborative use	64	36	Accepted
Fun to use	84	16	Accepted
Helps Retention	88	21	Accepted

Discussion of Findings

One of the frustrations for teachers and parents of kids with ADHD is getting a child to stop, listen, and understand what is being taught or asked of him/her. Shire (2018), note with dismay that it can be frustrating when a student seems to be constantly fidgeting, jumping up from their seat, interrupting and disrupting the whole class. It's natural for you to feel that one student is in danger of holding all the others back. Therefore, any intervention to

captivate the attention of a child with ADHD is worth exploring. Studies have shown that students with reading difficulties have challenges associated with alterations in the left hemisphere language system (Démonet, Taylor, & Chaix, 2004) especially, there are abnormal responses in the left inferior frontal region with increased activation, in the left parietal-temporal regions and the left inferior temporal-occipital regions with reduced activation during both phonological and reading tasks (Démonet et al., 2004; Hoeft et al., 2006; Shaywitz & Shaywitz, 2005). This is not applicable to only dyslexia students but also to ADHD students who have challenges in reading. The study engaged the use of visual support in the reading skills of these students. The control group was asked to read and answer the questions that followed whereas the experimental group was exposed to pictures and texts alongside. Reading culture can be achieved when students are able to develop a positive reading habit over a given period of time, (Igbokwe, Nwachukwu, Ovu and Chiadikobi 2022). But this is unattainable due to the difficulties experienced by ADHD students. The study therefore affirmed that the visuals helped them in recollection of information as they could match the text against the pictures. This is in line with Shire (2018) who advocates the use of Mnemonics for remembering, repetitions for directions the use visual maps and Colour codes their homework diaries. The use of flash cards strategies also to help the weak memories of ADHD child. The application of some of the above to the study produced results which showed significant improvement in reading comprehension scores for the intervention group as distinct from the control group with 7% scores changes in the first test as against 23% in the Experimental group. The second test score had a difference of 8% for the control group against 15% in the Experimental group while the final tests scores for both groups were 4% and 22% respectively. While the control group had a 6.3% change, the intervention group had a 20% change. Based on the above, it becomes pertinent for teachers to be informed and updated about the best ways to manage ADHD behaviors (Reiff & Tippins, 1973). The use multimodal tools becomes a plus for the teacher to keep the students engrossed in reading activities. According to Igbokwe, Nwachukwu and Nwosu (2023), multimodal tools make the classrooms dynamic, fun, and engaging for all students but more interestingly, for ADHD students.

The results showed 45% increase in reading comprehension scores for the intervention group against that of the control group. Again the survey findings showed 90% of the students enjoyed the pictorial aid. Token economies were extended to the students for each successful output and encouraging behavior at the second stage of the experiment. The

theory of Token Economy is that, if someone receives a reward for an action, then that person is more likely to repeat that action (Positive behavioral support,1998). Typical rewards of the Token Economy system are: (a) food, (b) drinks, (c) music, (d) stickers, (e) activities, or (f) privileges. This works well with ADHD students, Bender and Mathes (1995) and Brook (2002) found that the procedure is effective to reduce out of seat behavior and eliminated the behavior all together over time among students with ADHD.

Peer tutoring has also been associated with dramatic academic gains (Brock, 2002). This is one of the strategies advocated by Vygotsky in his Social Constructivist learning theory where the peers can also be the MKOs providing learning assistance to the student. The students were seen engrossed in activities as they tried to figure out the pictures and in matching them against the texts. Aside providing them with collaboration and fun learning, peer learning through visual support also provided the students with the avenue to exhibit critical thinking. The Peers were seen to lessen the frustration of learning material, and they tended to be more direct and supportive than adults. The use of peer tutors or peer tutoring, increases student's time on task and improve academic performance (Harlacher, Roberts, & Merrell, 2006).The researchers further observed that the students were more focused with rapt attention, as they solved the puzzle of the tasks at hand.

Conclusion

There is no one intervention that will improve the classroom functioning of all students with ADHD (Brock, 2002) at the same time. Teachers need to employ a variety of interventions in the classroom if they are to help students with ADHD succeed in school (Duhaney, 2003), more so, in their reading skills. When these strategies are combined and used by teachers, they can increase the success of students with ADHD and help to reduce their hyperactivity (Cathleen-DuPaul et al., 1996). As the study proves, the use of multimodal tools, especially pictorial interventions proved a success for the study. Further studies can be conducted on other more complex tools to see the effect of the reading habits of ADHD students in our public schools.

Recommendations

1. Incorporate multimodal tools such as pictures, audio visuals into reading instructions for students with ADHD.
2. Differentiated instructions should be imbibed to meet the needs of different students.

3. Multimodal tools can be used to provide social interactions for the students for collaboration and improvement in their critical thinking.
4. Teachers can use charts to monitor progress and adjust instructions accordingly for the students.

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