

**Effect of Individualize Instructional Strategy and Academic Achievement of Senior Secondary School Students in Biology****Abu Alice Oladehinde (Ph.D)**

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Abstract

This study examined the effect of individualize instructional strategy as to enhance senior secondary school students academic achievement in biology than Talk and Chalk method. The design was quasi-experimental. The study was guided by 2 research questions and 1 null hypothesis. The population comprised 195 senior secondary two (SS2) biology students. A sample of 80 students from 2 schools in Anyigba, Kogi State was drawn from the population using balloting technique. The pre-test showed that the two schools were comparable before the administration of the treatment. The experimental group was taught with individualized instruction while the control group was taught with Talk and Chalk method in each of the sampled schools. Both the experimental and control groups were taught the same topics in biology by their regular biology teachers. The instrument used for the study was pre/test which was also reshuffled to post test biology achievement test on the concepts micro-organism around and micro-organism in action was validated by three experts. The reliability of the instrument was determined using product moment correlations with index of 0.98. The research questions were answered using mean and with standard deviation while the null hypothesis was tested using t-test for two independent groups. The findings revealed that the individualized instructional strategy enhanced the student's academic achievements in biology more than the Talk and Chalk method. The researcher recommended among others that biology students should be exposed to students-centered and activity-based teaching strategy such as individualized instructional strategy for enhanced student's achievement

Keywords: Achievement, Biology, Individualized Instructional Strategy, Learning Materials and Talk & Chalk Method.

Introduction

Biology is a natural science concerned with the study of life and living organisms including their structure, function, growth, evolution, distribution, and taxonomy (Aqua arena wetlands project, 2004). The study of biology enables one to become more aware of one's changing environment, explore it better and be better adapted to it. Biology is therefore one of the most important science subjects for creating self awareness in the individual as well as making the individual to contribute ones quota more effectively and meaningfully.

Biology serves as a core subject for many science disciplines among which are human medicine, agriculture, food technology, veterinary medicine, pharmacy and biology Education among others. This is further confirmed by the requirements for admission into Nigerian Universities as mentioned in the Joint Admission and Matriculation Board (JAMB) 2018/2019. In spite of the importance and position biology occupies a score science subject of the stated disciplines in Nigeria Universities the emphasis on teaching and learning of the subject is of low level performance in Senior Secondary School Examination (SSSE) Olorundere (2014). The poor academic performance of senior secondary school students in

biology had been plagued with gross under achievement with little or no appreciable improvement over the years (Omeregbe & Ewansiba, 2013; & Olorundare 2014).

Ihejirika, (2010) opined that some studies have demonstrated that students academic performance in senior secondary school certificate biology and other science subject examination since eighties have remained poor. Therefore, it becomes glaring that there has been no appreciable improvement in the general performance of the students that sat for Biology in the SSCE over the years. Some studies attributed the poor performance of students in SSCE biology to socio-economic background of students Gwuadu (2010). Others attributed it to intelligence and aptitude and yet others to teaching methods. Instances of poor instruction abound in the schools. It is not uncommon to see classes of students idling away precious time for lack of teacher's direction or any guide whatsoever. Such lessons are usually delivered by the Talk and Chalk method, a method which consists mainly of teacher dominated talks (Nyoku&Ezinwa, 2014). Evidence from the works of Nwagbo (2001), Olatoye, Aderogba, Aanu, (2011); Naboh, (2012); (Njoku&Ezinwa, 2014), revealed that the prevailing teaching methods in Nigeria is the Talk and Chalk method.

Ihejirika, (2010) attributed the poor academic performance of students in biology to poor state in which science is been taught in schools. "Talk and Chalk method has been the most widely used science teaching method. This instructional method according to these scholars is mainly authoritarian in nature. Neboh, (2012) & David, (2017) observed that teachers who provide good teachers student relationship and apply good teaching methods might improve academic achievement of students thereby motivating them to score high marks. Gillis, (2004), opined that science teachers should rather embrace more innovative, student- centered and activity- based approaches of teaching which have been reported to be more effective in realizing the objectives of the subject whereby more than one sense organ is involved by the learner to achievement his/her aims. Furthermore, innovative, student-centered and activity- based instructional strategy could be approached in form of individualized instructional techniques, where students engage in activities of learning on individual basis.

Individualized instructional, according to Olatoye, Aderogba&Aanu (2011) is an instructional strategy in which the content, instructional materials, instructional media, and pace of learning are based upon the abilities and interests of each individual learner. A variety of studies investigated the effectiveness of individualized instructional method as it enhanced the scholastic performance of students particularly in science subjects. Naboh, (2012) studied the relative effectiveness of two methods of teaching science (biology) at the secondary school level of Education in Nigeria, the results of findings revealed that the individualized instructional strategy was superior to the conventional approach (Talk and Chalk) in achievement in biology. Studies conducted by Neboh, (2012) on the effectiveness of individualized on academic achievement in secondary biology showed that students' academic achievement are greatly enhanced when taught with the individualized instructional method using learning activity package than the Talk and Chalk method. Similar studies concluded by David, (2017) on the comparative of individualized and cooperative learning

instructional strategies on senior secondary school students Academic Achievement in organic chemistry showed that individualized and corporative instructional methods were more effective in enhancing students' achievement than the Talk and Chalk method.

Also, Callo and Smith, (2006) compared two method of instruction on a group of eight gifted Junior high students in psychology results revealed that the control group which received traditional lecture (Talk and Chalk) format instruction had a lower mean score compared to the experimental group exposed to programmed units (individualized approach) in less time and scored significantly higher on the final test. Olatoye, Aderogba and Anu(2011) has earlier suggested that individualized instructional strategy that is characterized with activities based and learner- entered method that allow the learner (student) to proceed at his/her own rate, provide knowledge of results and above all require mastery at every level, leading to a specified performance outcome. Form the view point, a study of using individualized instructional strategy as an effective techniques against the Talk and Chalk (lecture) method as in this present study is appropriate. In order to find the potentials that individualize instructional strategy offers as a technique of teaching biology in the senior secondary school in Nigeria, this study is backed upon. Unless such a study is made, the soundness of the choice of individualize as a teaching technique cannot be defended.

Purpose of the Study

The main purpose of this study is to determine the effect of individualize instructional strategy and academic achievement of Senior Secondary School Students in Biology concepts "Micro-Organisms around and Micro-Organism in action". The study is designed more specifically to provide answers to the following research questions.

Research Questions

- 1.What is the mean gain score between students taught with individualized instructional strategy and those taught with Talk and Chalk Instructional Method?
2. Do teaching method (individualized and Talk and Chalk) have any effect on students academic achievement and high, average and low achievers in post-test scores in biology

Null Hypotheses

One null hypothesis was formulated for the study;

H₀₁: There is no significant difference in the mean scores of student taught using individualized instructional strategy and Talk and Chalk (lecture) method in biology achievement

Methodology

The research design adopted for this study was quasi-experimental. The experimental and control groups were pre tested ,categorized as high , average and low achievers before treatment and post tested after the treatment was administered. The population of the study comprised 195 senior secondary two (SS2) students in seven public schools in Anyigba, Dekina Local Government Area of Kogi State. A sample of 80 students from co-educational public senior secondary schools was drawn from the population using balloting technique and

was used for the study. The secondary school students were already exposed to biology teaching for, at least one year before the study was carried out. The average age of the student was 17 years. The schools were sorted out into experimental and control groups, by balloting. The experimental group was made up of 38 students and the control group 42 students. One instrument was used for data collection, developed by the researcher. The instrument was used as pre-test for both experimental and control groups and also used to categorize the students in high average and low achievers respectively.

The instrument comprised ten fill in the blanks, two essay questions and one alternative to practical question on the topics taught (Micro-Organism around and Micro-Organism in action). The test items and learning materials for the two groups were content and face validated by a panel of 3 that comprised one secondary school biology tutor, one lecturer in biology department and one expert in measurement and evaluation. The reliability coefficient was Pearson Product Moment Correlation method which gave 0.98. The topics treated in the biology are Micro-Organism around and Micro-Organism in action drawn from the senior secondary school curriculum. The Biology teacher received training on the use of individualized instructional strategy manual for the experimental group on the topic Micro Organism around and Micro-organism in action, while the Biology teacher for control group received training on the use of Talk and Chalk instructional method lesson notes on the same topics for the experiment group.

Before treatment commenced, each teacher (Experimental and control) administered the biology achievement test on the topics Micro Organism around and Micro Organism in action, as pre test and recorded their scores. The pre test lasted for 60 minutes. The pre test was also used to categorize the subject into high, average and low achievers. The pre test mean scores obtained from the two groups (i.e. experimental and control) were analyzed using t- test for two individual group .The t-test was used in order to determine the significance of the difference between means for the two separate groups to show that the two groups are compactable. The data collected through the post-test for control and experimental groups were scored. For analysis, the two groups in respective of schools were pooled together according to the method of instruction used and computed. Hypothesis one was tested using t-test for two independent groups at $p < 0.05$ level of significance and the research question one used mean and standard deviation to find their differences in their achievements. Arithmetic mean was employed to find the differences in research question two among the three levels i.e. high, average and low achievers.

Research Question 1: What is the mean gain score between students taught with individualized instructional strategy and those taught with Talk and Chalk Instructional Method?

The result is presented in Table 1

Table 1: Mean and Standard Deviation Differences in Post-test Scores between of Experimental and Control Groups in Biology.

Group	N	\bar{X}	SD	Mean. Diff
Experimental group	38	39.50	17.36	.83
Control group	42	22.43	16.53	

From the result in Table 1, show that the experimental group with mean of 39.50 performed higher than the control group with means of 22.43, implying a mean difference of 0.83 in favor of students in the experimental taught with individualized instructional strategy. To test whether the difference is significant or not, the null hypothesis one was tested using t – test for independent groups.

Research Question 2: Do teaching method Individualized Instructional Strategy and “Talk & Chalk method have any effect on student’s academic achievement on high, average and low achievers in post-test mean scores in biology?.

Table 2: Summary of the Arithmetic Mean Scores in the Post-test for the Three levels in Individualized and “Talk and Chalk” Methods.

Group	Method	High	Average	Low
Experimental group	Individualized	69.00	50.29	27.50
Control group	“Talk and Chalk”	60.00	46.00	15.16

In Table 2 the result suggests that there are differences among the means scores of high, average and low achievers of the experimental group as well as the means of the high, average and low achievers of the control group. As one can see in Table 2, the result indicates that the high achieve in the experimental group had a higher mean scores of 69.00 than the high achievers of the control group with a mean score of 60.00 while the average achievers in the experimental group had a mean scores of 50.29 the average achievers in the control group had a mean of 46.00.

The result also indicates the difference between the low achievers in the experimental group and the low achievers in the control groups. It could be seen that the low achievers in the experimental group had a higher mean score of 27.50 than the low achievers of the control group with a mean score of 15.16 The result suggests that there is a difference among the different levels of achievers (i.e. high, average and low achievers), meaning that there is a difference in the academic achievement of high, average and low achievers of experimental group taught using Individualized Instructional Strategy and high, average and low achievers of the control group that was taught with “Talk and Chalk” method in favor of the experimental group as shown in the mean scores

Test of Null Hypothesis

Null Hypothesis 1: States that there is no significant difference in the mean scores of students taught using individualized instructional strategy and those taught using Talk and Chalk method in biology achievement.

Table 3: Summary of t-test Comparison of the Post-test mean scores of individualized and “Talk and Chalk” Methods

Method	Subject (N)	\bar{X}	SD	df	t-cal	t-tab	P-value	Rmk
Individualized	38	39.50	17.36	78	4.43	1.99	0.000	Sig.
“Talk and Chalk”	42	22.43	16.53					

*P < 0.05 significant

The result from Table 3 reveals that the mean score of 39.50 for the Individualized instructional strategy is higher than the mean score of 22.43 for the Talk and Chalk (lecture) method. In testing the hypothesis, the t-value calculated is 4.43 is greater than t- critical of 1.99 at df of 78, also the p-value observed was 0.00 is significant at $p < 0.05$. With this result it is therefore adjudged that Individualized Instructional Strategy is more effective than the “Talk and Chalk” method. It can be concluded that there is a significant difference between the groups exposed to the individualized Instructional Strategy and the “Talk and Chalk” method in their achievements in biology. Hence, the null hypothesis of no significant difference is thus rejected.

Discussion of Findings

The study investigated the effect of individualized instructional strategy and academic achievement of senior secondary school students in biology. The results were presented to answer research one, two and null hypothesis one. The results of the research questions and the testing of null hypothesis one revealed from the findings that the use of the individualized instructional strategy enhanced the student’s academic achievement in biology, irrespective of their previous academic standings. The difference between the two methods of instruction was significant at the chosen probability level favoring the group with Individualized Instructional Strategy. In effect, the individualized instructional strategy was a more effective method in teaching biology than the “Talk and Chalk” Method. The subjects in the individualized group conducted their activities by themselves at their own pace during the school lesson periods. But this method was in contrast to the “Talk and Chalk” Instructional Method where the teacher did most of the work for the students.

Based on the results in Tables 1, 2 and 3 of the post-test means scores of this study, it is logical to attribute the superior performance of students in the Individualized group to

Individualized teaching and learning. Since the two groups were exposed to the same concepts during the study, one expects the two groups to perform about the same level when given the same examination. The two schools had similar educational background. The same state government funds and supplies science equipments, teachers, other teaching resources to the schools on an equitable basis and the two schools are located in the same environment (Anyigba-town) School records have also shown that the students in the two schools were admitted by the same body.

The earlier methods (Individualized) arouse greater student's interest going by psychological theories. These findings have led to the rejection of hypothesis one stated in this study. Also the individualized instructional strategy involved the use of several sense organs. Psychological researchers have shown that learning is enhanced when more than one sense organ is involved during the learning process David (2017). This finding agrees with the finding of Gillis (2004). Furthermore, the results of data analysis has shown that the teaching methods individualized instructional strategy and "Talk and Chalk" instructional method considered in this study, the results revealed that individualized instructional strategy was more effective in enhancing student's academic achievement than the "Talk and Chalk Method". This finding with the findings by Naboh (2012), agreed that an individualized method is superior to the Talk and Chalk Method of Instructions.

Also, these findings agree with the findings of Neboh (2012), David (2017) that Individualized Instructional Method was more effective than the Talk and Chalk Instructional Method in enhancing students' academic achievement in science. Furthermore, the result of the arithmetic mean scores on varied levels that is high, average and low achievers of Individualized Instructional Strategy scoring high means than the Talk and Chalk students taught with this Instructional Method. The study tallies with the findings of Callahan and Smith (2006) who compared two method of instruction on a group of eighteen gifted Junior School of high, average and low achievers. Results revealed that the high, average and low achievers of the control group which received traditional lecture format instruction had a lower mean scores compared to the high, average and low achievers of the experimental group exposed to individualized unit in less time in Mathematics and scoring higher means.

Conclusion

Research studies have shown that secondary school students academic achievement in biology have been consistently poor, despite all efforts being made by teachers to improve their intellectual skill and growth. These observed poor academic achievement have been attributed to among other things, the use of teaching methods or strategies which are not student-centered and dominated with activities .Based on the findings obtained in this study, it can be concluded that; The Individualized and Talk and Chalk Instructional Methods were not equal to improving the academic performance of these students in biology .The individualized instructional strategy appeared to have enhanced the student's academic achievement more than the Talk and Chalk method, when used in teaching biology.

Recommendations

1. Therefore, it is recommended that since individualized instructional strategy has been found to be more effective and has enhanced performance, there is need to emphasis the use of individualized in the senior secondary schools especially in the teaching of Biology.
2. The teachers of secondary school biology in Nigeria should attend conferences, workshops and seminars regularly where they would learn the requisite skills and knowledge to handle these innovative teaching strategies in their classrooms. This innovative teaching strategy should be incorporated into the Biology curriculum of teacher training tertiary institutions in Nigeria, in order to popularize their use among the teacher trainees.

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