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Message from the Editor

I am very pleased to publish second issue in 2021. As an editor of International Journal of Global Education (IJGE), this issue is the success of the reviewers, editorial board and the researchers. In this respect, I would like to thank to all reviewers, researchers and the editorial board. The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to International Journal of Global Education (IJGE), For any suggestions and comments on IJGE, please do not hesitate to send mail.

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EMOTIONAL AND COGNITIVE BEHAVIOURAL THERAPIES ON ACADEMIC PERFORMANCE OF SECONDARY SCHOOL STUDENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER IN IBADAN, OYO STATE, NIGERIA

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Abstract

The study determined the effectiveness of emotional and cognitive behavioural therapies in enhancing the academic performance of ADHD in Mathematics among senior secondary school students in Ibadan. To ascertain the degree of therapeutic efficacy, a randomized sample of 45 senior secondary school students with 15 participants in each from three different senior special schools in three different local government areas in Ibadan were chosen for the purpose. The quasi-experimental study employed a randomized sample that undertook training in Emotional and Cognitive Behavioural Therapies and with a control group were used. The instrument used for data collection are Mathematics achievement tests prepared by the National Examination Council (NECO) for 2017 & 2018 objective Mathematics papers were used since the instrument was prepared by the Public Examination body there is no need for revalidation of the instrument. A pair of pre-test and post-test data was obtained from each participant who formed the basis of the findings using ANCOVA for data analyses. Three hypotheses were formulated and tested at $\alpha = 0.05$ level of significance. Results showed that there were significant differences in the treatment with Cognitive Behavioural Therapy being more significant in enhancing Mathematics achievement among ADHD senior school students. Also, the results showed that gender and age have to do with the enhancement of academic performance among senior secondary school students with ADHD. It was therefore concluded that Emotional and Cognitive Behavioural Therapies can be used to enhance senior Mathematics academic performance of students with ADHD and recommendations are also offered.

Keywords: Emotional behaviour, Cognitive behaviour, Therapy, Performance, Attention Deficit Hyperactivity Disorder.

INTRODUCTION

Children with attention deficit hyperactivity disorder often present with the poor academic performance which negatively impact almost all areas of their lives. The condition is a prevalent Emotional and Behavioural disorders that can affect the scholastic and social functioning of school-age children and it is characterized by developmentally inappropriate behaviour, such as inattention, impulsiveness, hyperactivity and social skill deficits. It is most often discovered during the early school years when a

child begins to have problems paying attention. The condition can continue into the teen years and on to adulthood and though its exact cause is unknown, research is ongoing to study the brain for clues. Several factors like heredity, chemical imbalance, brain damage, poor nutrition, infections and substance abuse during pregnancy, exposure to toxins such as lead in early childhood, injury to the brain or a brain disorder may contribute to the development of attention deficit hyperactivity disorder (Daalsgard, 20l3). Social rules and relations are created, communicated and exchanged in verbal and nonverbal ways (Kully, 2012). These are generally acquired through incidental learning; watching people, copying the behaviour of others, practising, and getting feedback. Social skills are practised and learned by playing with a grown-up and through other childhood activities. The finer points of learning skills are developed by observation and peer feedback. Children with attention deficit hyperactivity disorder often miss these details. They may pick up bits and pieces of what is appropriate but lack an overall view of social expectations. Unfortunately, as adults, they often realize that something is wrong but they are never quite sure what it is. Social acceptance can be viewed as a spiral going up or down because individuals who exhibit appropriate learning skills are rewarded with more acceptance from those with whom they interact and are encouraged to develop even better social skills. Although social skills deficits are a central feature of attention deficit hyperactivity disorder, very few children with the condition receive adequate social skill training or programme (Hume, Bellini &Pratt, 2005). This is a troubling reality especially considering that the presence of social impairment may lead to the development of more detrimental outcomes, such as poor academic achievement, social failure, dropping out of school, peer rejection, anxiety, depression, and other negative outcomes (Tantam 2000, Welsh, Park, Wildaman, O'NeiI, and Elksnin (1998) reported that a lack of social skills are directly correlated to a nation's unemployment and under employment rates. Irrespective of the sub-type of the condition, individuals with attention deficit hyperactivity disorder often experience social difficulties like social rejection and interpersonal relationship problems as a result of their inattention, impulsivity and hyperactivity. Such negative interpersonal outcome causes psychological difficulties, and they also contribute to the development of comorbid mood and anxiety disorders. For most children with attention deficit hyperactivity disorder, social interactions are problematic and the combination of impulsivity, immaturity and difficulty in reading the social cues of others can lead to difficult peer and adult relationship.

Positive relationships with friends in childhood reduce stress and help to protect against psychological problems. However, children with attention deficit hyperactivity disorder (ADHD) lack these positive interactions and thus are at risk for a number of emotional problems, such as anxiety, depression and low self-esteem. As they grow older, their social problems get worse and their inappropriate behaviour leads to social rejection and exacerbates their inability to relate to others appropriately. In the long term, these children are more likely to have difficulty finding and maintaining successful careers because social aptitude can make or mar careers and relationships in the adult. Furthermore, ADHD is related to poor academic performance aid frequently associated with children exhibiting externalizing disorders such as delinquency and conduct disorder, as well as those with an internalizing disorder like depression and anxiety (Warnes, Sheridan, Geske &Warnes, 2005). Impairment in social skills is related to a broad range of problems including juvenile delinquency, socialization, withdrawal, aggression, antisocial behaviours, mental health problems and dropping out of school (Matson Wilkins, 2009). By contrast children without ADHD represents children who are able to adjust to their environment, succeed in avoiding conflict and maintain good communication with others (Cummings, Kaminski Merrell, 2008). Children who develop adequate social skills tend to exhibit fewer problems with adult and peers and better adjustment in the society (Shahim, 2004).Socially competent children are more effective in recognizing the emotions of others and in themselves, regulating their own emotional experience and sympathizing with the emotions

of their peers. Conversely, children with attention-deficit hyperactivity disorder lack the ability to establish and sustain successful relationships with their peers and teachers (Yukay-Yuksel, 2009).

ADHD may have a particularly serious impact on a certain part of your life, such as job performance. A therapist can help you work on areas that need special attention, giving you strategies that can help in specific situations at work and elsewhere. One widely used approach is Cognitive Behavioural Therapy (CBT). This type of psychotherapy helps people change negative thought patterns into positive, healthier ways of thinking. The idea is that if you change the way you think about a situation, your feelings and behaviours can change, too. For example, CBT may help change "all or nothing" thinking, in which many people with ADHD tend to think that their accomplishments must be either perfect or a failure.

CBT is very focused on giving you tools to help deal with stresses and challenges in life. Working on self-esteem is often a very important aspect of ADHD treatment. Cognitive restructuring therapy is a psychotherapeutic process of learning to identify and dispute irrational or maladaptive thoughts, such as all-or-nothing thinking, magical thinking and emotional reasoning which are commonly associated with many mental health disorders. Due to prevailing situations in Nigeria, many students are bombarded with negative 'thoughts which include: education is not a means to get wealth, graduates who passed out from various higher institutions of learning are jobless, graduates are being employed as drivers at Dangote Company, Most taxi drivers are graduates, 'Okada' riding business is even more lucrative than schooling, reading and passing an examination is psychologically and emotionally/intellectually tasking etc, and replacing all these negative thoughts with beneficial ones. All of the above thoughts and many more are categorised as "school avoidance thought" and if intervention packages are not put in place, students would not only drop out of school, those that are in school will be of sub-standard value for they are there just to please significant beings in their life and the achievement of educational goals and objectives as it is contained in the National Policy of Education (2014) would be a mere dream.

Cognitive restructuring employs many strategies, such as Socratic (questioning method), thought recording and guided imagery and a number of studies have indicated -that it is efficacious. Since the therapy has been effective in the treatment of depression, anxiety disorders (Gould, Safren. Washington & Otto, 2004), bulimia, social phobia. Borderline personality disorder, attention deficit hyperactivity disorder (Brown, Heimberg & Juster 2005). Also, Cognitive restructuring is also found to be efficacious in the reduction of truancy behaviour among senior secondary school students (Modo. Akpabio & Archibong. 2014) hence, it is the belief of the researcher that the therapy too will be of tremendous benefit to the participants of this study i.e. Senior Secondary School Students with ADHD whose attitude and interest in schooling are yet to improve.

Cognitive restructuring skill is a general competence that largely determines the cognitive style of a child. For example, a difference in restructuring ability between field dependent and field independent people is manifested in their intellectual functioning (Goodenough & Karp, 2005; Gough & Olton, 2006). The cognitive preference of an individual is manifested in his mode of attending to the subject matter of tasks, (Health, 2004). It then becomes necessary to restructure individual illogical thoughts capable of diverting students' attention to beneficial ones.

ADHD is not just about paying attention in conversations and in meetings. ADHD can lead to frequent emotional ups and downs, which can hamper relationships and everyday activities. Just waiting in line can make a person with ADHD quite irritable. So can minor setbacks, such as having a project not turn out quite right or having a boss who changes deadlines or who demands more work at the last minute. It may help to find a psychiatrist or another type of therapist and meet regularly to discuss your symptoms and any challenges or successes in your life. It is also common for adults with ADHD to have other mental

health conditions. Having ADHD along with another condition can severely interfere with daily functioning.

The second therapy to be applied is emotional therapy in enhancing senior secondary school Mathematics academic performance. Academic emotions are defined as students' emotional experiences related to the academic processes of teaching and learning, these include, hopelessness, boredom, anxiety, anger, and pride (Pekrun, Goetz, Titz, and Perry, 2002). Before effective learning takes place, students need to be considered because all learning is directed towards their all-round development. Although, learning is a didactic process which means that both teachers are learners are learning yet the result of teaching should be significant in the life of students. The creation of an enabling environment by the teacher is very important. Well ventilated classroom, good sitting arrangement, avoidance of overcrowded classroom, good teachers and students' relationships and provision of classroom motivation would help students to enjoy their learning.

However, several authors have worked on the causative factors associated with poor enhancement of academic performance among Nigerian students which are organismic (Adeyemo, 2005; Salami, 2010). Also, experts in the field of science education and psychology have shown consistently the effects of some factors affecting student's poor academic performance (Akinsola 1994; Akinsola & Animasahun, 2007). Some of these factors examined were gender, interest in schooling, emotional intelligence, Mathematics self-concept, age, depression, self-efficacy among others. Hence, based on their causative effects and potency in previous studies in solving psychological problems, the present study investigated the moderating effects of gender and age on poor academic performance among senior secondary school students with ADHD in Mathematics in Ibadan metropolis.

Gender refers to differences in students in terms of being male or female. Gender is a major factor that influences the subject interest of students. Further explanation in this context shows that Home Economics, Nursing, Secretary-ship and other feminine related careers have been traditionally regarded as aspects of the school curriculum reserved for females (Chan, 2001). Based on this, males choose male stereotyped occupations and females choose female stereotyped occupations. According to Wang and Ye (2015), more difficult tasks are usually reserved for males while less difficult ones are considered feminine in a natural setting. Ekeh (2003) discovered that male students performed better than females in science and Mathematics. These differences in performance can be attributed to gender which encourages male and female students to show interest in subjects relevant and related to the roles expected of them in the society. Studies have shown that gender has a negative impact on the Cognitive performance of students as girls perform better without the boys and vice versa (Akinsola & Animasahun, 2007, Okon, 2003). Gender differences in Mathematics achievement begin to appear at the upper primary school level and an increase in secondary school (Akinsola & Animasahun, 2007, Makau, 2004; Obura, 2001). These differences are caused by an interaction of factors within and outside the school as well as by the students' background (Makau & Coombe, 2004).

Gender influence can be considered as the variation in students learning outcomes that can be associated with being male or female. Students' gender from time has been documented to be unique in terms of learning abilities. Literature has shown that male students are likely to perform better in analytical subjects while their female counterparts perform better in language areas. Gender is considered a moderating variable in this study owing to its possibility of influencing the relationship between the experience students had during their virtual learning and the academic outcome as against those who did not have access to it. Observation has shown that variation has been discovered in male and female students

learning in the traditional model, likewise the technology option which is the virtual mode that could create more variance.

Age has also been identified as another factor that could affect the academic performance of senior secondary school students with ADHD negatively. According to Johnes (2018), the age of a student on entry to the university can have two different and opposite effects: If a student leaves his/her job to continue his/her studies, such maturity and dedication may positively influence the academic performance of the individual. On the contrary, it could be argued that older students might have forgotten their academic life and they may be in a difficult position to adjust. Studies conducted by Jansen (1996), and Vander Hulst and Jansen (2002) showed that younger students have better study or cognitive progress than older students, thus indicating that, higher age is an indicator of lower cognitive ability. Other studies have shown that younger students drop out less often than older students (Mclnnes 2000; Murthaugh, Burns & Schuster, 1999). However, Trueman and Hartley (1996) found older students to perform equally well or sometimes better than younger students due to maturity. According to Trueman and Hartley, this fact could be mediated by time-management skills that, older mature student, were better in time management. Furthermore, according to Mclnnes, James and MacNaught (1995), mature students have clearer career orientation and lower integration needs. Therefore, they would likely achieve better results.

Statement of the Problem

There are diverse ways of solving a problem. If a problem cannot be solved medically it can be solved by applying psychotherapy. On this occasion, the problem of children with ADHD can be solved by using psychotherapy like emotional and cognitive behavioural therapies which are psychotherapy in nature. Solution is sought for this category of people in that parent who give birth to this type of children cannot be told to hide their children at home neither can they be told that their children are useless or that their children are not educable. In order to alleviate the fear or problem of the parents by not making these children over-dependence for life they must have the right to education so that they can be useful to themselves, their parents and the society at large. Therefore, the researcher had studied the emotional and cognitive behaviour therapies critically and through literature, applied the two therapies to a sample of these children in enhancing their academic performance in general and in Mathematics in particular with the notion that once they can improve in Mathematics, they will be able to perform well in other subjects.

Purpose of the Study

The general purpose of this study is to investigate the effectiveness of emotional and cognitive Mathematics among senior secondary school students in Ibadan, Oyo State, Nigeria. The specific purposes of the study are: (i) to examine the main effect of treatment on academic performance of students with ADHD in Mathematics in selected senior secondary school students. (ii) to determine the main effect of moderating variables (gender and age) on academic performance of students with ADHD in Mathematics in selected secondary schools.

Hypotheses

The following null hypotheses were tested at the $\alpha = 0.05$ level of significance.

1. There is no significant main effect of treatment on academic performance of students with ADHD in Mathematics in selected secondary schools.
2. There is no significant main effect of gender on academic performance of students with ADHD in Mathematics in selected secondary schools.
3. There is no significant main effect of age on academic performance of students with ADHD in Mathematics in selected secondary schools.

Design

A 3 x 2 x 2 pre-test, post-test and control group experimental design was used for this study. There were two treatment groups Emotional and Cognitive Behavioural Therapies) and one control group. The two experimental groups and the control group make the three rows i.e. A_1, A_2, and A_3 while the columns contain the moderating variables which are gender varied at two levels (male B_1 and female B_2) and age subsumed under gender and varied at two levels (young C_1 and old C_2). The effect of such on the dependent variable (academic performance of students with ADHD in Mathematics) was also determined.

Population

The population for this study consisted of Senior Secondary School Two Students (SSS II) with ADHD in Ibadan, Oyo State, Nigeria. The students were selected from public Senior Secondary Schools that are meant for the Special students. Three Local Governments were selected in Ibadan Metropolis, they are Ibadan North and the school selected is Cheshire Home for Special students. From Ibadan North East, the school selected is HLA School for the Special Children and the third school was selected from Ibadan North West local government and the school selected is School for Special Need children, Oniyanrin. They have an SSII students' population of 142, 127 and 115 respectively; totalling 384 handicapped students with students suffering from ADHD.

Sample and Sampling Technique

Purposive sampling was used to select the special school while the simple random sampling technique was used to select the participants from the selected schools from each local government area chosen. From each of the selected schools, participants were selected based on cumulative academic performance records on the class Mathematics curriculum. These constituted the first stage of the screening process adopted to determine the academic performance of students with ADHD in Mathematics in SSII students in Oyo State. Those students who had poor cumulative academic performance records in the previous school terms in Mathematics were assumed to be affected by their level of ADHD and these set of students were selected for further screening as a confirmatory test, they were further subjected to Mathematics achievement test prepared by NECO 2017 for the entrance examination into Senior Secondary school. Using this technique, the first 15 students that had the worst scores in each of the 3 schools were finally selected from each school. The total sample size consisted of 45 students with ADHD for the study. The mean age of the students used is 15.45 years with 1.75 standard deviation. Oyo state is the biggest state of South-West geopolitical zone of Nigeria. This study is conceptualised in Oyo states since the researcher lives and sees what is operating in terms of mathematical education in the state and the southwest geopolitical zone.

Inclusion Criteria

The following criteria were considered in the selection of participants for this study;

a. Participants in this study were registered and regular students of the selected schools with ADHD.
b. They were all SSII and either male or female individuals with ADHD symptoms.
c. They were all found to have an average score below 40% which is the pass mark in Mathematics after examining their scores over three academic terms.

Instrumentations

This study utilized two instruments for data collection. **Section A:** Demographic information of the students such as gender and age are required. This section was developed by the researcher:

1. Mathematics Achievement Test (MAT-BECE Prepared by NECO, 2017 and 2018) for screening the participants and measuring the dependent variable
   Mathematics Achievement Test(MAT)was constructed by National Examination Council (NECO) and it is made up of 60items covering the Junior Mathematics curriculum. Each item has four options response format of A, B, C & D out of which only one option is the correct option. The administration of the test lasts for 90minutes. MAT is a standardized test since it was developed by NECCO a public examination body, it is believed that its psychometric properties had been established. The Basic Certificate Examination paper for 2017 was used for screening exercise while that of 2018 was used for real study respectively.

Procedure for Data Collection

Experimental Group 1 (Emotional Therapy)

Session 1: General orientation, familiarisation, establishment of rapport and administration of instrument to obtain pre-test score
Session 2: Concept of emotional behaviour
Session 3: Single out the most important issues on emotions and thus create a structure and identify a goal for the treatment
Session 4: Enhancement and maintenance of good emotions in accordance with the teaching and learning principles
Session 5: Modification of students' identity or personality or to integrate key development missed while students are at early stage of development
Session 6: Understanding that students' emotion can be shaped in relation to the significant others surrounding them.
Session 7: Positive relations with others
Session 8: Rehearsal of the principles learnt from Behavioural modelling Therapy, collection of post-test scores and the formal closing of the session.

Experimental Group II (Cognitive Behaviour Therapy)

Session 1: Introduction, to have a rapport with the participants after screening them, agree on the sessions, the timing and also to motivate them to make themselves available, participate fully and wholeheartedly because of the inherent significance in the therapeutic sessions.
Session 2: Administration of Pre-test objectives: To administer the pre-test on the participants in order to measure their Cognitive error and level of their positive affirmation on self as well as their relationship to academic performance
Session 3: Identify the sources of their 'Cognitive error' illogical thoughts
Session 4: Recognising unhelpful thought objectives: To enable the participants to abstain from overgeneralising illogical thoughts or events capable of promoting lukewarmness to school activities
Session 5: Developing and testing new skills to counter school avoidance thought
Session 6: Benefit of developed positive attitude to and to enhance performance in Mathematics
Session 7: lop courage Dysfunctional assumptions: Participants would be able to develop courage even when all hope is dashed
Session 8: Overall review, Post- Test Administration and Conclusion.

Control Group

Session 1: Administration of pre-test instrument
Session 2: Career Choice

Session 3: Basic Issues that Affect the Career Choice of Secondary School Students.
Session 4: Administration of the post-test instrument at the 8th week.
Copies of MAT were administered to the participants in their various groups before they were exposed to treatment and after the treatment, the copies of the Mathematics Achievement Test questionnaire was also administered for the post-test score. The data collection spread over eight weeks during which 45 questionnaires were administered as a pre-test score and another 45 questionnaires as a post-test score. The data was scored, coded, and subjected to analysis using SPSS.

Data Analysis

Analysis of Covariance (ANCOVA) was the major statistical tool employed in this study. ANCOVA was used to remove initial differences between the participants in the experimental and control groups. Duncan Post-hoc analysis was also used in this study to determine the directions of differences and significance that were identified. Though, the results from Table 1 showed that there are seven possible hypotheses and findings, but since the study is a journal article the researcher limited the discussion of the results to only the main effects of the study and silent about the interaction of the main effects.

RESULTS

Hypothesis One: There is no significant main effect of treatment on academic performance of students with ADHD in Mathematics in selected secondary schools.

Table 1. Summary of 3x2x2 Analysis of Covariance (ANCOVA) Showing the Significant Main and Interaction Effects of Treatment Groups, Gender and Age of Students with ADHD on Academic Performance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	77775.538[a]	20	3888.777	97.574	.000	.907
Intercept	952.986	1	952.986	23.912	.000	.107
Pre Score	2899.742	1	2899.742	72.758	.000	.268
Treatment	26864.376	2	13432.188	337.030	.000	.772
Age	517.730	2	258.865	6.495	.002	.061
Gender	85.974	2	499.656	2.079	.034	.041
Treatment*Age	831.163	4	1253.107	5.214	.001	.095
Treatment*Gender	1117.873	4	1685.229	7.012	.000	.124
Age* Gender	659.938	3	1326.649	5.520	.001	.077
Treat*Age*Gender	418.231	2	209.116	5.247	.006	.050
Error	7931.057	33	1261.038			
Total	1855667.000	45				
Corrected Total	85706.595	44				

a. R Squared = .907 (Adjusted R Squared = .898), *Significant at $\alpha = 0.05$

The table 1 showed that there was **a** significant main effect of treatment on students with ADHD academic performance ($F_{(2, 33)} = 337.030$, $p < .05$, = .772). This implies that there was a significant impact of the treatment in the groups' test scores on students' academic performance. Therefore, the null hypothesis which stated that there is no significant main effect of treatment on students' academic performance was rejected; Table 1 also shows the contributing effect size of 77.2%. For further clarification on the margin of differences between the treatment groups and the control group, Duncan post-hoc analysis which shows the comparison of the adjusted mean was computed and the result is as shown in Table 2 respectively.

Table 2. Duncan Post-hoc Test Showing the Significant Differences among Various Treatment Groups and the Control Group on Academic Performance of Secondary School Students with ADHD

Experiment/control	N	Subset for alpha = 0.05		
		1	2	3
Control	15	21.47		
Emotional Behaviour Therapy	15		46.31	
Cognitive Behaviour Therapy	15			56.57
Sig.		1.000	1.000	1.000

From the table 2, it was revealed that experimental group II (Cognitive Behaviour Therapy) (= 56.57) had the highest mean while the experimental group I (Emotional Behaviour Therapy) (= 46.31) and control group (= 21.47). By implication, Cognitive Behaviour Therapy was more potent in enhancing the academic performance of the students with ADHD than Emotional Behaviour Therapy. The coefficient of determination (Adjusted R^2 = .898) overall indicates that the differences that exist in the group account for 89.8% in the variation of students' academic performance.

Hypothesis Two: There is no significant main effect of gender on academic performance of students with ADHD in Mathematics in selected secondary schools.

Table 1indicated that there was a significant main effect of gender on academic performance of students with ADHD in Mathematics among secondary school students ($F_{(1, 33)} = 2.079$, $p < .05$, = .041). Hence, the null hypothesis was rejected. This denotes that there was a significant difference in academic performance of students with ADHD in Mathematics among secondary school students. The descriptive statistics further indicate that the mean score of male students (estimated mean = 47.49) and female (estimated mean = 37.06). This implies that male students have higher academic performance than their female counterpart.

Hypothesis Three: There is no significant main effect of age on academic performance of students with ADHD in Mathematics in selected secondary schools.

Table 1 demonstrated that there was a significant main effect of age on the academic performance of students with ADHD in Mathematics among secondary school students ($F_{(1, 33)} = 6.495$, $p < .05$, = .061). Therefore, the null hypothesis was rejected. Descriptive statistics further indicate that the mean score of young ADHD students (estimated mean = 43.04) and Old ADHD students (estimated mean = 40.99). This implies that young ADHD students have higher academic performance than their old ADHD counterparts.

DISCUSSION of the FINDINGS

The first hypothesis states that there is no significant main effect of treatment on academic performance of students with ADHD in Mathematics in selected secondary school students. The result of the findings revealed that there was a significant main effect of treatment on the academic performance of students with ADHD in Mathematics among secondary school students in experimental groups and that of the control group. Therefore, the hypothesis is rejected. This implies that there was a significant impact of the treatment in the groups' test scores on the academic performance of students with ADHD in Mathematics. It was revealed further that Cognitive Behavioural Therapy and Emotional Behaviour Therapy were effective in fostering students' academic performance of students with ADHD in Mathematics among Secondary School Students in Ibadan Metropolis. The result also showed that the two experimental groups were superior to the control group. The Duncan post-hoc analysis further indicates that students in the (Cognitive Behavioural Therapy) group performed better than their counterparts in the (Emotional

Behaviour Therapy) group. This can be explained in terms of the effectiveness of each of the Therapy in fostering students' academic performance of students with ADHD in Mathematics. This could be attributed to the manner of the utilization of diverse techniques such as homework, revision, discussion and questions used in the delivery of each programme.

Based on their uniqueness, these Therapies are expected to produce varying degrees of effectiveness in fostering students' academic performance of students with ADHD in Mathematics. As observed, the result is an indication that therapeutic intervention was effective and therefore attests to the fact that students' academic performance of students with ADHD in Mathematics could be fostered, improved and encouraged with the effective use of Cognitive Behavioural Therapy and Emotional behaviour Therapy. The result further confirmed the findings of Multon, Brown and Lent (2012) meta-analyzed results of studies conducted to examine the effect of Cognitive restructuring Therapy on the academic performance of students in Mathematics. The studies assessed the academic performance of students with ADHD in Mathematics in a variety of ways including basic Cognitive skills, academic course work and standardized tests. They were diverse in terms of sample and experimental design. They reported that an overall effect size of 0.38, indicating that Cognitive Behavioural Therapy accounted for approximately 38% of the variance in students' academic performance of students with ADHD in Mathematics.

In studies of college students who pursue science and engineering courses, high Cognitive Behavioural Therapy has been demonstrated to influence the academic persistence, necessary to maintain the high academic performance of students with ADHD in Mathematics (Brown & Lent, 2012). Zorkina and Nalbone (2003) studied how group assignments affected participants academic self-confidence and academic performance. The direct relationship between academic self-confidence and academic performance was addressed by a bivariate correlation between self-reported academic confidence and academic performance. The correlation was significant, indicating that as academic self confidence increased academic performance of students with ADHD also increases.

Also, Abe, Ilogu and Madueke (2014) investigated the effectiveness of Emotional Therapy among Senior Secondary II students' in Mathematics in Enugu Metropolis, Enugu State, Nigeria. A quasi-experimental pre-test, post-test control group design was adopted for the study. The initial sample was 147 participants (male and female) who were Senior Secondary School II students drawn from two public schools in the Enugu zone of Enugu Metropolis. The final sample for the intervention consisted of 80 participants. The findings showed that academic performance was enhanced among participants exposed to Emotional Therapy compared to those in the control group. More recent research has focused on Emotional Behaviour Therapy, reflecting helplessness versus mastery (Deweck & Leggett, 1988; Dweck, 2015), cooperative versus competitive (Ames, 1992; Pintrich, et. al., 2000), and ego versus task-involved, and approaches to the achievement of goals set (Lau, et. al., 2008). These research traditions have a significantly advanced understanding of how Emotional behaviour Therapy influence the academic performance of students with ADHD in Mathematics.

The second hypothesis states that there is no significant main effect of age on participant's academic performance of students with ADHD in Mathematics. The result of the findings indicated that there was a significant main effect of age on students' academic performance of students with ADHD in Mathematics. Hence, the null hypothesis was rejected. This denotes that there was a significant difference in the academic performance of students with ADHD in Mathematics of young and old students with ADHD. This finding, however, is consistent with the findings of Howe and Covell (2013), who found that young children with ADHD are easy to manipulate than older ADHD children. The capable parents that are able to manage ADHD and nurture moderately competitive kinship relationships, a foundation for

literacy are built with no difficulty. Such people provide children with the support they will need for desirable learning.

However, Aikens and Barbarin (2008), Prior and Gerard (2006), examined the relationship between parents' involvement, Emotional behaviour and academic performance. They found that the relationship between Emotional Behaviour Therapy and parental monitoring with adolescents achievement was stronger for families with a higher level of Emotional behaviour than those with a lower level of Emotional behaviour. Prior and Gerard (2007) found that students whose Emotional behaviour are stable tend to perform well academically. Afolabi (2005) reported from his study that most children in Secondary Schools have already made up their minds that they are not good in Mathematics as a subject as such did not put much interest in the subject. Parents as the first teachers of their children at home can help in laying the foundation of confidence in the children for the better academic performance of students with ADHD in the subjects later as they grow up.

The third hypothesis states that there is no significant main effect of gender on participants' academic performance of students with ADHD in Mathematics. The result demonstrated that there was a significant main effect of gender on students' academic performance of students with ADHD in Mathematics. Therefore, the null hypothesis was rejected. The result further indicates the differences in the mean score of male students (estimated mean = 47.49) and female students (estimated mean = 37.06). This implies that male students have higher academic performance than their female counterparts. This premise is in congruence with that of Weberin (2012), in her research titled "Gender Differences in interest, perceived personal capacity, and participation", today, more women than in the past obtain degrees in science and engineering (Dean & Fleckenstein, 2007; Hiu, Carbett & St. Rose, 2010). However, women still remain under-represented in science, technology, engineering and Mathematics (Hill., 2010). One wonders after so many systemic efforts (Liston, Peterson & Ragan, 2008; Lufkin & Reha, 2009), why women continue to be underrepresented. Valian (2007) suggested that fewer females are found pursuing professional careers in science than males due to low interest.

Valiant concluded that since individuals make their own choices, some individuals, regardless of the encouragement or support they receive, remain uninfluenced and do not explore related career options. The finding suggests that boys need adequate attention, develops positive attitudes towards academic performance most especially when they are in secondary schools (adolescent stage) than to form bad gang which may eventually prompt them to develop poor performance and end up as drop-outs.

Conclusion

The study investigated the effectiveness of Emotional and Cognitive Behavioural Therapies on academic performance of secondary school students with attention deficit hyperactivity disorder in Ibadan metropolis, Oyo State, Nigeria. Gender and age were employed as moderating variables. In line with this, the participants were taken through the training programmes; relevant data collected and analyzed using appropriate statistical tools to bring out the results. The findings showed that Emotional and Cognitive Behavioural Therapies were effective in enhancing academic performance of secondary school students with attention deficit hyperactivity disorder in Ibadan Oyo State, Nigeria as evidenced from the findings; Cognitive Behavioural Therapy was more effective than Emotional Behaviour Therapy in enhancing academic performance among the participants with ADHD. As such, if the Therapies were adequately applied and the gains of the training sustained, the application of these treatment packages will help in improving academic performance among secondary school students. The study also found that academic performance differ along age line which obviously means that age is one of the variables that determine academic performance among secondary school students with ADHD. Also, gender was

established as essential variable that affects academic performance among secondary school students as male students performed better than their female counterparts.

Based on the findings of this study, it was concluded that since the major aim of the school and academia is the attainment of sound academic standard which is not achievable without adequate stable emotion and Cognitive restructuring of students with ADHD, the two interventions used in the study had therefore demonstrated the effectiveness and relevance in enhancing academic performance among Secondary School students with ADHD in Ibadan Oyo State, Nigeria and the need for the full integration of psychological counselling service into the secondary school system.

Recommendations

Based on the findings in this study, the following recommendations were highlighted for consideration;

- Since Emotional and Cognitive Behavioural Therapies were effective in enhancing academic performance among Secondary School students with ADHD, it is therefore recommended that concerted effort should be provided by counselling psychologists, educational counsellors and other related professionals to adopt these two Therapies when handling issues related with academic performance with the attendant challenges, taking into cognizance their performance and encourage students to attend schools regularly.
- The public and private schools should endeavour to provide enabling environment for the students with ADHD. This will help in enhancing their wellbeing and invariably improve students' academic achievement.
- It was recommended that the school should employ the service of at least a practicing counselling/educational psychologist who will be saddled with the responsibility of using the psychological principles and Therapies in attending to several psychological challenges that students might be facing in the school system.
- The home (parents/guardians) and school (school management) should work as a team to collaboratively look for ways by which students' academic performance could be enhanced and improved.
- Experts in the field of Counseling/Educational psychologists should intensify their effort to organize seminars/conferences on the implications of these moderating variables (that is gender and age among others) as they interact with students' academic performance.
- The curriculum planners and policymakers in education should integrate programmes designed to improve the quality of education, emphasis should be placed on student orientation programmes such as Emotional and Cognitive Behavioural Therapies among others, these will help inefficient management of various psychological challenges faced by students.
- The policymakers and general public should be made aware of both the scourge (poor academic performance of students with ADHD) and the interventions (Emotional and Cognitive Behavioural Therapies) and work towards better effective usage of the treatment to improve academic performance.

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ATTITUDE AND PERCEPTIONS OF LIBRARY AND INFORMATION SCIENCE UNDERGRADUATE STUDENTS TOWARDS COMPUTER-BASED TEST IN NIGERIAN UNIVERSITIES

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Abstract

The adoption of Information and Communication Technology (ICTs) in education has initiated modern advantages for changes and innovation in educational assessment resulting in the adoption of Computer-Based Test (CBT). Attitude and perception towards CBT are inevitable variables affecting the acceptance of CBT examinations. This study investigated attitude and perception of Library and Information Science undergraduate students towards (CBT) examination in Nigerian Universities. The objectives of the study were to: (i) examine the attitude of Library and Information Science students towards CBT examination in Nigerian universities; (ii) determine Library and Information Science student's perception towards the ease of use of CBT examination in Nigerian universities; (iii) determine Library and Information Science student's perception on the usefulness of CBT examination; (iv) identify the constraints faced by Library and Information Science students during CBT examinations; and (v) ascertain the difference between male and female Library and Information Science student's attitude and perception towards CBT examination. The study adopted descriptive survey research design. Population of the study consist of Library and Information Science undergraduate students in Nigerian universities. A sample of 378 was purposively drawn from four selected universities in North-Central, Nigeria. Data was collected with the use of questionnaire and analysed using descriptive and inferential statistics. Findings of the study were: (i) Library and Information Science students in Nigerian universities had positive attitude towards CBT examination, (ii) Library and Information Science students perception on the ease of use of use of CBT was positive, (iii) Library and Information Science students perceived CBT examination to be useful, (iv) there were no constraints against CBT examination, and (v) there was a significant difference between the male and female Library and Information Science students attitude and perception towards CBT examination. The study recommended the expansion of CBT centres and provision of more facilities in Nigerian universities.

Keywords: Attitude, computer-based test, library and information science students, Nigerian universities, perception, paper-based test.

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INTRODUCTION

The world has become one community as a result of the utilization of technology and the changes in information and communication technologies (ICTs) have made huge impacts in education globally. In other words, ICTs are widely employed devices which have notably influenced the daily activities of its users by decreasing tedious practices and bridging distances barrier. ICTs has been seen as essential tool for the society. Choi and Byun (2017) asserted that the fast innovation of ICTs and its introduction in educational system has changed the world from information technology age to knowledge age which results in the rise of technologies in various ways. The adoption and use of ICTs in education has initiated modern advantages for changes and innovation in educational assessment resulting in the adoption of Computer-Based Test (CBT).

Peter, Bill and David (2004) revealed that the use of Computer-Based Test (CBT) can be traced back to 1960's when it was first introduced to test knowledge and problem solving skills. Today, CBT has change into multi-platforms from mono-platform for test-takers to input their answers and receive feedbacks via computer. This platform creates great surface where test-takers manually fill their answers, prescribe marking and the response is marked using computer and it is usually in multiple choice questions (MCQ) and also CBT test-takers filled responses are fed into computer optical mark reader which reads the form, scores and report test reliability (Kuzmina, 2010). The adoption of CBT was necessitated by the issue with paper-based test (PBT). Paper-based test (PPT) was found to have many problems in its usage such as: expenses in conducting examination on the part of the examination bodies, subjective scoring and plausible manipulation of results, late release of results and missing grades (Alabi, Issa & Oyekunle, 2012).

As a result of the technology knowledge know-how and credibility in Africa, some Nigerian universities have adopted and adapted to the use of ICTs through its incorporation into their daily administrational processes by creating and using 'management information system' (Mejabi & Raji, 2010). The incorporation of ICTs in education led to the use of computer- based test in place of paper- based test for conducting examinations. CBT measures complex form of knowledge and reasoning which is not possible via conventional methods; dwindling paper consumption which evasively diminishes greenhouse gases and energy consumption (Bodmann & Robinson, 2004, DeRosa, 2007). The use of CBT makes school examination management effective, efficient and easier as it aids both students and lecturers in knowledge, learning processes which improves academic performances and brings about vital changes from conventional mode of educational system to globalized educational system. According to Peter, Bills and David (2004), CBT embodies a vital qualitative shift from conventional mode of administering examination which is PPT, due to its innovative abilities which gives it lot of advantages over the use of traditional method. In the sphere of educational assessment, as changes are made in assessment methodologies so does the same changes reflect on the practical aspects of academic methods (OECD, 2010). In the light of these changes, student's attitude, perception, and their acceptances of the adoption of CBT into academic system must be considered as these factors determines their level of performances with the use of CBT examination.

Computer-based test helps in time saving and reduction of manpower efforts, fewer response interpretation errors (reading and decoding), improved security due to electronic transmission and encryption (Hochlehnert, Brass, Moeltner & Juenger, 2011). Despite the numerous benefits that are derivable from the use of CBT examination, researchers have reported that there are constraints to its use such as negative effects of computer anxiety, long transition time for changing from traditional assessment to CBT due to the efforts in adapting to routines and technology, expensive in buying computer to serve

the whole population of the test-takers, technical issues during examination (Hofer, 2007; Pinner, 2011). It has also been reported by studies that students have formed negative attitude and perception towards computer-based examinations.

Attitude is not an inborn instinct phenomenon but a person's inner psychic state that influences their behaviour and are formed in the process of experience (Saparniene, Merkys and Saparnis, 2005). Attitude is the character of an individual to respond differently towards a particular stimuli (customs or institutional practices) either favorably, neutrally or unfavorably. The attitude of students serves as irreplaceable variables because they are known to enhance students learning process, if they are positive they will have some potential impact on students' academic performance on different test modes (Claria & Wallace, 2002; Leeson, 2006; Paek, 2005). More so, improvement and implementation of CBT can be properly redesigned once the use of CBT in education has been carefully perceived and accepted by students (Bull & McKenna, 2004). Perception towards CBT is also an inevitable variable which determines how students view the usefulness and ease of use of the system and their level of academic performances with CBT as mode of assessment of student's which in educational settings is one of the sole objectives of the organization. In regards to this, knowing the attitudes and perception of undergraduate towards this method of examination is significant because students are now prone to the use of technology, which is fast gaining acknowledgement throughout the whole world.

The objectives of this study are to:

i. examine the attitude of Library and Information Science students towards CBT examination in Nigerian Universities;
ii. determine Library and Information Science student's perception towards the ease of use of CBT examination in Nigerian universities;
iii. determine Library and Information Science student's perception on the usefulness of CBT examination;
iv. identify the constraints faced by Library and Information Science students during CBT examinations in Nigerian universities; and
v. ascertain difference between male and female Library and Information Science students' attitude and perception towards CBT examination.

Hypotheses

Ho_1: There is no significant difference between male and female Library and Information Science students' attitude towards CBT examination.

Ho_2: There is no significant difference between male and female Library and Information Science students' perception towards the ease of the use of CBT examination.

REVIEW OF RELATED LITERATURE

Education is the driving force of economic and social development of any society. It is essential to identify ways to make education of good quality, accessible, and affordable to all, using the latest technology available to propel the national educational system to greater level with cutting edge technologies (Anene, 2016). McGorry (2002) argued that ICTs has the potential to remove the barriers that are causing the problems of low rate of education in any country. The barriers faced by educational system in the country according to McGorry (2002) are problem of how to test and assess the performance of students due to the large population, printing of lot of answer sheets and question papers, preparation for available halls or venues to hold examination, scripts marking which sometimes leads to missing scripts. As a result of ICTs inclusion in education such problems are curbed.

According to Uysal and Kuzu (2009), the fast advancement of ICTs in teaching and learning has shifted the paradigm from PBT to CBT examination to minimize examination malpractices and grade students automatically. Computer- Based Examination is a product of the introduction of ICTs incorporated into educational settings for assessment purpose. Bennett (2015), stressed that CBT represents a modern way of answering examination questions, replacing the written pen and paper format. The questions are delivered in multiple choice format (MCQ), and normally consist of four set of options given to the test-takers in which only one answer out of the four serves as the correct answer to question asked during CBT examination (Ajinaji, 2017).

Daramola (2018) defined CBT as test assessment, evaluation that are administered by computer in a consecrated /or in a stand-alone network, or by other technological devices linked to the internet/ worldwide web (www), in which most comes in a MCQ. Davey (2011) argued that CBT leads to increased convenience because of its operational convenience for students, test administrators, and those who use test scores. These conveniences as identified by Daramola, (2018) includes; self-proctoring, immediate scoring, integrated data management system and preference. Inconsistencies in PPT environment can mean that test results are not reflective of the true ability of candidates. For example, the distractions that can be present when taking a test in a large conference hall. Having dedicated CBT test centers with controlled environments ensures "greater consistency" in the test environment leading to more reliable results (Industry Report, 2012; Ejim, 2017).

According to Ejim (2017), CBT opens up an examination to its full potential as a valid, reliable and efficient assessment tool. The ability to embed high-quality media in CBT means that in many instances, knowledge and skills can be tested in more authentic ways, even the method by which CBT items are delivered to candidates can greatly improve an examination, the items (questions) don't have to be innovated. Lecturers and students are both receiving the benefits of the use of CBT as lecturers can incorporate hints into test questions and as well monitor the progression of students through frequent use of assessment. Students can monitor their own proficiency, revise and rehearse at their own pace and they can also receive detailed and specific feedback during and immediately after a test. More so, lecturers can assign different learning activities to students based on their test results and can also receive/provide feedback for evaluation of modules/courses/programs/ greater storage efficiency, thousands of answer scripts can be stored on a portable hard disk of a server compared to the physical space required for paper scripts; and saves time and manpower for test administration, and merits of lower long-term costs (Simin & Heidari, 2013).

Attitude is an expression of favour or disfavour towards a person, place, thing or event which could be positive or negative when rating. Koshsima and Toroujeni (2017) reported that attitude towards computerized test plays a crucial role in implementing CBT successfully. According to them, attitude towards computer can be influenced by some contextual factors such as age, gender and socio-economics status. Social environment, computer experience, gender differences and computer self- efficacy. Teriz and Economides (2011), in their study stated that attitude of males and females towards CBT's are under the influence of ''social environment'', the boys focus on its usefulness while the girls stress the ease of use. However, controlling for computer experience males and females had similar interest towards computer. Recently it has been suggested that the contemporary male and female students alike are more pragmatic so that there may not be differences between genders and generalizations in terms of computers. Domino and Domino (2006) stated that if students do not have confidence in a test, it will affect their levels of engagement and cooperation. As a result of this lack of confidence student's performance with the use will tend to be very poor.

Computer experience is one of the factors that determines students attitude towards CBT. Computer experience could be likened to students having access to participating in computer-related work or courses, playing games with computers, having computer at home. More so, Karadeniz (2009) observed that students had positive attitude towards CBT and assessment due to ease of use, comprehensive and instant feedback. Tella and Bashorun (2012) examined the attitude of students towards CBT at the University of Ilorin, sample of 2209 undergraduates were selected from seven out of ten faculties and a data was gathered through CBT attitudinal survey (CBTAS) alongside a focus group discussion. The findings demonstrated that, generally, respondents have positive attitudes towards CBT, more than average of the respondents prefer CBT to PPT.

Perception is an individual's arrangement, identification and analysis of sensory information in order to represent and apprehend present information or environment. In other words, perception is the process of attaining awareness or understanding of information by selection, organization, and interpretation of stimuli into a meaningful and coherent picture of how one views the world and things around them. According to Arbaugh (2000), essential factors that influence students' perception on CBT are perceived usefulness, perceived ease of use, flexibility of e-learning, and gender. In the same view Piccoli, Ahmad and Ives (2001) were of the opinion that ''maturity, motivation, technology comfort, technology attitudes, computer anxiety, and epistemic beliefs, technology control, teaching styles, self- efficacy, availability, objectivist and constructivist, quality, reliability, face validity, sequence, control, factual knowledge, procedural knowledge, conceptual knowledge, timing, frequency and quality'' are the factors that influence users perception towards CBT examination. Russell, Hoffman and Higgins (2003) added that font text size, the computer screen and graphics, all have a vital role in students' perception.

According to Oladimeji, Akinoso, Omotunde and Annenne (2017) study on student's perception of CBT in Nigeria. The result suggested that student's perceived ease of use of CBT in Nigeria universities were positive and that CBT can be better made compatible with other means of administering test. It further revealed that it is easy to use by students in the universities. The average mean score of student's perceived ease of use of CBT was 44.93% out of a maximum of 66, which translated to 66.1%. This means there was a high level of satisfaction with the ease use of CBT examination. Fluck, Pullen and Harper (2009), showed that CBT is easy to use for students as the features of CBT makes it go beyond the conventional practices and facilities, to record a broader repertoire of cognitive skills and knowledge which shows its effectiveness.

Alsadoon (2017) investigated student's perception of E-assessment at Saudi Electronic University and the study concluded that students had positive perceptions of e-assessment and valued its features such as immediate feedback and unbiased grading. The study further revealed that the use of e-assessment in the above university was encouraging to students and school management. Similarly, Adegun, Akinola, Adepoju, and Kolajo, (2018) examined Ladoke Akintola University of Technology, Ogbomoso student's perception on CBT examination in the use of "Library 101" course. Questionnaire was as instrument for data collection and the data collected covered 5,000 population of hundred level (100L) undergraduate students. 10% of respondents were randomly selected which formed a total of 500 respondents. The result showed that a significant percentage of the respondents were either doing good or fairly good academically. 16% claimed of very good in computer familiarity, 23% claimed good while 21% were fairly good. 18.75% and 6.25% of both gender answered that they had high computer familiarity, 16.25% and 8.75% agreed on very high of computer familiarity, 15% and 10% graded averagely while 13.75% 1.25% admitted low computer familiarity.

Gender is personal conception of oneself as a female or male. According to Anene (2016), gender is a natural link to a social attribute and opportunity associated with being a masculine and feminine and a mutual relationship of mankind. In line with this study, gender differences entails knowing the differences in attitude and perception of both masculine and feminine towards CBT examination. Adegbija, George and Bolac (2013) investigated students view on E-assessment at the University of Ilorin. The study found a significant difference between the view of males and female students on E-assessment at the University of Ilorin with male perceiving it more positively than their female counterparts. Furthermore, Olufemi and Osuakuade (2014) revealed a significant difference in the computer knowledge of male and female candidates with the male been found to be more knowledgeable in computer than their female counterparts because the male candidates used computers more often than female candidates, while the female candidates were less interested and less confident in computer than male candidates.

Bennett (2015) stated that actualizing computer exams requires a protected testing condition, one that keeps understudies from looking for answers by checking their computer hard drives, texting or messaging companions, or perusing the web. These issues can be categorized under technical, financial and user's issues. Hardware and software must be carefully monitored to avoid failure such as freezing and crashing during examination and time can be wasted when computers have to be restarted or changed. Patricia, Akanwa, and Nobert, (2015) stated that the challenges encountered by students when using CBT include: insufficient supply of computer, candidate's incompetence in the use of computers and fluctuation in network service, insufficient time allocated for the exam, students feel nervous, insufficient computer set to serve the large populations, and many of the questions are too cheap, some CBT results get mixed up due to improper data base management which at times leads to mass failure.

Adewole, et al. (2018), observed some problems in the use of CBT examination, such as lack of computer familiarity, student's common attitude towards CBT examination and other peculiar problems. Tella and Bashorun (2012) identified some issues as reported by students to be shortage of computer, lack of skills on the part of the students, and loss of data in the process of writing CBT examination, slow network and hazard of reading on the screen were also identified.

RESEARCH METHODOLOGY

This study adopted descriptive survey design. According to Aina (2004), descriptive survey design is used to gather opinion of people on a particular issue or problem. The population of the study comprised Library and Information Science undergraduate students in Nigeria. A purposive sampling technique was adopted in sampling 378 Library and Information Science undergraduate students from four selected universities in North-Central, Nigeria. The selected universities included Kwara State University, Malete; University of Ilorin, Ilorin; Federal University of Technology, Minna; and University of Abuja. Questionnaire was the instrument used for data collection. The instrument was validated by five experts and pre-tested. Data were analysed using descriptive and inferential statistics.

DATA ANALYSIS AND DISCUSSION

Table 1. Respondents by Gender

Gender	Frequency	Percent
Male	184	48.7
Female	194	51.3
Total	378	100.0

Table 1 reveals that majority of the respondents 194 (51.3%) were female.

Analyses and Interpretation of Research Questions and Hypotheses

Research Question 1: What are the attitudes of Library and Information Science students towards CBT examination in Nigerian universities?

Table 2. Attitude towards CBT Examination

S/N	Attitude	SA F (%)	A F (%)	SD F (%)	D F (%)	Remark
1	I don't have the fear of failing with the use of CBT for exam	200(52.9%)	76(20.1%)	50(13.2%)	52(13.8%)	Agreed
2	I don't lack confidence during CBT examination	200(52.9%)	107(28.3%)	40(10.6%)	31(8.2%)	Agreed
3	The use of CBT doesn't make me nervous	143(37.8%)	100(26.5%)	100(26.5%)	35(9.3%)	Agreed
4	The more I use CBT for my exams, the more I get used to it	190(50.3%)	120(31.7%)	42(11.1%)	26(6.9%)	Agreed
5	I am used to CBT because I use computer for other daily routines (games, assignment and chats)	186(49.2%)	62(16.4%)	76(20.1%)	54(14.3%)	Agreed
6	I am familiar with the use of CBT for exam	240(63.5%)	71(18.8%)	31(8.2%)	36(9.5%)	Agreed
7	I prefer CBT mode of exam to PBT for my courses	98(25.9%)	90(23.8%)	100(26.5%)	90(23.8%)	Disagreed
8	I don't see CBT as a threat to my proficiency	105(27.8%)	160(42.3%)	45(11.9%)	68(18.0%)	Agreed

Table 2 shows the frequency and percentage responses on the attitude of students towards CBT exam. The table reveals that the students have positive attitude towards CBT examination. Their attitude include: I don't have fear of failing with the use of CBT in exam 276 (73%), I don't lack confidence during CBT examination 307 (81%), the use of CBT doesn't make me nervous 243 (64.3%), the more I use CBT for my exams, the more I get used to it 310 (82%), I am used to CBT because I use computer for other daily routines (games, assignment and chats) 248 (65.6%), I am familiar with the use of CBT for exam 311 (82.3%) and I don't see CBT as a threat to my proficiency 265 (70.1%). However, the results also reveals that majority of the respondents 190 (50.3%) still prefer paper-based exam to CBT mode. This finding is in agreement with the finding of Karadeniz (2009) which reported that students had positive attitude towards CBT and assessment due to ease of use, comprehensive and instant feedback.

Research Question 2: What are Library and Information Science student's perceptions towards the ease of use of CBT examination in Nigerian universities?

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Table 3. Perception on the ease of use of CBT examination

S/N	Perceived Ease of use	SA	A	SD	D	Remark
		F (%)	F (%)	F (%)	F (%)	
1	I find CBT easy to use for testing	198(52.4%)	100(26.5%)	48(12.7%)	32(8.5%)	Agreed
2	CBT questions are not too cumbersome	189(50.0%)	38(10.1%)	75(19.8%)	76(20.1%)	Agreed
3	CBT is users friendly due to ease of navigation	200(52.9%)	62(16.4%)	97(25.7%)	19(5.0%)	Agreed
4	I rarely become confused when I use CBT for exams	139(36.8%)	80(21.2%)	98(25.9%)	61(16.1%)	Agreed
5	CBT is conducted in a conducive environment	189(50.0%)	96(25.4%)	58(15.3%)	35(9.3%)	Agreed

Table 3 shows the frequency and percentage responses on the perception of ease of use of CBT examination. The table reveals that students have positive perception towards the ease of use of CBT examination as they find testing with CBT easy 298 (78.9%), CBT question were not cumbersome 227 (61%), it is users friendly 262 (69.3%), they rarely become confused when they use CBT for exam 219 (58%%) and as a result of the conduciveness of the environment in which the exam is held 285 (74%). This finding is in agreement with that of Oladimeji, Akinoso, Omotunde and Annenne (2017) which revealed that student's perceived ease of use of CBT in Nigeria universities were positive and that CBT can be better made compatible with other means of administering test. It also conforms with that of Fluck, Pullen and Harper (2009) which revealed that CBT is easy to use for student's as the features of CBT makes it go beyond the conventional practices and facilities, to record a broader repertoire of cognitive skills and knowledge which shows its effectiveness.

Research Question 3: What are Library and Information Science student's perceptions on the usefulness of CBT examination?

Table 4. Perception on the usefulness of CBT examination

S/N	Usefulness	SA	A	SD	D	Remark
		F (%)	F (%)	F (%)	F (%)	
1	CBT improves my academic performances	101(26.7%)	140(37.0%)	48(12.7%)	89(23.5%)	Agreed
2	CBT makes exam easier for me	158(41.8%)	100(26.5%)	80(21.2%)	40(10.6%)	Agreed
3	CBT increases my mental efforts	200(52.9%)	58(15.3%)	90(23.8%)	30(7.9%)	Agreed
4	CBT gives unbiased grades	137(36.2%)	78(20.6%)	98(25.9%)	65(17.2%)	Agreed
5	Results don't get missing with the use of CBT for exam	143(37.8%)	85(22.5%)	85(22.5%)	65(17.2%)	Agreed

Table 4 shows the frequency and percentages responses on the perception of the usefulness of CBT exam. The table reveals that majority of the respondents indicated positive perception on the usefulness of CBT examination as majority of the respondents agreed that CBT improves their academic performances 242 (63.7%), makes exam easier for them 258 (68.3%), increases their mental efforts 258 (68.2%), gives unbiased grades 215 56.8%) and results don't get missing with the use of CBT examination 228 (60.3%). This finding is in agreement with that of Parshall, Spray, Kalohn, and Davey, (2002) which reported that student's degree of computer literacy increases the usefulness of CBT with great efficiency and possibility to take the test any time. The finding is also in conformity with that of Aojula, Barber, Cullen and Andrews (2006) which reported that CBT is useful for students as it increases their computer knowledge. This confirms the usefulness of CBT as a method of student's assessment.

Research Question 4: What are the constraints faced by Library and Information Science students during CBT examination in Nigerian universities?

Table 5. Constraints faced by students during CBT examination

S/N	Constraints	SA	A	SD	D	Remark
		F (%)	F (%)	F (%)	F (%)	
1	I find it difficulty logging into CBT system	100(26.5%)	27(7.1%)	153(40.5%)	98(25.9%)	Disagreed
2	I always encounter problems with submitting of my answers	53(14.0%)	40(10.6%)	200(52.9%)	85(22.5%)	Disagreed
3	I find it difficult to review my previous answers	50(13.2%)	6(1.6%)	202(53.4%)	120(31.7%)	Disagreed
4	I get stressed during and after the use of CBT exam	164(43.4%)	7(1.9%)	112(29.6%)	95(25.1%)	Disagreed
5	I am always unable to finish my CBT exam before the assigned time to CBT elapses	99(26.2%)	69(18.3%)	115(30.4%)	95(25.1%)	Disagreed

Table 5 shows the frequency and percentage responses on the constraints faced by students during CBT examination. The table revealed that the respondents disagreed to items 1, 2, 3, 4, and 5 with percentages ranges from 54.7% to 85.1%. The result of the analysis implies that majority of the respondents disagreed to the statements as they do not find it difficult logging into the system, they don't encounter problem with submission of answers, reviewing of previous answers, they don't get stressed during and after CBT exam and they always finish before the assigned time for CBT exam elapses which makes their use of CBT for examination very easy, fast and enjoyable. This finding contradicts with the finding of Tella and Bashorun (2012) who identified some constraints as reported by students to be shortage of computers, lack of skills on the part of the students, and loss of data in the process of writing CBT examination, slow network and hazard of reading on the screen were also identified.

Test of Hypotheses

Two null hypotheses were formulated and tested in this study. The null hypotheses were tested at 0.05 level of significance. The summary of the test of hypotheses are presented in Table 6 and 7.

H_{01}: There is no significant difference between male and female Library and Information Science student's attitude towards CBT examination in Nigerian Universities.

Table 6. Summary of t-test of the difference between the mean ratings of male and female student's attitude towards CBT examination

Group	N	Mean	SD	t-cal	df	p-value	Decision
Males	184	2.11	0.76	30.47	376	0.00	S
Females	194	3.83	0.18				

P<0.05

Table 6 reveals that there are 184 males and 194 respondents. The male and female student's responses showed that there is high positive rating on attitude towards CBT exam. ($\bar{X}$ = 2.11; SD = 0.76) and ($\bar{X}$ = 3.83; SD = 0.18). The table reveals a significant difference between the mean responses of male and females students' attitude towards CBT exam (t_{376} = 30.47, P<0.05). Therefore, the null hypothesis that states that there is no significant difference between male and female Library and Information Science student's attitude towards CBT exam in Nigerian universities was rejected. This implied that male and female student's differ in their responses regarding their attitude towards CBT exam. Their responses showed that female students rated attitude towards CBT exam higher than the male students did (mean difference = 1.72).

H_{02}: There is no significant difference between male and female Library and Information Science students' perception towards the ease of the use of CBT examination

Table 7. Summary of t-test of the difference between the mean ratings of male and female student's perception on the ease of use of CBT examination

Group	N	Mean	SD	t-cal	df	p-value	Decision
Males	184	1.95	0.78	34.87	376	0.000	S
Females	194	3.93	0.12				

P<0.05

Table 7 reveals that there are 184 males and 194 respondents. The male and female student's responses shows that there is high positive rating on the ease of use of CBT exam. ($\bar{X}$ = 1.95; SD = 0.78) and ($\bar{X}$ = 3.93; SD = 0.12). The table reveals that there was significant difference between the mean responses of male and females Library and Information Science students towards the perception of ease of use of CBT exam (t_{376} = 34.87, P<0.05). The null hypothesis that stated that there is no significant difference between the mean ratings of males and female Library and Information Science student's perception on the ease of use of CBT exam was rejected. This indicates that male and female students differ in their responses regarding the ease of use of CBT exam. Their responses shows that female students rated perception on ease of use of CBT exam higher than the male students did (mean difference = 1.98).

SUMMARY of FINDINGS

The findings of the study were:

i. Students had positive attitude towards CBT examination as a result of their lack of fear of failing with the use of CBT examination, confidence during the exam, the more they use CBT for exam the more they get used to it, the use of computer for other routines such as gaming, chatting, working and among others which familiarizes them with CBT mode of testing and thereby reduces nervousness and anxiety in them and as a result they don't see CBT as a threat to their

proficiency. However, regardless of their positive attitude towards CBT the study showed that majority still prefer PPT mode to CBT mode.

ii. Students had positive perception on the ease of use of CBT examination because of its ease of use, lack of cumbersome questions, user friendliness of the system, conducive environment for testing and they rarely become confused when using CBT mode of testing, all of which makes CBT easy for use by the students.

iii. Students perceived CBT to be useful to them because the use of CBT increases their academic performances, makes exam easier for them, increases their mental efforts, gives unbiased grades as the computer does the grading and results do not get missing with the use of CBT for exams.

iv. There are not constraints against the use of CBT examination in the universities under study. Users find it easy log-in to CBT system, submission of answers, reviewing of previous answers, and absence of stress before and after examination with proper assignment of time to the exam which makes it enjoyable, fun and saves time for both the students and the administrators.

v. It was observed that there is a significant differences between male and female students' attitudes towards CBT examination with the female holding higher and positive attitude than their male counterparts.

vi. There was a significant differences between the male and the female perception towards the ease of use of CBT examination as the females held more positively on its ease of use of CBT than the male students

Conclusion

The study concluded that CBT examination in Nigerian universities, is a success story, since the system is not confronted with challenges and students have developed positive attitude towards CBT examination.

Recommendations

Based on the findings of this study, the following recommendations were made to improve the CBT examination in Nigerian universities.

i. More and modern CBT facilities should be provided and more centres should be created to ensure that large numbers of the students are accommodated in a day and facilitate effective usage of CBT examination.

ii. Students should be properly sensitized on the advantages of CBT examination over traditional method of examination in order to ensure wide acceptances of CBT by students.

iii. Students should be exposed to practical computer assignments in order to familiarize them with the use of computers and develop their computer literacy skills.

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THE EFFICIENCY OF COMPUTER-ASSISTED GAME-BASED LEARNING APPLICATIONS IN TEACHING VERBS AND VERB-RELATED SUBJECTS

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Abstract

The aim of this research is to determine students' attitudes toward and success in Turkish lessons and grammar with the use of computer-assisted game-based learning applications. There are many opinions in the literature of the problems faced in grammar teaching. One of these problems is that students take a negative approach toward grammar lessons. A further problem is that students' academic achievement is not at the expected level. Games have many functions appropriate to the modern understanding of education. They make lessons enjoyable and maintain students' motivation to learn. In this study, educational computer games were used to reveal the effects on students' attitudes toward and their academic achievement in Turkish lessons and grammar. The pretest-posttest unequalized group quasi-experimental design based on quantitative research methods was used. The educational games, developed by the researcher, were used over ten weeks by the experimental group and with curriculum-related activities in the control group. Apart from these variables, the study kept all other conditions equal. The study group consisted of two different classes of 7th grade students studying in a secondary school. Examination of the attitudes and academic achievement scores of the experimental and control groups toward Turkish lessons and grammar shows that there was a significant difference in favor of the experimental group. The results suggest that computer-assisted game-based learning applications for grammar teaching have a positive effect on students' attitudes and achievement.

Keywords: Game based learning, grammar teaching, computer assisted teaching.

INTRODUCTION

Language is a tool for communication and thought that people use to share their feelings, thoughts, and observations using signs or words and it is used effectively between people (Güneş, 2017; Demirel & Şahinel, 2006). Grammar, on the other hand, is a system that deals with language in all its aspects and examines the sound, form, sentence and text structure revealing meanings and functions (Ergin, 2013; Güneş, 2013). Individuals become part of society through the use of their mother tongue and through socializing strengthen their relationship with society. The 2005 Turkish Curriculum in Turkey intruduced some changes to grammar teaching following the latest scientific developments. These changes are important for enabling individuals to better express themselves. Today's technology can be used to achieve this and one way is by using educational computer games. In general, students use these games in their free time (Buchman & Funk, 1996).

Games are activities that develop individuals' physical and mental skills, with or without tools (Bilen, 1999; Koçyiğit, Tuğluk & Kök, 2007), and they have very different effects when used in education. Games increase students' motivation, get them interested in the content, and help the student to relax

(Yağız, 2007). Games, which also have an interesting feature (Karabacak, 1996), allow students to learn by doing and experiencing (Aslan Akın & Atıcı, 2015). When used in accordance with their purpose, games are an educational and instructive activity as well as entertaining (Taşpınar, 2012). Since today's children spend most of their time in front of the computer using technological tools and playing video games, researchers have become interested in how computer games can be used in the classroom as an educational tool (Prensky, 2001b).

Background of the Study

The use of computers in the field of education has increased recently. Studies show that the use of computers in education positively affects both students' attitudes toward lessons and their achievement (Çankaya & Karamete, 2008). In addition, including games in the education process encourages students to become more active in the process, leading to the development of a computer-assisted game-based learning method, also referred to as educational computer games (Karamete & Çankaya, 2008).

The use of games in education is not new. Educational games, defined as all games used in line with the objectives of education (Tural, 2005). Computer games are defined as software that helps students learn the subjects in the curriculum and improves their problem-solving skills (Demirel, Seferoğlu & Yağcı, 2003). According to Taşpınar (2012:241), it is necessary to follow a certain order to use educational games:

- The teacher chooses a game according to lesson outcomes.
- The purpose and rules of the game are explained and the materials, roles, and functions of the game are determined.
- The awards and possible achievements at the end of the game are indicated.
- The game is demonstrated.
- At the end of the game, a feedback activity is carried out with student participation and discussion-evaluation activities are carried out in accordance with the purpose of the subject.

Typical gamification applications are Nike+ for sports, ClassDojo for classroom management, and Duolingo for foreign language learning (Özkan & Samur, 2017). The purpose of gamification is to make the learning process more attractive (Güler & Güler, 2015).

Games are used in game-based learning environments, defined as game-framed problem-based learning environments embedded in specific problem scenarios (Bayırtepe & Tüzün, 2017). Here, students come up with solutions to achieve goals (Malta, 2010). The digital game-based learning approach, defined by Prensky (2001a) as educational games supported by digital environments, has been developed based on game-based learning environments. This study applies computer-assisted game-based learning applications to the computer-assısted game-based learning method.

The success of computer games, especially after the 1980s and1990s, has led educators to see these games as a tool in education (Mayer, Schustack & Blanton, 1999). According to Devary (2008: 39), for a computer game to be educational, it must contain particular features:

- It must have elements of interaction and feedback.
- It should allow players to research and review and contribute to their productivity.
- There must be different ways to reach goals.
- Educational content should be placed in the game in such a way that the player does not notice it.
- Players should have the option to choose the character they want.

In addition, participation, challenge, competition, exploration, and motivation are natural elements of educational games. This is because a game with a challenge and that encourages competition between students can motivate and involve them in playing and exploring the game (Zin & Wong, 2009). Educational computer games are used in fields such as mathematics, science, medicine, and engineering, as well as in the field of language teaching (Yağız, 2007). Game-based learning environments create a new social and cultural environment, and contribute to the individual's learning by combining technology through thinking and communication (Shaffer et. al, 2005).

Several studies examining the effects of educational games in Turkish teaching suggest that educational games have positive effects on students' academic achievement (Aşçı, 2019; Kayan & Aydın, 2020). Similar results have been obtained in research into teaching Turkish as a foreign language, which conclude that educational games have a positive affect on learning (Kara, 2010; Gürsoy & Arslan, 2011; Kalfa, 2014).

Problem Situation

Traditional approaches used in grammar teaching fail to meet the expectations of students and have a negative affect on their attitudes toward the subject and their academic achievement. The effective use of computers in education may affect students' attitudes toward and academic achievement in their course. However, the increased use of computers in recent years does not mean that computers are being used more efficiently. The widespread use of computers in many fields such as medicine, engineering, geography, and mathematics has made computers an indispensable element of our lives, particularly in education. During the Covid-19 pandemic, the importance of distance education increased considerably, and computer-based training gained momentum. Some studies, especially those in which educational computer games were used as a method, conclude that student attitudes and academic achievement increased and their anxiety about lessons decreased (Aşçı, 2019; Kayan & Aydın, 2020; Can, 2003; Chen et al., 2012; Kebritchi, Hirumi & Bai, 2010).

The use of educational computer games helps to reveal students' emotions and imagination, such as competition, pleasure, and anxiety, and improve their learning performance as they take more risks in the learning environment (Lo et al., 2008; Whitehall & McDonald, 1993). Students are motivated, focusing more on their education leading to an increase in performance (Ricci et al., 1996). Such games are not only used to entertain students but also to reinforce knowledge (Bayırtepe & Tüzün, 2007). Students learn while playing (Siang & Rao, 2003) and learning improves by doing and experiencing (Kirriemur & McFarlane, 2004).

There are gaps in the current literature on computer-assisted game-based learning studies in Turkish teaching. This study was conducted to close this gap and to investigate the effectiveness of computer-assisted game-based learning applications on students' attitudes and academic achievement.

The purpose of the study

The aim of this research is to determine the effects of computer-assisted game-based learning applications and computer-assisted educational games on students' attitudes toward Turkish lessons and grammar, and their academic success in Turkish grammar.

Research Question

The research question is "Do computer-assisted game-based grammar teaching applications have an effect on 7th grade students' attitudes toward grammar and Turkish lessons and their grammar achievement before and after process-based applications?"

Sub-questions

1) Is there a significant difference between 7th grade experiemental group students' attitudes toward Turkish lessons and grammar and their achievement in Turkish grammar before and after the process-based applications?

2) Is there a significant difference between 7th grade control group students' attitudes toward Turkish lessons and grammar and their achievement in Turkish grammar before and after the process-based applications?

3) Is there a statisically significant difference between the experimental and control groups' attitudes toward Turkish lessons and grammar and their achievement in Turkish grammar with the use of computer-assisted game-based grammar teaching?

4) Is there a statistiacally significatn difference between attitudes toward Turkish lessons and grammar and their achievement in Turkish grammar with the use of computer-assisted game-based grammar teaching according to gender?

METHOD

This section describes the research process and procedures, the method used, the sample group, and the data collection tools used before and after the research process. In addition, the design and sample of the research are explained and the development process of the tools used for data collection (validity and reliability analysis) is explained, and details of the methods used and the data analysis process are illustrated.

The quantitative research method was used in this study. The research is a quasi-experimental model in terms of revealing the effects of independent variables on dependent variables. This model was carried out using a quasi-experimental design with pretest-posttest comparison group. The pretest-posttest comparison group design measures the dependent variables before and after the experimental research (Karasar, 1999). In this model, the participants are divided into two groups as the experimental group and the control group. During the research process, validity and reliability studies were conducted and Cronbach Alpha = 0.987 and KMO value was found to be .612 for the Verb Structure Achievement Test. The Barlett integrity test was found to be .00. Cronbach Alpha=0.98 and the KMO value was 721 in the scale of attitude toward grammar. The Barlett integrity test was found to be .00.

The study group consisted of 7th grade students, from two branches, in a secondary school affiliated to the Ministry of National Education. Fıfty-seven students participated in the research, 28 students (12 girls and 16 boys) were in the experimental group and 29 students (14 girls and 15 boys) were in the control group.

The Verb Achievement Test, developed by Gündoğdu and Dönmez (2018), was used as the pretest and posttest achievement test; the scale developed by Ünal and Köse (2014) was used to measure the students' attitude toward the Turkish lessons and a scale, developed by Pehlivan, Aydın and Uyumaz (2018), was used to measure the attitude toward grammar. The Structure in Act Achievement Test, developed by Gündoğdu and Dönmez (30), consists of 26 questions. The item discrimination indexes of this test range from 0.33 to 0.73 and the item difficulty indexes range from 0.23 to 0.76. The reliability of the test results was calculated as 0.83 and the difficulty as 44%, and it was determined that the achievement test was a medium difficulty level.

The scale of Ünal and Köse (2014), consisting of 27 items, was used to measure the students' attitude toward the Turkish lessons. The Cronbach Alpha reliability coefficient of the scale was determined as 0.914 and its content validity was ensured by taking expert opinions. These findings determined that the scale was valid and reliable. The Kaiser-Meyer-Olkin value of the study was determined to be

0.909. This result can be considered excellent as it is above 0.90. The Barlett Test of Sphericity value is (χ2=4046.967; df=595, p<0.00) and was found to be significant. Thus, it was concluded that this study is suitable for exploratory factor analysis. In addition, a significant difference was found between the 27% subgroup and the upper group across all factors and the entire scale. This suggests that these factors and the scale were able to distinguish between the lower and upper groups.

The attitude toward grammar scale, developed by Pehlivan, Aydın and Uyumaz (2018), consists of 25 items with 3 factors and is a 5-point Likert-type type including "I strongly disagree", "I do not agree", "I agree moderately", "I agree" and "I completely agree". The Kaiser-Meyer-Olkin value of the scale was found to be 0.908 and the Barlett's Test of Sphericity value was determined as χ2=3444.794, df=300, p<.000. The Cronbach Alpha reliability coefficient of the scale was calculated as 0.887. As a result of the analysis, it was concluded that the scale is a valid and reliable scale.

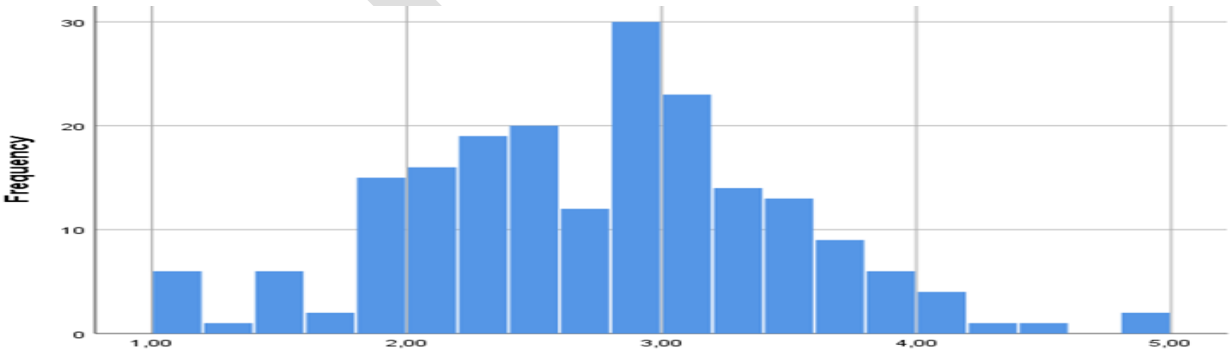
The computer-assisted game-based learning applications used in this study were developed by the researcher for the experimental group and the lessons were taught following the current curriculum in the control group. Apart from the method used, the same teacher participated in the lessons of both classes to ensure equal conditions. The research started in December 2018 and ended in March 2019.

There were two stages to the research. In the first stage, computer-assisted game-based learning applications were developed by the researcher. In the second stage, the effectiveness of these applications was investigated. It was decided to teach the subject of verb structure. Before the research, the Grammar Achievement Test, Attitude Scale Toward Turkish lessons, and the Attitude Toward Grammar Scale were applied to the experimental and control groups as a pretest. For the experimental group, computer-supported game-based learning applications were developed by taking expert opinions, and a ten-week plan was prepared in line with the curriculum.

For the experiemental group, the lessons began with interesting material, the course content was determined, and both the book and the applications, prepared by the researcher, were used with the help of smart board and projection. Students participated in these educational games in groups of 4-6. In the control group, the intuition method was used, following the current curriculum, and the activities in the Turkish book were also used. This application lasted ten weeks. After the research, posttests were applied to the experimental and control groups in order to determine academic achievement in the Turkish course and the differences in their attitudes toward the Turkish course and grammar. The findings are explained in the following section.

FINDINGS

The following Graph 1 shows the Skewness (skewness) and Kurtosis (kurtosis) values are distributed between +1.0 and -1.0 values, which is a normal distribution (Tabachnick and Fidell, 2013).



Graph 1

The first sub-question of the study is "Is there a significant difference between 7th grade experiemental group students' attitudes toward Turkish lessons and grammar and their achievement in Turkish grammar before and after the process-based applications?"

In order to answer this question, the Kruskal Wallis H test was conducted. The grammar achievement pretest and posttest scores (Z=-4.156, p<0.05), grammar attitude pretest and posttest scores (Z=-4.025, p<0.05) of the students in the experimental group studying with computer-assisted game-based learning applications and Turkish attitude pretest and posttest scores (Z=-4,320, p<0.05) were found to be statistically significant. The results show that the students in the experimental group showed a more positive attitude toward Turkish lessons in their posttest scores than pretest scores and achieved higher grammar scores. The computer-assisted game-based learning applications improved the students' attitudes toward Turkish lessons and increased their grammar success.

In the analysis of the data obtained in the study, independent groups t-test was used in cases where two groups were compared, and one-way analysis of variance was used for three or more groups. In cases where analysis of variance was found to be significant, the LSD test was applied for pairwise comparisons. However, for analysis of variance and t test, Levene's Test was applied first and the homogeneity of variances was tested. If p<0.05 was found in Levene's test (in cases where variances were not homogeneous), non-parametric tests such as Kruskal Wallis Test and Mann Whitney-U Test were applied instead of analysis of variance.

The second sub-question of the study is, "Is there a significant difference between 7th grade control group students' attitudes toward Turkish lessons and grammar and their achievement in Turkish grammar before and after the process-based applications?" The results of Kruskal Wallis H tests, which were conducted to answer this question, are as follows.

There is a statistically significant difference between the pretest and posttest scores of the students in the control group (Z=-4.654, p<0.05). The posttest scores of the students in the control group were found to be higher than the pretest scores. It was concluded that there was no statistically significant difference between the grammar attitude pretest and posttest scores of the students in the control group (Z=-2,415, p>0.05) and the Turkish attitude pretest and posttest scores (Z=-0.412, p>0.05).

The third sub-question of the study is, "Is there a statisically significant difference between the experimental and control groups' attitudes toward Turkish lessons and grammar and their achievement in Turkish grammar with the use of computer-assisted game-based grammar teaching?" The results of Mann Whitney U tests conducted to answer this question are given below.

Grammar achievement scores (U=486,000, p>0.05), grammar attitude scores (U=465,000, p>0.05), and Turkish attitude scores (U=486,000) of the students in the experimental and control groups before computer-assisted game-based learning applications were 603,000, p>0.05). There was no statistically significant difference. After the computer-assisted game-based learning applications, the grammar achievement scores (U=483,000, p<0.05), grammar attitude scores (U=460,000, p<0.05), and Turkish attitude scores (U) of the students in the experimental and control groups =592,000, p<0.05) were found to significantly statistically different.

The fourth sub-question of the study is "Is there a statistiacally significatn difference between attitudes toward Turkish lessons and grammar and their achievement in Turkish grammar with the use of computer-assisted game-based grammar teaching according to gender?" The grammar achievement scores (U=134,000, p>0.05), grammar attitude scores (U=102,000, p>0.05), and Turkish attitude scores (U=118.500, p>0.05) show there was no statistically significant difference according to gender.

After the computer-assisted game-based learning applications, the students in the experimental group's grammar achievement scores (U=144.000, p>0.05), grammar attitude scores (U=122.500, p>0.05), and Turkish attitude scores (U=137.000, p> 0.05) did not show a statistically significant difference according to gender. The pretest and posttest grammar attitude scores (U=128.000, p>0.05) and

Turkish attitude scores (U=152.500, p>0.05) of the students in the control group where the current curriculum practices were followed show no statistically significant difference according to gender. However, the pretest grammar achievement scores of the students in the control group (U=83.0000, p<0.05) do show a statistically significant difference according to gender in favor of female students. In other words, the pretest grammar achievement scores of the female students in the control group are higher than the grammar achievement scores of the male students. Likewise, the posttest grammar achievement scores of the students in the control group (U=71,000, p<0.05) show a significant difference in favor of female students.

When the results of all students participating in the study were examined according to the gender variable, a statistically significant difference was found between the grammar achievements of the students in the experimental and control groups (p<0.05), and it was determined that female students were more successful. A statistically significant difference was found between the grammar attitudes of the students in the experimental and control groups in terms of gender (p<0.05), and it was determined that the attitudes of the female students were more positive, but there was no statistically significant difference between the Turkish lessons attitudes of the students in the experimental and control groups in terms of gender (p>0.05).

DISCUSSION

Success

The first and second sub-questions of this study sought to answer whether there is a significant difference in the success of computer-assisted game-based grammar teaching in Turkish grammar before and after the process-based applications in secondary school 7th grade students in the experimental and control groups. A significant difference was found in terms of Turkish grammar achievement in the experimental and control groups. There are studies with similar and dissimilar results to this study in the literature.

A study conducted on learning grammar in a foreign language determined that the effect of computer-assisted learning method on student success was higher in the posttest scores of both the experimental and control groups than the scores in the pretest, and that this difference was significant (Odabaşı, 1994). A study examining the effect of computer-assisted teaching on eliminating misconceptions in social studies teaching concludes that the experimental and control groups were more successful at the end of the process (Toros & Yeşiltaş, 2015). Keser (2012) examined the effect of computer-assisted instruction on success and permanence in the social studies course and concludes that the experimental and control groups were more successful in the posttest application. Polat and Varol (2012) examined the effect of educational computer games on academic achievement in a social studies course and concludes that the pretest-posttest scores of the experimental and control groups increased in favor of the posttest and that both groups were more successful at the end of the process. In Bayturan's (2011) study in which he examined the effects of computer-assisted instruction on students' achievement, attitudes, and computer self-efficacy perceptions in mathematics teaching, it was found that the posttest scores of the experimental and control group students were higher between the pretest-posttest achievement scores and both groups were successful at the end of the process.

Studies on Turkish teaching show similar results to the current study. Kayan and Aydın's (2020) study in which the effects of computer-assisted educational games on the teaching of noun and name-related subjects on students' grammatical success, their attitudes toward grammar and their attitudes toward Turkish lessons applied pretest and posttest achievement tests to both the experimental and control groups. A significant difference was found between the pretest-posttest scores, and a significant difference was found between the pretest-posttest success scores in the control group. They conclude that both groups were successful at the end of the process. Durukan (2011) examined the success of computer-assisted grammar teaching on students and found a significant difference between the pretest-posttest achievement scores of the experimental group. There was a significant difference

between the pretest-posttest success scores in the control group, and both groups were found to be successful at the end of the application. In Aşçı's (2019) study, in which the use of educational digital games in teaching the subject of structure in words examined the academic achievement of the students in Turkish lessons, a significant difference was found between the pretest-posttest success scores of the experimental group, with the posttest success scores being found to be higher. A significant difference was found between the pretest-posttest success scores in the control group, and it was concluded that both groups were more successful at the end of the study.

There are studies whose findings are not in line with the findings obtained in the current study. One study using educational computer games determined there was no statistically significant difference between pretest and posttest mean scores of the control group in English teaching (Donmuş, 2012). Some studies in science teaching concluded that there was no significant difference between the pretest and posttest scores of the control group (Ural, 2009; Hançer & Yalçın, 2009).

The third sub-question of the current study sought to determine whether there is a significant difference between the experimental and control groups in the success of computer-assisted game-based grammar teaching in 7th grade students in Turkish grammar. It was determined that the experimental group was more successful in terms of grammar academic achievement and that computer-assisted game-based learning applications give more effective results than the existing curriculum applications.

There are studies showing similar results inn the literature. Studies conducted in social studies teaching show that the experimental group in which educational computer games and computer-assisted teaching were applied was more successful than the control group who followed the current curriculum applications (Polat & Varol, 2012; Keser, 2012; Toros & Yeşiltaş 2015). In studies conducted in science teaching, an experimental group in which computer-assisted instruction was applied was more successful than the control group (Hançer & Yalçın, 2009; Yenice, Sümer, Oktaylar, & Erbil, 2003; Güven & Sülün, 2012). A study on the effect of computer-assisted instruction on students' success in mathematics teaching determined that the experimental group in which computer-assisted instruction was applied was more successful than the control group (Bayturan, 2011). Kayan and Aydın (2020) examined the effects of computer-assisted educational games on students' grammatical success, attitudes toward grammar and attitudes toward Turkish lessons in teaching noun and name-related subjects. They concluded that the experimental group in which educational games were used was more successful than the control group. Durukan (2011) concluded that the computer-assisted grammar teaching applied in the experimental group was more effective than the traditional approach applied in the control group. What is more, the experimental group achieved more successful results than the control group at the end of the process.

There are, however, studies that are not in line with the findings of the current study in the literature. A study conducted on teaching Turkish determined that there was no significant difference in terms of success between the experimental group in which educational digital games were applied and the control group in which the current curriculum applications were used (Aşçı, 2019). Similar results have been shown in different fields. A study conducted in science teaching concluded that there was no significant difference between the experimental group in which educational computer games were applied and the control group in terms of success. A study conducted in English language teaching determined that there was no significant difference in terms of success between the experimental group in which computer assisted learning method was used and the control group in which current curriculum applications were used (Odabaşı, 1994).

The fourth sub-question of the current study sought to determine whether there is a significant difference between the pretest and posttest results of computer-assisted game-based grammar teaching in secondary school 7th grade students in Turkish grammar achievement according to gender. There was no significant gender difference between the grammar achievement scores of the students in the

experimental group before and after the computer-assisted game-based learning applications. However, a significant difference was found between the grammar achievement scores of the students in the control group before and after the computer-assisted game-based learning applications, and it was determined that the pretest grammar achievement scores of the female students were higher than the male students.

Female students were the most successful of all students participating in the application. There are studies in the literature that came up with similar results. A study in which computer-aided teaching applications and computer games were used in mathematics teaching determined that the success of female students was higher than that of male students (Kula & Erdem, 2005; Uygun, 2008).

There are also studies in the literature that are not in line with the results of the current study. One study examined the success of computer-assisted teaching in English teaching compared to traditional teaching and determined that male students were more successful (Naba'h, Hussain, Al-Omari & Shdeifat, 2009). Another study examined the effect of educational computer games on academic achievement in science lessons and concluded that male students were more successful (Obut, 2005).

Attitude

The first and second sub-questions of the current study sought to determine whether there was a significant difference in the attitudes of computer-assisted game-based grammar teaching toward Turkish lessons and grammar in secondary school 7th grade students in the experimental and control groups before and after the process-based applications. The findings show that the experimental group's attitudes toward Turkish lessons and grammar increased between the pretest and posttest results before and after the process, while there was no significant difference between the pretest and posttest results of the control group before and after the process.

A review of the literature reveals similar results. Studies conducted in mathematics teaching determined that the computer assisted teaching and game-based learning environments applied in the experimental group improved the students' attitudes toward mathematics lessons (Bayturan, 2011; Akın & Atıcı, 2015). Similar results were obtained in a study on physics teaching which determined that there was an increase in the attitude scores of the experimental group in which computer-assisted activities were used in the pretest and posttests (Yiğit & Akdeniz, 2003). A study examining the effects of using educational computer games in English teaching on achievement, permanence, and motivation determined that the posttest scores in the experimental group were higher than the pretest scores, and there was no significant difference between the pretest and posttest scores in the control group (Donmuş, 2012).

Kayan and Aydın's (2020) study on Turkish teaching which examined the effects of computer aided educational games on students' grammar achievement, attitudes toward grammar, and attitudes toward Turkish lessons in teaching nouns and subjects related to nouns, grammar pretest and posttests were administered to the experimental and control groups. Pre- and posttests were applied for Turkish lessons. The findings show that the experimental group's attitude scores toward grammar and Turkish lessons increased whereas there was no significant difference in the scores of grammar and attitude toward Turkish lessons in the control group. In a study by Durukan (2011) in which the effect of computer-assisted grammar teaching on achievement and attitude was investigated, pretest-posttest was applied to the experimental and control groups to measure the attitudes of the participants.

The third sub-question of the current study sought to determine whether there is a significant difference between the experimental and control groups in the attitudes of 7th grade secondary school students in computer-assisted game-based grammar teaching toward Turkish lessons and grammar. The findings show that while there was no significant difference between the experimental and control groups in the attitude scales for Turkish lessons and grammar before the process, there was a significant difference in favor of the experimental group at the end of the process.

In a study conducted in mathematics teaching examining the effects of technology-supported teaching on students' achievement level, attitudes, and permanence in algebra teaching, the attitudes of the experimental and control groups toward mathematics lessons were determined and concluded that there was no significant difference according to the pretest results made before the process. In the posttest, a significant difference was reached in favor of the experimental group, and it was concluded that technology-supported instruction increased attitudes positively (Öner, 2009). A study by Hançer and Yalçın (2009) in which the effect of computer-assisted learning based on the constructivist approach in science education on problem solving skills was measured concluded that there was no significant difference between the pretest scores of the experimental and control groups' attitudes. However, at the end of the process, a significant difference was found between the posttest scores applied to both groups in favor of the experimental group.

There are also studies that are not in line with the result of the current study. A study conducted in science teaching determined that computer-assisted teaching did not have any effect on attitude (Guven & Sülün, 2012). Uygun (2009) concluded that the computer-assisted teaching software applied in mathematics teaching did not have any effect on the attitudes of the experimental group students.

The fourth sub-question of the current study sought to determine whether there is a significant difference between the pretest and posttest results of the computer-assisted game-based grammar teaching of secondary school 7th grade students toward Turkish lessons and grammar. The experimental group students' attitude scores toward grammar and attitude scores toward Turkish lessons before and after computer-assisted game-based learning applications do not show a statistically significant difference according to gender. It was determined that there was no statistically significant difference according to gender in the attitude scores of the control group students towards grammar before and after the process and their attitude scores towards the Turkish lessons. In addition, a statistically significant difference was found between the attitudes of the students in the experimental and control groups toward grammar in terms of gender, and it was determined that the attitudes of female students were higher. However, it has been determined that there is no statistically significant difference between the attitudes of the experimental and control group students to the Turkish lessons in terms of gender. Studies on mathematics teaching concluded that computer-assisted teaching and educational computer games do not have an effect on gender, and there is no significant difference according to the pretest and posttest results (Öztürk, 2007).

Conclusion and Suggestions

This research was carried out in order to reveal the academic success of students, their attitudes toward Turkish lessons and grammar in the teaching of verbs and verb-related subjects through computer-assisted game-based learning applications. A quasi-experimental method suitable for the pretest-posttest model with a control group was used. The experimental group of the research consisted of 28 students and the control group consisted of 29 students. The study continued for ten weeks and educational games were prepared within the framework of expert opinion.

Examination of the success scores found significant differences in the pretest and posttest applications for Turkish grammar achievement between the experimental group, in which educational games were used, and the control group, in which curriculum-based applications were used. The posttest scores of both groups were higher than the pretest scores, suggesting that they were more successful after the process than before the process. However, comparison of the posttest scores applied at the end of the process in the experimental and control groups showed that the experimental group was more successful. Analysis of the achievement scores according to gender determined that while there was no significant difference in the experimental group before and after the process, the female students in the control group were more successful in the pretest and posttest.

Examination of attitude scores suggests that there was an increase in the attitudes of the experimental group toward Turkish lessons and grammar at the end of the process, but there was no change in the control group. Analysis of the attitude scores according to gender suggests that there was no statistically significant difference between the pretest and posttest scores of male and female students in both the experimental and control groups.

Considering the results of all students according to gender suggests that there was a significant difference in the grammar achievement of female students. In addition, it was determined that the attitudes of female students toward grammar increased, but it was concluded that there was no significant difference between the attitude scores toward Turkish lessons according to gender.

Suggestions considering the results of the study are as follows:

- The games used in the research were designed simply as a technical infrastructure. These games can be developed with the support of software experts and computer supported games can be prepared at a higher level.
- By creating a multi-player environment in the games, they can be integrated into the education system of a school or country, not just a classroom. In this way, the points to be taken from the central exams can be replaced by points collected from the games. Thus, students can evaluate themselves not only according to the success ranking of the class or school they are in but also on an average of success in which the whole country participates.
- Student opinions can be consulted while the games are being prepared.
- In terms of compatibility with the operating system, not only computer games but also games that can work on phones, tablets, and game consoles can be developed.
- Sexism should be avoided during the preparation process of the games.
- Information about game technology, game-based learning, and educational games can be transferred to teachers at the level of undergraduate education and to trainee teachers.
- Researches on the computer-assisted game-based learning method can be carried out at different grade levels, thus contributing to the literature by measuring the achievement and attitudes of students in other disciplines.

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