



(RESEARCH ARTICLE)



Gamification and word recognition skills of pupils' with attention deficit hyperactivity disorder in Calabar municipality, Cross River State, Nigeria

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Abstract

The purpose of this study was to determine the effect of Gamification on Word Recognition Skills of pupils with Attention Deficit Hyperactivity Disorder (ADHD) in Calabar Municipality. To achieve this purpose, two research questions and two research hypotheses were formulated to guide the study. The study employed the quasi-experimental research design using pre-test-post-test non-randomized control group design. The population of the study comprised 104 Attention Deficit Hyperactivity primary one pupils in the 23 public schools in Calabar Municipality. A sample size of 47 ADHD pupils in three intact classes were used in the study. Three public primary schools in Calabar Municipality were randomly sampled using Cap and Draw method and all the ADHD pupils in the three schools participated in the study. Adapted Attention Deficit hyperactivity disorder (ADHD) diagnostic checklist, Pupils performance test on Word Recognition Activity Test (WRAT) and Instructional (treatment) package on Go-Fish Game were the instruments used for data collection. The instruments was subjected to face and content validation by three specialists and yielded a reliability Co-efficient of .86. Mean and standard deviation were used for answering research questions while Analysis of Co-Variance (ANCOVA) was used to test the hypotheses at .05 level of significance. The results of the analysis revealed significant difference in academic performance of ADHD pupils taught picture clues with the help of Go-Fish Game. The reading game was found to be more effective in improving ADHD pupils' word recognition skills. There was no significant difference in word recognition skills given their cognitive ability levels. Some recommendations were made to include that teachers should embrace the 21st century skills by effectively using diverse instructional language games to stimulate the desire to learn among pupils with ADHD so as to conquer their academic deficiencies and challenges.

Keywords: Gamification; Word Recognition Skills; Attention Deficit Hyperactivity Disorder; Picture Clues; Cognitive Ability Levels

1. Introduction

One of the objectives of teaching English Language in primary schools in Nigeria is to enable the learners to communicate fluently, independently and accurately in everyday life. Being an integral subject in the curriculum, the learner at the foundation stage must have grammatical, lexical and semantic knowledge in the four language skills (Reading, speaking, listening and writing) which enable him/her to have sufficient command of English in spoken and written forms.

Word recognition is the key to life-long reading skills. Word recognition is the ability of a reader to recognize written words correctly and virtually effortlessly, as rapid and effortless word recognition is the main component of fluent reading which is the foundation of the reading process. However, young children need to acquire skills to become good readers. One of such skills is Word Recognition which refers to the ability of a reader to identify, read and analyze the meaning attached to the word in a sentence. It is the main component of fluent reading and the basic foundation skill of any reading process. Word recognition has several components among which are: context clues, picture clues, word

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analogy and structural analysis. These clues help the learners to accurately recognize words which are a key ingredient of reading acquisition (Spencer and Maris, 2010).

Studies have revealed that learners with Attention Deficit Hyperactivity Disorder (ADHD), present impairments related to learning when they read. ADHD is a neuro-developmental disorder or condition that affects the way the brain receives, processes and responds to information. This disorder is caused by an impaired prefrontal cortex (PFC) development that affects executive function, particularly inhibition resulting in loss of cognition and behavioural control (American Psychiatric Association, 2000).

Studies have revealed that learners with ADHD present difficulties related to decoding such as reading errors due to grapheme, phoneme, mismatches, syllable, and errors by omission as well as substitution of words. These difficulties are caused by attention problems and use of the working memory to manage information necessary for phonological processing of words. They find it difficult to concentrate on a text and following a narrative connecting a text to their prior knowledge of a topic or guessing at the meaning of unknown words in a context (Barkely, 2014). The author asserted that word recognition skills are very difficult to acquire and recommended that teachers must employ a variety of methods, techniques and skills which will make learning more active, interesting and participatory. Teachers must not only teach children how to read and write but internalizing instructional media that will make them acquire new skills, concepts and language competencies.

One of such media that has the power to shore up retention as well as capture the learner's attention is gamification. Gamification is one of the educational approaches and techniques that increases motivation and engagement of learners. According to Linda (2017), gamification is the use of game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning and solve problems.

Picture Clues have long been considered as valuable aids to teach word recognition skills among ADHD learners. Picture Clues are reading materials in pictorial form which give clues to what the word under the pictures mean. Picture clues can often help with recognition of words; pictures of objects, places, and people among others are very useful in teaching ADHD Children especially at initial reading instruction. Since beginner- readers run into unknown words, picture clues are helpful for decoding these words. They provide contexts which help children make guesses about words that are unfamiliar. Repeated exposure to pictures and what they depict may result in children recognizing and connecting words instantly (Muhanna, 2012).



Figure 1 Picture Clues of animal and cup

Picture supported teaching methods help ADHD children recognize words. Pictures are generally a direct illustration of the presented words. One strategy that can be used to help students with ADHD meet their goals in word recognition skill is to use pictorial games adapted specifically for students with ADHD.

A study by Alali and Al Barakat (2024) on the impact of picture-based activities in enhancing comprehension skills among young children in Indonesia involved 380 children split into experimental and control groups with 190 pupils exposed to picture-based game activities, while the control group of 190 taught conventionally. Findings indicated significantly higher average scores in reading comprehension test using picture based game activities in improving comprehension skills.

Caudill (2021) study compared the effectiveness and efficiency of two instructional conditions on the reading comprehension of fifth and sixth grade students with moderate and severe disabilities. Words plus pictures and words alone condition were examined through the use of an adapted alternating treatment design replicated across 3 participants. Results indicated that word plus pictures proved very effective on the reading comprehension of fifth and sixth grade students with moderate and severe disabilities.

Also a study conducted by Nurhayati (2014b), investigated retelling the ideas and summarizing text using interesting picture series that can increase students' motivation in the reading class especially to improve their reading comprehension. They got more strategies to deliver their ideas to other friends after participating in creating picture series and using those reading strategies. The current research investigated improving students' pronunciation ability through Go Fish and Maze Game; moreover it was also conducted to get more information on activities which make them tend to become more confident to pronounce some basic words in enjoyable situations.

Pupils' cognitive ability level and instructional games show that instructional games can be an effective tool among learners of different learning styles (High, Medium and Low) in the language classroom. Research studies have revealed that although both high and low ability groups learn as much by instructional games as by conventional instruction, low ability groups learned relatively more on the basis of percentage gained from pretest to posttest (Gambari, 2010).

Gambari (2010), investigated the effectiveness of video-based game cooperative learning strategy on high, medium and low academic achievers in mathematics. The study used a population of 120 second year senior secondary mathematics students in Minna, Nigeria. The authors reported that the use of cooperative video-based instruction package improved the performance of students in mathematics as well as enhanced equal performance of students at different achievement levels (High, Medium and Low). The researcher opined that no significant difference existed between the high, medium and low achievers when taught mathematics using video base instruction and that achievement levels had no influence on the academic performance of the students.

ADHD learners sometimes find word recognition skills problematic and yet often manage to counteract this problem when reading text, by making intelligent inferences about the general idea of the text. Nevertheless, ADHD learners can reach a great height of language proficiency if appropriate instructional strategy, media, method or technique is employed. It is against this background that this study was carried out to examine the Effect of Gamification on Word Recognition Skills of pupils with Attention Deficit Hyperactivity Disorder in Calabar Municipal Area of Cross River State, Nigeria.

2. Theoretical Framework

2.1. Theory of Gamified Learning by Richard Landers (2015)

The theory of gamified learning by Richard Landers (2015) was considered relevant to this study. The theory of gamified learning provides a theoretical framework to test the impact of gamified efforts upon learner behaviour and attitudes, as well as the effect of these behavioural and attitudinal changes on learning. The theory reveals that learners who engage with a task more often, produce greater knowledge and skill than those who do not practice. Many games increases student time-on-task as one of the primary motivations for incorporating games in the classroom.

Landers introduced the theory of gamified learning to explain the casual paths by which gamification intervention can affect outcomes for learners across a wide variety of contexts. This theory describes two specific processes by which gamification can be used to affect learning outcomes: a mediating process and moderating process. Incomplete consideration of the psychological processes involved can result in gamification appearing to fail to achieve intended results. However, failures can in fact occur at multiple points, and the fault is only sometimes due to design evaluation.

This theory is relevant to this study as it help ADHD pupils come in contact with new ways and methods of learning where it provides them with the appropriate path to improve their learning outcome in the context of education and training. They are fully engaged in the game where they can construct their own learning, think critically and gain attention on what is presented to them. This implies that designers working to build a scientific literature of gamification must identify the target process carefully and only decide upon an appropriate instructional design and rigorous evaluation strategy of that process.

2.2. Statement of the Problem

The researcher, in her observation as a teacher, has realized that some pupils find it difficult to learn. They find it difficult to adhere to instruction; some are rowdy and loud, while some will just decide to be quiet and uninvolved with other kids. Some also cannot stay still, they like to run around and squirm in their seats even when they are forced to stay still. They like to attract too much attention to themselves by making so much noise not minding where they are. The children climb windows during classes, they daydream, fidgets and loses focus on activity in class; and because of their inattention, performance in English Language tends to suffer. The researcher's on-the-spot interaction with other teachers of English Language revealed that effort has been made to stop this act but to no avail. More often than not,

teachers are faced with quite a number of difficulties managing the learners. The teacher becomes angry, less focused, frustrated and stressed up. These observations and experiences were what caught the interest in this research on the use of game to teach word recognition skills to see whether the learner's attention will be captured to learn. Teachers are dissatisfied with the current method of teaching reading in public primary schools, today you see pupils still unable to read simple sentences even after basic education.

However, for ADHD pupils to improve in word recognition, should teachers embrace the 21st century skills by employing techniques, strategies, methods and media which can make learning more interesting and participatory as well as capture and sustain learners' attention? Can Go- Fish game make learning more engaging and motivational? Can its combination of colours make complex or abstract concepts simple for learners? Since children are influenced by fantasy, can the pictures and colours transport them to places not otherwise familiar in their experience? By this can the learners be fully engaged with their body, mind and emotion thereby making learning more permanent on the part of the learners? It is against this backdrop that the researcher poses the question 'Can Go-Fish Game be used to improve the word-recognition skills of primary one pupils with Attention Deficit Hyperactivity Disorder in Calabar Municipality Area of Cross River State'?

2.3. Purpose of the Study

This study was to determine the effects of Go-Fish Game on Word Recognition Skills of pupils with ADHD in Calabar Municipality. The study addressed the following research questions:

- How do pupils taught Picture Clues with the help of Go-Fish Game and those taught with expository method differ in their academic performance?
- To what extent does pupils of different cognitive ability levels differ in Word Recognition Skills when taught with the help of Go-Fish Game?

2.4. Hypotheses

The following null hypotheses were formulated to guide the study

- There is no significant difference in the Performance of pupils' taught Picture Clues with the help of Go-Fish Game and those taught with expository method.
- There is no significant difference in Word Recognition Skills of pupils of different Cognitive Ability Levels when taught with Go-Fish Game.

3. Method

The study adopted a quasi-experimental research design using pre-test post-test non-randomized control group design. The study was conducted in Calabar Municipality Area of Cross River State, Nigeria. The population of the study comprised 104 Attention Deficit Hyperactivity primary one pupils in the 23 public schools in Calabar Municipality. A sample size of 47 ADHD pupils was used in the study. Three public primary schools in Calabar Municipality were randomly sampled using Cap and Draw method and all the ADHD pupils in the three schools participated in the study. In the three schools, 26 were in the experimental group while 21 were in the control group.

The following instruments were used to gather data for the study. Adapted Attention Deficit hyperactivity disorder (ADHD) diagnostic checklist, Pupils performance test on Word Recognition Activity Test (WRAT) and Instructional (treatment) package on Go-Fish Game. ADHD Diagnostic Checklist and Word Recognition Performance Test (WRPT) were trial tested on 24 pupils who were not part of the main study. The instruments were subjected to face and content validities. The content validity was established using test blue print. The face validity which had a 15 item questions was given to three experts, one English Language specialist, one lecturer in the Department of Educational Technology and one expert in Test and Measurement. In order to establish the reliability of the instruments for this study data were collected, coded and analyzed using Kendall's Coefficient of Concordance for ADHD Diagnostic Checklist which yielded coefficient index of .82, while Kuder Richardson Formula-21 was used to determine the internal consistency for Word Recognition Performance Test (WRPT) which yielded a coefficient index of .86 which considered the instruments reliable and suitable for the study. Descriptive statistics of mean and standard deviation were used in answering the research questions while analysis of Co-Variance (ANCOVA) was used for testing the hypotheses at .05 level of significance.

4. Results

4.1. Research Question 1

How do pupils taught Picture Clues with the help of Go-Fish Game and those taught with expository method differ in their academic performance?

Table 1 Mean and Standard Deviation of Pupils' Academic Performance Picture Clues with Go Fish Game and Expository Method

Picture Clues	N	Pre-Test		Post-Test		Gain Score
		\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	
Go Fish Method	26	3.00	1.17	5.69	1.76	2.69
Expository Method	21	2.10	1.18	1.90	1.18	0.20

The result in Table 1 indicated that the mean performance gain score of pupils taught Picture Clues with go fish game is 2.69, while that of pupils taught using expository method was .20. The mean gain score difference between the two groups is 2.49 in favour of pupils taught picture clues using go fish game. Therefore, there is a difference in the performance of pupils taught picture clues using go fish game and expository method.

4.2. Research Question 2

To what extent does the Use of Go-Fish Game affect the academic performance of pupils of different cognitive ability levels in Word Recognition Skills?

Table 2 Mean and Standard Deviation of Pupils' Academic Performance Taught Word Recognition with Go Fish Game Based on Ability Level

Ability Levels	N	Pre-Test		Post-Test		Gain Score
		\bar{X}_1	SD	\bar{X}_2	SD	
High	11	14.42	3.09	22.20	4.47	7.78
Medium	9	10.67	2.94	17.05	4.50	6.42
Low	6	7.67	3.44	14.25	3.01	6.58

The result in Table 2 indicated that the mean performance gain score of students with high ability level is 7.78, that of pupils with moderate ability level was 6.42 while pupils with low ability level was 6.58. The mean gain score of pupils with high ability level was the highest while pupils with medium and low ability level was the least indicating that pupils taught word recognition differ in their performance based on ability level.

4.3. Hypothesis 1

There is no significant difference in the Performance of pupils' taught Picture Clues with the help of Go-Fish Game and those taught with expository method.

Table 3 Analysis of Covariance of the difference in the Performance of Pupils Taught Picture Clues Using Go Fish Game and Expository Method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	179.51 ^a	2	89.76	42.70	.00
Intercept	54.94	1	54.94	26.14	.00
Pretest	12.86	1	12.86	6.12	.02
Teaching Method	114.67	1	114.67	54.55	.00

Error	92.49	44	2.10		
Total	1024.00	47			
Corrected Total	272.00	46			
a. R Squared = .660 (Adjusted R Squared = .645); F-Crit = 2.01					

The result in Table 3 reveals that the calculated F-value of 54.55 is greater than the critical F-value of 2.01 at 1 and 45 degrees of freedom and at .05 level of significance. With this result, the null hypothesis was rejected. Hence, there is significant difference in the performance of pupils in picture clue taught with the help of Go-Fish Game and those taught with expository method.

4.4. Hypothesis 2

There is no significant difference in Word Recognition Skills of pupils of different Cognitive Ability Levels when taught with Go-Fish Game.

Table 4 Analysis of Covariance of the difference in the Performance of Pupils Taught Word Recognition Using Go Fish Game Based on Ability Level

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	45.55 ^a	3	15.19	.96	.43
Intercept	434.19	1	434.19	27.44	.00
Pretest	41.46	1	41.46	2.62	.12
Ability Level	7.75	2	3.87	.26	.79
Error	284.81	18	15.82		
Total	10716.00	22			
Corrected Total	330.36	21			
a. R Squared = .138 (Adjusted R Squared = -.006) ; F-Crit = 2.01					

The result in Table 4 reveals that the calculated F-value of 0.25 is less than the critical F-value of 2.01 at 1 and 45 degrees of freedom and at .05 level of significance. With this result, the null hypothesis was retained. This means that there is no significant difference in Word Recognition Skills of pupils of different Cognitive Ability Levels when taught with Go-Fish Game.

5. Discussion of Findings

5.1. Games and Picture Clues among Pupils with Attention Deficit Hyperactivity Disorder

The result of testing null hypothesis 1 indicated that there is a significant difference in the Performance of pupils' taught Picture Clues with the help of Go-Fish Game and those taught with expository method. The result in Table 3 indicated that the mean performance of pupils taught picture clues using go fish game was higher than that of pupils taught using expository method. The reason for this result could be that the pupils' continual spinning to the various animals on the card keeps the focus and help accurate word recognition easier. It could also be that the prepared pictures with different colours appears attractive and captures the interest of the pupils. The results agree with the findings of Caudill (2021) study who compared the effectiveness and efficiency of two instructional conditions on the reading comprehension of fifth and sixth grade students with moderate and severe disabilities. Words plus pictures and words alone condition were examined through the use of an adapted alternating treatment design replicated across 3 participants. Results indicated that word plus pictures proved very effective on the reading comprehension of fifth and sixth grade students with moderate and severe disabilities.

5.2. Games and Academic Performance of ADHD Pupils based on their Cognitive Ability Levels

The result of testing null hypothesis 2 indicated that there is no significant difference in Word Recognition Skills of pupils of different Cognitive Ability Levels when taught with or without Go-Fish Game. The result in Table 4 indicated that the three ability levels had equivalent mean gain scores. Both the high, middle and low learners in the Go-Fish group had comparable performance. This can be attributed to the use of design element such as colour, pictures, diagrams which were all incorporated in the instructional package. The design elements were able to mediate between the experiences of the low learners and thus spur them up to understand the lessons as good as their high ability counterparts. This findings supports earlier studies of Gambari (2010), who investigated the effectiveness of video-based game cooperative learning strategy on high, medium and low academic achievers in mathematics. The study used a population of 120 second year senior secondary mathematics students in Minna. The authors reported that the use of cooperative video-based instruction package improved the performance of students in mathematics as well as enhanced equal performance of students at different achievement levels (High, Medium and Low).

6. Conclusion

Based on the findings of the study, it was concluded that the use of Go-Fish Game do enhance academic performance of ADHD pupils in Word Recognition Skills in Calabar Municipality, Cross River State, Nigeria.

Recommendation

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

There is need for teachers to embrace the 21st century skills by effectively using diverse instructional language games to stimulate the desire to learn among pupils with ADHD so as to conquer their academic deficiencies and challenges.

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