EFFECT OF BLENDED LEARNING APPROACH ON GENDER AND LOCATION ON STUDENT’S ACHIEVEMENT IN BASIC SCIENCE IN PLATEAU STATE, NIGERIA

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ABSTRACT

This study looked at the influence of gender and school location on students’ achievement in Basic Science when taught using blended learning approach in Plateau Central Education Zone. The study was guided by two research questions and two hypotheses. Quasi-experimental research design was adopted for the study; specifically, the non-equivalent control group design. The population of the study comprised 7,800 JSS II Basic Science students in co-educational schools in Central Education Zone of Plateau State made up of males and females, urban and rural. The sample for the study comprised 147 JSS II Basic Science students (86 males and 61 females with 95 of them from urban schools and 52 from rural schools) drawn from the population of the study using purposive-sampling technique. The Kudrer Richardson formula 20 was used and a reliability coefficient index of 0.78 was obtained. The treatment lasted for six weeks. The instrument for data collection was Basic Science Achievement Test (BSAT), which was also reshuffled and used as Basic Science Retention Test (BSRT). Mean and standard deviation were used to answer the research questions while ANCOVA statistics was used to test the null hypotheses at 0.05 level of significance. The results obtained in the study revealed that male students taught Basic Science using BLA had higher mean achievement score than their female counterparts. Students in the urban area taught Basic Science using BLA had higher mean achievement score than their counterparts in the rural area. Gender and location exerted some significant influence on students’ achievement in Basic Science. Based on the finding it was recommended that blended learning approach be used in the teaching of Basic Science and gender should not be a barrier in the application of innovative teaching strategies in science classes.

KEYWORDS: Blended learning approach, Gender, Location, Achievement

INTRODUCTION

Science has been regarded as the bedrock through which modern-day technological breakthroughs are built. It is on this basis that countries of the world, especially the developing ones like Nigeria, are striving to develop technologically and scientifically. Man’s life today
depends greatly on science. This is well stressed by Amunga & Amadalo (2010), who opined that science is a dynamic human activity concerned with understanding the workings of the world to help man know more about the universe and utilise its resources for his own benefit. Without the applications of science, for example, it would have been difficult for man to explore the other planets of the universe and draw the benefits that abound in his environment. Science has made man comfortable in the areas of health, nutrition, agriculture, transportation, material and energy production and industrial development (Akpan, 2008). Through science, distance is not a barrier to information sharing. It is in view of the role of science that the Federal Government of Nigeria, through the Federal Ministry of Education, introduced science subjects in schools (Ajibola, 2008). Basic science, formerly known as Integrated science, was one of the science subjects developed to enable students learn scientific skills and principles and gain knowledge at the junior secondary school level for further study in science. Mark and Djagbo (2013) stated that Basic Science treats scientific concepts in a manner free of the restrictions imposed by the arbitrary subject boundaries of the separate sciences to expose students to the general principles and unity of science. The need to improve the quality of science teaching and learning for citizens of Nigeria so that they develop scientific literacy to cope with the demands of science and technology today has been the yearning of every well-meaning Nigerians in the 21st century.

Gender and school location should not be the basis for science achievement in schools, rather, innovative teaching strategies or technique like Blended Learning Approach (BLA) should be the basis. Over the years, science educators and researchers in science education have intensified their efforts in using other innovative teaching methods to see how to ease the controversy surrounding the achievement of students in basic science by gender and by school location. This effort has not really yielded significant results, therefore, the present study is poised to investigate how gender and school location may influence achievement in basic science if a highly articulated and innovative technique such as blended learning approach is used in imparting basic knowledge to students.

Gender refers to socially and culturally constructed characteristics and roles, which are ascribed to males and females in any society. Gender is a major factor that influences career choice, subject interest and achievement of students in science subjects (Okeke, 2008). Gender difference is one of the variables in the educational system that tends to affect learners in secondary schools. Educators have expressed diverse views about gender and achievement especially in sciences. While some are of the view that male students do better than female students (Ogunleye, 2002; Ezirim, 2006; Okwo & Otunbar, 2007), others disagree with this view, arguing that achievement is dependent on several factors such as socio-economic...
background and teaching method among others (Agomuoh, 2010; Ogunleye & Babajide, 2011). Based on these statements about gender and students’ achievement in basic science, this study seeks to investigate whether the use of blended learning approach could streamline gender differences on students’ achievement in basic science.

Maguire and Elang (2006) defined blended learning approach as a mix of delivery approach and technologies to enrich learning experiences and deliver outcome. Sharma and Barret (2007) conceptualized blended learning approach as the combination of lecture method classroom with an appropriate use of technology. According to Maguire and Zhang (2007), blended learning approach is the mixing of appropriate delivery techniques and technologies to enhance students learning thereby producing the desired outcome. Blended learning approach integrates technology with other approaches and allows students to take ownership of their learning process (Lee, 2011).

Location is the place or point that something is situated at. Schools are located in both urban and rural areas. School location means urban-rural schools (Ezeudu, 2003). Urban area is the location within the state/local government headquarters with basic amenities like tarred roads, electricity and pipe borne water while rural areas are located away from the capital of the state and headquarters of local government areas with little or no infrastructural facilities when compared with urban areas. Boylan and McSwan (2007) reported that rural schools are inferior and lacking in the range of facilities and therefore affect students’ academic achievement. School environment is said to affect the learning of a child and it is very relevant to note that the emotional stability of the child is a factor that is important in the child’s achievement (Udegbe, 2006). A location may have consequences for how well students learn at the school. As such, the location of a school could determine students’ level of achievement. This is so because some benefits such as adequate infrastructure may better attract staff to stay and teach in urban schools than in rural schools with little or no infrastructure. According to Popoola and Oke (2010), Etuk and Jeremiah (2011), students from urban schools achieved significantly higher than students from rural schools in Chemistry achievement test. Another study by Okebukola (2002) acceded that students from rural schools performed significantly better than their counterparts in urban schools when they were taught Biology using students’ improvised instructional materials.

Furthermore, studies by Onah (2011), Owoeye and Yara (2011) indicate that students in urban schools perform better in science than their counterparts in the rural schools. Studies carried out by Bosede (2010), and Ezeudu (2003) show that location has no effect on students’ academic achievement. The finding by Agboola and Ojo (2007) also found no significant difference in performance between urban and rural students. The review of related literature
shows overlapping results in the effect of school location on the academic achievement of students but no study investigated the effect of blended learning approach on the academic achievement and retention of students in urban and rural areas. This gap in the findings therefore forms the basis for this study.

RESEARCH QUESTIONS

1. What is the mean achievement score of male and female students taught Basic Science with blended learning approach?
2. What is the mean achievement score of rural and urban students taught Basic Science with blended learning approach?

HYPOTHESES

1. There is no significant difference in the mean achievement scores of male and female students in Basic Science when taught using blended learning approach.
2. There is no significant difference in the mean achievement scores of urban and rural students when taught basic science using blended learning approach.

METHOD

Design of the study

Quasi-experimental design, specifically the non-equivalent control group design was employed in this study. This study is non-equivalent group design because the learners who participated in the study varied in number and characteristics. Quasi-experimental design is suitable where intact classes are used and two groups are used, where one is treated and the other is not. The population of the study comprised all the 7,800 Basic Science students in Plateau Central Education Zone. One hundred and forty-seven (147) JSS II basic science students formed the sample for this study (86 male and 61 female with 95 from urban and 52 from rural areas). This sample was drawn using purposive sampling technique. The choice of purposive sampling technique is because of the need to carry out the study in schools that have computers; hence the researcher chose only those that met the criteria. Two groups where used for this study namely, experimental group and control group. The regular Basic Science teachers in the schools helped to carry out the experiment. The instrument for data collection was Basic Science Achievement Test (BSAT) developed by the researchers. The instrument consisted of 40 multiple-choice items with four options, A-D. Each correct item in the BSAT carried one mark. The BSAT was used as pretest which was reshuffled and served as post-test. This instrument (BSAT) was trial tested on 30 JSS 11 students outside the study area. Data collected from the trial testing was used to determine the reliability of the instrument using Kuder Richardson formula 20 and an internal consistency reliability index of 0.78 was obtained. This showed that the instrument is reliable for use. The research questions were
analysed using mean and standard deviation while Analysis of Covariance (ANCOVA) was used for testing the null hypotheses at 0.05% level of significance.

RESULTS

Research Question 1: What is the mean achievement score of male and female students taught Basic Science with blended learning approach?

Table 1: Mean (\( \bar{X} \)) and Standard Deviation (SD) on Mean Achievement Scores of Male and Female Students Taught Basic Science with Blended Learning Approach

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>PRETEST ( \bar{X}_1 )</th>
<th>SD</th>
<th>POSTTEST ( \bar{X}_2 )</th>
<th>SD</th>
<th>GAIN SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>86</td>
<td>13.93</td>
<td>5.77</td>
<td>21.86</td>
<td>6.43</td>
<td>7.93</td>
</tr>
<tr>
<td>Rural</td>
<td>61</td>
<td>13.29</td>
<td>6.16</td>
<td>19.94</td>
<td>7.37</td>
<td>6.65</td>
</tr>
</tbody>
</table>

Data in table 1 showed that male students taught Basic Science using BLA had mean achievement score of 21.86 while their female counterparts had mean achievement score of 19.94. Male students had gain score of 7.93 while their female counterparts had gain score of 6.65. The result showed that male students taught Basic Science using BLA had higher mean achievement score than their female counterparts.

Research Question 2: What is the mean achievement score of rural and urban students taught Basic Science with blended learning approach?

Table 2: Mean (\( \bar{X} \)) and Standard Deviation (SD) on Mean Achievement Scores of Rural and Urban Students Taught Basic Science with Blended Learning Approach

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>PRETEST ( \bar{X}_1 )</th>
<th>SD</th>
<th>POSTTEST ( \bar{X}_2 )</th>
<th>SD</th>
<th>GAIN SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>95</td>
<td>16.62</td>
<td>5.14</td>
<td>25.17</td>
<td>5.08</td>
<td>8.55</td>
</tr>
<tr>
<td>Rural</td>
<td>52</td>
<td>8.83</td>
<td>3.39</td>
<td>14.24</td>
<td>2.86</td>
<td>5.41</td>
</tr>
</tbody>
</table>

Data in table 2 showed that students in the urban area taught Basic Science using BLA had mean achievement score of 25.17 while their counterparts in the rural area had mean achievement score of 14.24. Students in the urban area had gain score of 8.55 while their counterparts in the rural area had gain score of 5.41. The result showed that students in the urban area taught Basic Science using BLA had higher mean achievement score than their counterparts in the rural area.

HYPOTHESES

Ho1: There is no significant difference in the mean achievement scores of male and female students in Basic Science when taught using blended learning approach and those taught using lecture method
Table 3: Analysis of Covariance of Students’ Mean Achievement Scores in Basic Science

<table>
<thead>
<tr>
<th>SOURCES OF VARIATION</th>
<th>SUM OF SQUARES</th>
<th>DF</th>
<th>MEAN SQUARE</th>
<th>F</th>
<th>SIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected model</td>
<td>3917.301</td>
<td>8</td>
<td>489.663</td>
<td>47.610</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>2699.994</td>
<td>1</td>
<td>2699.994</td>
<td>262.521</td>
<td>.000</td>
</tr>
<tr>
<td>Pretest</td>
<td>655.781</td>
<td>1</td>
<td>655.781</td>
<td>63.762</td>
<td>.000</td>
</tr>
<tr>
<td>Method</td>
<td>143.084</td>
<td>1</td>
<td>143.084</td>
<td>13.912</td>
<td>.000</td>
</tr>
<tr>
<td>Gender</td>
<td>32.159</td>
<td>1</td>
<td>32.159</td>
<td>3.127</td>
<td>.079</td>
</tr>
<tr>
<td>Location</td>
<td>735.737</td>
<td>1</td>
<td>735.737</td>
<td>71.536</td>
<td>.000</td>
</tr>
<tr>
<td>Error</td>
<td>1419.311</td>
<td>138</td>
<td>10.285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>61058.000</td>
<td>147</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected total</td>
<td>5336.612</td>
<td>146</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data in Table 3 showed no statistical significant main influence of gender on students’ achievement in Basic Science F (1, 146) = 3.127, p ≥ .079 or p > 0.05. The null hypothesis therefore, was not rejected, indicating that there was no significant difference in the mean achievement scores of male and female students taught Basic Science using BLA and those taught using the conventional lecture method.

Ho2: There is no significant difference in the mean achievement scores of urban and rural students when taught basic science using blended learning approach and those taught using the conventional lecture method.

Data in Table 3 showed that there was statistical significant main influence of school location on students’ mean achievement score in Basic Science F (1, 146) = 71.536, p < .000. The null hypothesis therefore, was rejected, indicating that there was significant difference in the mean achievement scores of rural and urban students taught Basic Science using BLA and those taught using the conventional lecture method.

DISCUSSION OF RESULTS

The findings of this study revealed that male students had higher mean achievement score than their female counterparts in Basic Science. The difference in the mean achievement scores was not statistically significant. The researcher observed that the male students were more excited than their female counterpart about the innovative BLA and were asking questions and discussing among themselves with keen concentration. This may have enhanced their achievement. The method was able to streamline the gender differences in Basic Science because both male and female students performed well though females were observed to be reserved and shy to participate in class discussion. The finding of this study is in line with the findings of Ogunleye and Babajide (2011), Ogbu (2005), Agomuoh and Nzewi, (2003) which lend credence to gender insignificance in science achievement. However, Egbo (2005) observed significant difference in achievement in Chemistry due to gender.
The difference in the mean achievement scores for urban and rural students was not statistically significant. The finding could be as a result of the differences in environment in which these students find themselves. In the urban area, the achievement must have been borne out of availability of more electronic facilities that they are used to which may not have been available in the rural set up. For instance, English Made Simple and Mathematics Made Simple cassettes or CDs are not new to them. This possibly gave them advantage over their counterparts in the rural area, who may have inadequate or no computers completely and other electronic resources in their schools and at home. These facilities could have helped students in the urban area to be abreast with the use of BLA and therefore achieved higher than their rural counterparts. The finding of this study is in line with the findings of Odubumi and Balogun (2008) and Da-Uba (2011) who found out that students from urban schools are more at home with technological devices than their rural counterparts. Probably, for students in the rural schools, that may be their first encounter with electronic gadgets in the classroom. The finding is also consistent with Jegede (2007) who carried out a study on school location and the use of play simulation on students’ achievement in Chemistry and the result showed that students in rural schools are more apprehensive and science-phobia stricken than their urban counterparts in learning Chemistry lessons. Both students in rural and urban schools were provided with equal facilities and given the same nature of instruction. It was hoped that they will perform equally but that was not the case.

CONCLUSION

From the results obtained in the study, it was found out that:

1. Male students taught Basic Science using blended learning approach in Plateau Central Education Zone, had higher mean achievement score than their female counterparts.
2. Students in the urban area taught Basic Science using blended learning approach had higher mean achievement score than their counterparts in the rural.
3. Generally, the finding of the study showed that blended learning approach was more effective in improving students’ achievement in basic science than the conventional lecture method.

EDUCATIONAL IMPLICATIONS OF THE FINDINGS

The study revealed that blended learning approach was superior to conventional lecture method. These results imply that the current instructional approach used in teaching basic science might have been partly responsible for students’ poor achievement in basic science and other science subjects. The major implication of this study is that blended learning approach is an instructional strategy that enjoys a variety of motivational techniques to make instruction more relevant and make students more responsible for their learning instead of depending on
the teacher all the time. Another implication is that the use of blended learning approach offers a good medium for classroom discussions that can facilitate individual participation and increase students understanding of basic science concepts very well and may result to excellent achievement in basic science.

RECOMMENDATIONS

This study concentrated on the effect of blended learning approach on gender and location on student’s achievement in basic. The researchers recommend as follows:

1. Further research be carried out on other subject areas in secondary schools using blended learning approach
2. Investigate the effect of other independent variables like interest and motivation of students in the use of blended learning approach

REFERENCES


