

DIFFERENTIAL EFFECTS OF PROJECT BASED, GROUP DISCUSSION AND SELF-REGULATED LEARNING TECHNIQUES ON STUDENTS' ACHIEVEMENT IN BIOLOGY

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ABSTRACT: *This study investigated the differential effects of Project Based, Group Discussion and Self Regulated Learning Techniques on students' academic achievement on Biology in Aba South Local Government Area of Abia State. Non Equivalent control Group Quasi Experimental design was used. Four research question and Four Hypotheses guided the conduct of the study. The population is all the SS2 Biology students from the six public secondary school in the Area of study totaling 1142. The sample size consists of 128 SS2 students drawn through purposive sampling technique. Simple random sampling Technique with slip of papers was used to assign the students into four groups of Project Based, Group Discussion, Self Regulated Learning Techniques and the Control Group. Mean (\bar{x}) and Standard Deviation (SD) were used to answer the research questions. Paired Sample t-test, Independent t-test, Analysis of Covariance and Post Hoc Multiple Comparison were used to analyze the Hypotheses at 0.05 significance level. The Study found out that Project Based Learning significantly outperformed Group Discussion, Self Regulated Learning and the Control Group in enhancing students' achievement, while Self Regulated Learning enhanced students' achievement higher than Group Discussion but not significantly. All the treatment groups significantly outperformed the Control Group. Based on the findings of the study, the following recommendations were made; Proper learning strategy which may help students comprehend the content of the learning like Project Based learning should be encouraged in the teaching and learning environment. Learning without relevant strategies should be de-emphasized at all levels of education.*

KEYWORDS: Project, Group Discussion, Self-Regulated Learning Techniques Students' Achievement, Biology

INTRODUCTION

Biology is the study of living things. Biologists investigate animals, plants and Microbes in many different ways and on a huge range or scales from molecules and cells to individual organisms 'population and ecosystem. Wikipedia (2006) stressed that during the past four decades; the study of Biology has undergone rapid changes and has had a significant impact on the ways we live. We are now able to produce antibiotics and vaccines, grow disease resistant crops, transport organs and manipulate genes. Biologists are actively researching solutions to vital concerns such as increasing world food supply, improving and protecting our environment and conquering diseases. Biology occupies a special position in the senior secondary school curriculum in Nigeria. Credit pass in any of the science subjects, is one of the criteria to gaining admission into any of the Nigeria Universities. Biology is mostly registered for, in the senior secondary certificate examination (SSCE) and the National Examination's commission (NECO), by science, arts and social science oriented students. It

has been observed that students are not performing well enough in Biology and other science subjects at SSCE. Oshokoye (2005) and Adesomowo (2005) noted that there had been a steady increase in failure rates of secondary school students in these sciences specifically Biology, Chemistry and Physics over the years. The unflinching efforts of the teachers in the teaching and learning situation especially by the use of some teaching methods like lecture method, chalk board, laboratory and discovery methods to impart knowledge to the learners, coupled with government efforts to raise the standard of education by improving on the infrastructural facilities through the Niger Delta Development Commission (NDDC) and Education Trust Fund (ETF) developmental projects in various public schools, achievement has remained substandard. Odubunmi (2006), noted that when students find the learning of a concept difficult in a subject, they might end up hating the subject. It should be note worthy that the reason for poor performance of students in this subject, is not that students do not have innate potential to learn and understand what they have learnt, but as Santrock (2006) posits that students' achievement depends on three variables; of motivation, expectancy and incentive, in which case students are capable to learn and understand whatever they are taught at any given moment, if they are properly motivated through the use of appropriate teaching techniques or strategies in the teaching and learning situation.

Oyedeke in Ibe (2008) observed that learners face many difficulties in learning science subjects particularly Biology in our schools. To overcome these barriers, teachers need to utilize learning strategies. A good science learner finds ways to use these techniques to succeed in science learning. These Techniques usually make learning more successful especially when applied in learning of Biology as a subject. Sims and Sims (1995) informed that institutions of higher education are always looking for ways of making their educational initiatives more effective. Higher education administrators and instructors at all levels are constantly under pressure to provide more effective and efficient services. In colleges and Universities, teaching serves as an important vehicle for achieving institutional goals of increased effectiveness, efficiency and the enhancement of students learning. Success in a changing world will require the ability to explore new opportunities and learn from past successes and failures. These ideas are neither new nor controversial. A number of factors determine the level of performance in the school system, especially the quality of the input and school process variables. On this note, Ochumba (2008) opined that goals of education can only be achieved with a well organized school system that would ensure that all aspects of school life are well articulated and effectively coordinated. Many have blamed the poor performance on the teachers who have failed to use the appropriate learning Techniques or strategies in teaching the students, while others blame the students for lack of attention and inability to study and recall what they have learnt in the classroom during the examination.

There seems to be inconclusive arguments over who or what is responsible for the poor performance of students in our schools both primary and tertiary education. The levels of understanding of subjects taught, and recall ability of students and subsequent performance during examination either internal or external these days, left much to be desired. Mtsem (2011) reported that teaching methods affects the responses of students' performance and determined whether they are interested and motivated and involved in the teaching and learning processes. What constitutes good teaching and learning of school subjects is the use of appropriate alternative means of imparting knowledge so as to defend and ensure that this all important subject is not relegated to the background. Among these alternative techniques, is the use of Project Based, Group Discussion and Self Regulated Learning techniques. Markhan (2011), defined project based learning as a student centered pedagogy, which involves a dynamic

classroom approach in which students acquire a deeper knowledge through active exploration of real world challenge and problems. In this type of learning, what the teacher does is to direct the learners on what to do. The teachers gives the assignment and the learners carries out the research on the assigned topic, acquires the information or knowledge for presentation to the class.

Blumenfield (1990) states that project based learning technique is a comprehensive perspective focused on teaching by engaging students to pursue solutions to non trivial problems, by asking and refining questions, debating ideas, making predictions, designing plan and analyzing data, drawing conclusions, communicating their ideas and findings to others, asking new questions and creating artifacts. Artifacts may include a variety of media such as writing, arts, drawings, videos, photography or technology based presentation. Andrew (2013) stated that Project Based Learning also gives students the opportunity to explore problems and challenges that have real world applications, and increasing the possibility of long term relations of skills and concepts. The skills are all about a student researching into a topic to have knowledge of it. Jiang (2008), conducted an empirical investigation on the correlation between the effects of project based learning and Deep approach of learning among language learners and found out that project based learning has a positive effect on the motivation and strategy of language learners, and this contributed to improved deep approach of learning. Similarly, Wekesa (2016) carried out a resent investigation on the influence of Project Based Learning Technique on students' performance in the concept of classification of organism among secondary schools in Kenya.

Consequently, Wikipedia described Group Discussion Learning Technique as a form of systematic and purposeful communicative situation that allows its participants to express views and opinions and share with other participants. It is a systematic oral exchange of information, views and opinions about a topic, issues, problems or situations among members of a group that share certain common objectives. It is an interactive oral process. It is structured in such a way that the participants gets an opportunity to express his or her views and comments on the views expressed by other members. Abduraheem (2011), noted that Discussion Learning Technique is a strategy or technique in which a teach leads or guides the students in their groups towards expressing their opinions and ideas with the view to identifying and solving problems collectively. The role of the teacher in this technique is that of a facilitator. The teacher presents the lesson topics to the learners and also creates enabling environment for them. Oyedije (1996), explained that Group discussion Technique works on the principles that the knowledge and idea of several people are more likely to find solution or answers to specific problem or topics. Rahman, Khalel, Jumani, Ajural & Sherif (2011), carried out investigation on the impact of Group Discussion Technique and Lecture method on students' performance in social studies. The result showed that Group discussion has potency over Lecture method in enhancing students' achievement in social Studies. Similarly, Abduraheem (2011), carried out investigation on the effectiveness of discussion Technique of Learning on Students achievement and retention on social Studies. The result indicated that there was a significant difference between the pretest and achievement mean scores of students in the experimental and Control groups. The study revealed that group Discussion Technique was better than the Conventional Lecture method in improving students' achievement and retention in Social studies. Sequel to this, Paris and Paris (2004), described Self Regulated Learning Technique as the autonomy and control through which individuals monitor, direct, and regulate actions towards goals of information acquisition, expanding expertise and self improvement. This refers to learning that is guided by meta-cognition (thinking about ones thinking), strategic

action, (planning, monitoring and evaluating personal progress against a standard and motivation to learn. This entail that in Self Regulated learning, the learner takes control and evaluates his own learning and behavior.

Zimmerman (1990) explained that Self Regulated learners are architects of their academic strength and weakness and they have a repertoire of strategies they appropriately apply to tackle the day to day challenges of academic tasks. These learners attribute their success or failures to factors like efforts they experienced on a task and effective use of strategies within their control. The learners believe that opportunities to carry on challenging tasks, practice their learning, develop a deep understanding of subject matter, will give rise to academic success. Putrich and Shunck in Zimmerman (2000) informed that Self Regulated Learners exhibit a high sense of self efficacy. Self Regulation is the ability to regulate ones cognition, behavior, actions and motivation, strategically, and autonomously, in order to achieve skills and knowledge. Jafargohar and Morshedian (2014), conducted an investigation on the intermediate English Foreign Language (EFL) readers on their ability to make within text inferences while reading. The findings of the study revealed that Self Regulated instruction aimed at English foreign language comprehension, significantly contributed to learners ability to make correct within text inferences, while reading in English foreign language. Sardareh, Saad, and Boroomand (2012) carried an investigation on the relationship between the use of self Regulated strategies and academic achievement. The result of the study revealed the potency of Self Regulated learning on enhancing students' academic achievement. Learning Techniques usually make learning more successful especially in science subjects.

Regarding the problem of the study, research have shown that majority of our students basically engage in route learning and therefore, appear to have difficulty in the understanding of some scientific concepts. Incidentally, efforts by teachers to improve students' learning seem not to give encouraging results as students continue to show weakness in the knowledge of some vital concepts which are the basic recipe of science. Since the use of route learning by students in studying Biology has not enhanced achievement in the subject and it is not certain to predict which of the strategies or techniques is most effective. There is need to find out which of them will be better in the teaching and learning of Biology. This leads to the problem of this study: What is the differential effects of Project Based, Group Discussion, and Self Regulated Learning Techniques on the academic achievement of secondary school Biology students.

The Problem of this study is to determine the differential Effects of three selected learning techniques on the academic achievement of Senior secondary SS2 Students in Biology. Four Research questions guided the study;

1. What is the effect of Project Based Learning Technique on students' academic achievement with regards to the analysis of their pretest and post-test mean scores?
2. What is the effect of Group Discussion Learning Technique on students' academic achievement with regards to the analysis of their pretest and post-test mean scores?
3. To what extent do Self Regulated Learning Technique affect students' academic achievement as determined by the analysis of their pretest and post-test mean scores?
4. To what extent do the mean achievement scores of student treated with Project Based Learning, Group Discussion Learning, Self Regulated Learning and Control Group differ as determined by the analysis of their post-test mean scores?

Four Null Hypotheses were formulated and tested at 0.05 significance level.

1. There is no significant effect of Project Based Learning Technique on students' academic achievement in Biology as determined by the analysis of their pretest and post-test mean scores
2. There is no significant effect of group Discussion Learning Technique on students' academic achievement in Biology as determined by the analysis of their pretest and post-test mean scores.
3. There is no significant effect of Self regulated Learning Technique on students' academic achievement as determined by the analysis of their pretest and post-test mean scores.
4. There is no significant difference in the effects of Project Based Learning Technique, Group Discussion learning Technique, Self Regulated Learning Technique and Control Group on the academic achievement of students in Biology as determined by the analysis of their post-test mean scores.

METHODOLOGY

The design used in this study is the Non-equivalent control Group Quasi Experimental design. The study was conducted in Aba South Local Government Area of Abia state. The population is the entire SS2 Biology students from the Six public Secondary schools in the area of study totaling 1142. The sample of this study consists of 128 SS2 Biology students drawn through purposive sampling Technique. Simple random sampling technique with slip of papers was used to select Four (4) classes. The same method was used to design the experimental groups and the control group. The instrument for data collection is the Biology is the Biology subject Achievement Test (BSAT). Before the commencement of the study, All the students were administered with the instrument of the pretest. The experiment was conducted by the regular Biology teachers of the schools used. The teachers were adequately trained on how to present the lessons for the Project Based group, and guided on how to plan for the projects, involve the students in planning for the project, organize the discussion group, the Self Regulated Learning group and the Control Group as well as teach the lessons, using the lesson plans prepared by the researcher.

Eight lessons which lasted for Four (4) weeks were taught in the study for the groups. The Topic hinges on plant and animal cells. For The Project Based Learning group, the eight lessons were taught to the students by their regular teachers. The Teachers were adequately trained on how to select activities for the learners especially such that will support the questions. The teachers were also guided on how to design a timeline for project components, help students who may not perceive time limits, set benchmarks, give students direction for managing their time, teach them how to schedule their tasks, help them to set deadline, keep the essential questions simple and initiate Project that will let all students meet with success. The teachers also provides enabling environment for the learners and allows them to go in new direction, but guide them when they appear to digress from the project. The classrooms were decorated with charts containing the learning materials in the subject matter. At the end of each week's lesson, the students were administered with a test on the specific objective of the lesson and

students who scored 50 percent and above were commended and encouraged with praises, and those who scored below 50 percent were encouraged to work harder.

In the Group Discussion Learning Group, the students were taught the eight lessons by their regular Biology teachers. The learners were divided into small learning units. The teacher introduced the lesson and allows the groups to discuss it under her supervision. The classrooms were decorated with teaching aids and charts containing the specific subject matter. At the end of the first lesson, the students were administered with a test based on the specific objectives of the lesson. The students, that scored 50 percent and above, were commended and encouraged with praises. While the students that scored below 50 percent were encouraged to work harder. This treatment continued till the last lesson.

In the Self Regulated Learning group, the students were taught the eight lessons by their regular Biology teachers. The teachers ensured an enabling environment for the individual students. The teacher guided the learners with some relevant learning techniques like, note taking, encoding and decoding of major concepts, concept map, and memorization to aid the learners' comprehension of the subject. At the end of the first lesson, the students were administered with a test based on the specific objectives of the lesson. The students that scored from 50 percent and above, were commended and encouraged with praises. The learning environment was also decorated with learning aids and charts.

The Control Group was also taught the eight lessons by their regular Biology teacher, using the lesson plans provided by the researcher. The learning environment was decorated with teaching aids and charts. This group did not receive any special treatment rather, the normal communication and chalk and board method utilized by senior secondary school teachers in the area of study was adopted. At the end of the first lesson, a test based on the specific objective of the lesson was administered to the students. The students that scored from 50 percent and above were commended and encouraged with praises. Whereas the students that scored below 50 percent were encouraged to work harder. This treatment continued till the end of the experiment. The researcher occasionally supervised the lesson in all the classes in the various schools used in the study so as to ensure that the specifications of the lesson plans were judiciously done as well as supplying the necessary learning materials needed. The treatment lasted for four weeks twice a week. At the end of the eight lessons, the teachers administered the post-test. The post-test contained the same test items as in the pretest, but in the post-test, all the test items were re-arranged so that the students will not discover that they were the instrument administered to them during the pretest. The post-test was administered to all the students at the end of the eight lessons. This yielded the post-test scores.

The Biology subject Achievement Test (BSAT), was validated by two experienced Biology teachers and two experts from Education Psychology in terms of clarity of words, plausibility of the answer options, determination of correct answers and sentence structure.

The reliability of the instrument was determined by test re-test method. The students' scores in the first and second administration were correlated with Pearson's product moment coefficient r . The coefficient obtained was .96. The research questions were answered with Mean (\bar{x}) and standard Deviation (SD). The null Hypotheses 1, 2, 3, were analyzed with paired sample t-test at 0.05 Alpha levels. Hypothesis 4 was analyzed with Analysis of covariance (ANCOVA). The data analysis was conducted with research questions and hypothesis.

Research Question One: What is the effect of Project Based Learning Technique (PBLT) on students' achievement with regards to the analysis of their pretest and post-test mean scores?

Hypothesis One: Project Based Learning Technique (PBLT) does not significantly enhance students' achievement in Biology as determined by the analysis of their pretest and post-test mean scores.

Table 1: Paired t-test analysis of the effect of project Based Learning Technique on students' achievement in Biology

Test	N	Mean	SD	Mean Gain	DF	T-Cal	Sig.
PBL posttest	31	58.65	10.89	22.00	30	10.21	0.000
PBL pretest	31	36.65	11.33				

Table 1, showed that the pretest mean scores of the students exposed to PBLT, is 36.65 while their post-test mean score is 58.65, based on that, it is deduced that they made a mean gain of 22.00. More so, when this mean gain was subjected to paired t-test statistics, a calculated t-value of 10.21 was obtained at DF of 30 at significant of 0.000 ($P < 0.05$). Thus PBLT had a significant effect on students' achievement in Biology. On this basis the null hypothesis is rejected.

Research Question Two: What is the effect of Group Discussion Learning Technique on students' achievement with regards to the analysis of their pretest and post-test mean scores?

Hypothesis Two: Group Discussion Learning Technique (GDLT), does not significantly enhance students' achievement in Biology as determined by the analysis of their pretest and post-test mean scores.

Table 2: Paired t-test on the effect of GDLT on students' achievement in Biology.

Test	N	Mean	SD	Mean gain	DF	t-Cal	Sig.
Post-Test	33	52.24	8.57	12.85	32	8.54	0.000
Pretest	33	39.39	9.24				

In table two, it is shown that the pretest mean score of GDLT group and their post-test mean scores are 39.39 (SD = 9.24) and 52.24 (SD = 8.51) respectively. So the students in GDLT group gained the mean of 12.85 from their pretest to post-test mean. Again when the mean gain was subjected to paired t-test analysis, calculated t-value of 8.54 was obtained at DF of 32 and at a significant level of 0.000 (< 0.05). Thus the null Hypothesis is rejected which means that GDLT, had a significant effect on the students' achievement in Biology

Research Question Three: What is the effect of Self regulated Learning Technique (SRLT) on students' achievement in Biology as determined by the analysis of their pretest and post-test mean scores?

Hypothesis Three: Self Regulated Learning Technique (SRLT) does not significantly enhance students' achievement in Biology as determined by the analysis of their pretest and post-test mean scores.

Table 3: Paired t-test analysis on the effect of Self Regulated Learning Technique on students' achievement in Biology.

Test	N	Mean	SD	Mean gain	DF	t-Cal	Sig.
Post-test	33	53.94	10.04	16.73	32	7.530	0.000
Pretest	33	37.21	12.95				

Table three showed that the pretest and post-test mean scores of the students exposed to Self Regulated Learning Technique are 37.21 (SD = 12.95) and 53.94 (SD = 10.04) respectively. Based on this, it is obvious that these students had a mean gain of 16.73. When the mean gain was subjected to t-test, a calculated value of 7.530 was obtained at DF of 32 and a significant level of 0.000 ($P < 0.05$). Thus the null Hypothesis was rejected which indicates that Self Regulated learning Technique had a significant effect on students' achievement in Biology.

Research Question Four: To what extent do the Biology mean achievement scores of students trained with PBLT, GDLT, SRLT, and CG differ as determined by the analysis of their post-test mean scores?

Table 4: Mean and Standard Deviation on the mean scores of students in Biology based on their groups.

Group	N	Post-test		Pretest		Mean gained
		Mean	SD	Mean	SD	
PBLT	31	58.65	10.89	36.65	11.33	22.00
GDLT	33	51.85	9.09	39.39	9.24	14.46
SRLT	33	53.94	10.04	37.21	12.95	16.73
CTRG	31	38.45	8.97	36.58	9.23	1.87
Total	128	50.79	12.18	37.48	10.75	13.31

Table Four, Showed that the students exposed to PBLT had the mean scores of 58.65 (SD = 10.89) and 36.65 (SD = 11.35) respectively for the post-test and pretest, hence they gained a mean of 22.00. For the GDLT groups, their pretest and post-test mean scores are 39.39 (SD = 9.24) and 51.85 (SD = 9.09) respectively. Considering the SRLT group their post-test and pretest mean scores are 53.94 (SD = 10.04) and 37.21 (SD = 12.95) respectively. For the Control Group, their post-test and pretest mean scores are 38.45 (SD = 8.95) and 36.58 (SD = 9.23) respectively. It is also deduced from the pretest and post-test mean scores, that PBLT group gained a mean of 22.00, GDLT, a mean of 14.46, SRLT a mean gain of 16.73 then the Control Group a mean gain of 1.87. So, the PBLT had the highest mean gain, followed by SRLT, GDLT and the Control Group.

Hypothesis Four: There is no significant difference in the mean achievement scores of the students trained with PBLT, GDLT, SRLT, and CG on Biology

Table 4.1: Summary of One way Analysis of Covariate on the differential mean scores of the students based on their groups.

Source of Variance	Sum of Squares	DF	Mean Squares	F	Sig.
Covariate (BSAT pretest)	2677.39	1	2577.59		
Group	68774.29	3	2291.43	30.43	0.00
Error	9263.309	123	75.31		
Total	18837.3	127			

DISCUSSION OF FINDINGS

Hypothesis One: Shows that there is a significant effect of Project Based Learning on students' academic achievement on Biology as determined by the analysis of their pretest and post-test mean scores, and significant level of 0.000 ($P < 0.000$). Hypothesis Two, also indicated that Group Discussion Learning Technique enhanced students' achievement as determined by their pretest and post-test mean scores. Hypothesis Three, shows that /self Regulated Learning had significant effect on the students' academic achievement in Biology as determined by their pretest and post-test mean scores. On the differential effects of Project Based Learning, Group Discussion and Self Regulated Learning and the Control Group on students' academic achievement in Biology, it is revealed that Project Based enhanced students' achievement in Biology significantly higher than Self Regulated Learning, Group Discussion Learning, and the Control Group Conventional method. The reason behind the supremacy of project Based Learning, Group discussion, and Self regulated Learning over the Control group could be attributed to the belief that the promise of seeing a very real impact becomes the motivation for learning.

Project Based Learning allows students to be totally involved in setting, planning, investigation and production of products presentation or performance that answers a real world question or responds to an authentic challenge. It could also be that Project Based Learning helped the

students to actively participate in the class, and to do things themselves and to discover new things through their prior knowledge. This is in line with the stipulation of Markham (2011), that Project Based Learning is a classroom approach in which students acquire a deeper knowledge through active participation and exploration of real world challenges and problems. The potency of all the treatment groups over the control group could be based on the fact that learning strategies have great influence on enhancement of academic achievement. This is in line with the assertion of Santrock (2006) who informed that academic achievement depends on three variables of motivation, expectancy and incentive. This means that learners are capable of understanding their learning content at any moment, if they are properly motivated through the use of appropriate learning strategies or techniques. Another finding of the study is that Group discussion has significant effect on the academic achievement of students in Biology. The reason could be that discussion learning Technique encourages individual learners to have free participation in the learning situation. In this situation, students of all levels exchange ideas together on the subject matters which may have positive influence on the learners' retention. Supporting this view, Sweigert (1991), informed that group led discussion classes produces greater effect on students' recall and understanding as they read. Another finding of this study, indicates that Self Regulated Learning Techniques had a significant effect on the students' academic achievement in Biology as determined by their pretest and post-test mean scores. The reason could be as a result of orientation. Their mastery of relevant learning skills, enabled them to have control over their learning environment. This is in line with the thought of Wilkpedia (2015), that an individual's environment, cognition and behavior integrate and ultimately determine how the individual functions. Another finding of this study shows that there is a significant difference in the mean achievement scores in Biology of students treated with Project Based Learning, Group Discussion Learning, Self Regulated Learning and the control Group. Project Based had a higher mean gain followed by Self regulated learning, Group discussion and the Control group. This shows that Project Based Learning is the most effective technique followed by Self regulated and then the Group Discussion. The Control Group although showed improvement in their academic achievement but such improvement was not significant. The findings of this study is in line with the findings of Adekoye (2010), Ezendu (1995), Zachnon (1997), and Boalerct (2002) who in their studies show that Project based Learning method improves students achievements in sciences. It is also in line with the study of Olatoye and Adekoye (2010), who reported significant effect of Project Based Learning on students' achievement in an aspect of Agriculture Science.

Implication for Teaching and Learning

The result of this study will go a long way to ensure that application of the study techniques can be experimentally be promoted rather than the Chalk Board method. The study revealed that Project Based learning, Self Regulated and Group Discussion Learning Techniques could be relevant to secondary schools and Universities as alternative strategies in improving their academic achievement. Such techniques will equally help those whose achievements are below standard even the poor learners to acquire learning techniques that are potent to motivate and subsequently enhance their academic achievement. Project Based Learning should be taught in conjunction with an academic subject and not separately. There should be a review of the Secondary school Biology curriculum with the aim of including Project Based Learning Technique and increasing the time for teaching of Project Based learning technique. Other relevant alternative instructional techniques could be employed to enhance achievement in the subject. Based on the findings on Self Regulated learning, teachers should train learners to be able to assume responsibility for their own learning. Learners should be trained to be able to

use different techniques, manage, control, monitor and evaluate their learning processes. Based on the findings on group Discussion, teachers should establish a learning environment specifically designed to help students grapple with the meaning of information test and encourage the learners to individually discuss and make contributions on group basis.

RECOMMENDATIONS

Based on the finding, the following recommendations were made; Teachers at all levels of education should at all times emphasize in the learners prior knowledge for meaningful learning to occur. Teachers at all levels should be conversant with the learning techniques or strategies. This will enable them to vary their mode of presenting the lessons to the students. Teaching without any form of technique or strategy should be de-emphasized in the teaching of biology. Learning strategies should be adopted in the teaching and learning environment, particularly, in practical subjects like Biology. Project based Learning Technique should be emphasized above other techniques in this study. Nonetheless, other relevant Techniques could be used. Psychologists and counselors should be abreast with the learning strategies or techniques, in order to assist identifying students with poor or negative strategies as to give them relevant and necessary remedial treatment. This will gear towards enhancing students' achievement potentials in schools. There should be seminars and workshops to sensitize both teachers and learners on the relevant teaching techniques. This will help to arouse interest in the teaching and learning environment and everybody will put in his or her best. The ministry of Education and its agencies, should adopt Project Based learning Technique among other student centered instructional Techniques for teaching of practical oriented concepts like classification of plant and animal cells.

CONCLUSION

This study is aimed at determining the differential effects of Project Based learning, Group discussion Learning and Self Regulated Learning Techniques on the academic achievement of students in Biology. This study showed that there is a significant effect of Project Based Learning Technique on the academic achievement of students. Project Based Learning Technique Group Scored significantly higher than Group discussion, Self Regulated Learning and Control Group, thereby outperformed all the other treatment groups, followed by Self Regulated Learning Group, and then Group Discussion Learning Group. The mean scores of Self Regulated Learning Technique and Group Discussion Learning Technique do not differ significantly. All the treatment groups performed significantly higher than the Control Group all at post-test.

REFERENCE

- Abduraheem B. O. (2011) Effects of Discussion Method on Secondary Students' Achievement and retention in Social studies. European Journal of Educational studies. Ozean Publications Ltd. <http://www.edu.graduate/prospect>. Retrieved Online 13th December 2014
- Adesomowo C. (2005), Effects of Teaching Method on students' Achievement in Biology. International Journal on Educational Research Eisevier Publication Ltd.

- Andrew M. (2013), Edutopia; the George Lucas Educational Foundation. Retrieved Online 22nd August, 2016.
- Blumenfield P. C. (1999), Motivating Project Based Learning: Supporting the doing, supporting the learning.. From <http://www.edu.org.com>. Retrieved Online 21st November, 2015.
- Boaleret M. (2002), Bringing about change in the classroom, strength and weakness of Self Regulated Learning Approach; Learning and instruction. International Journal of Educational Research. Retrieved Online on 4th April, 2015.
- Ezendu F. O. (1995), The Development of preliminary test in teacher training college. Selected units of organic Chemistry. Unpublished M.Ed thesis University of Nigeria.
- Ibe P. O. (2008), Relationship Between Test anxiety. Self concept and Academic Achievement of Secondary students in chemistry. Unpublished M.Ed Thesis. Imo State University Owerri.
- Jarfargohar, M. & Morshedian, M. (2014), The effects of Self Regulation training on students' improvement of Improvement of English as a foreign Language Readers.. Retrieved Online 24th Oct. 2015.
- Jiang, J. X. (2008), Empirical Study on Project Based Learning Technique and Deep Approach of Learning. Don. Dua University of Shanghai. Retrieved 2nd April. 2015.
- Markhan, T. (2011), Project Based Learning; Teachers Librarian 39 (2) 38-42. Retrieved from <http://www.edu.com>.
- Mtsem, A. A. (2011), Effects of Diagnostic and contextual Instructional school Algebra. A PhD Thesis Abia State University Uturu.
- Ochuba, V. O. (2008), Improving the Quality of Effective inspection of schools. <http://www.edu.findaticles.com>.
- Odubgumni, A. O. (2006), Science and Technology Education in Nigeria. The Euphoria, the frustration and hopes. The 21st Inaugural Lecture. Lagos State University Lagos. Faculty of Education.
- Olatoye, R. A. & Adekoye, Y. M. (2010), Effects of Project Based Learning on Agricultural Science; Issues on Educational Measurement and Evaluation in Nigeria. Pub. Institute of Education University of Ibadan.
- Oshokoye, I. O. (2005), Teaching and Researching History in Nigeria. Ibadan. Laurel Edu. Pub. Ltd.
- Paris, S. G. & Paris, A. H. (2004), Classroom Application of Research on Self Regulated Learning. Educational Psychologist 30(2) 89-101. Retrieved Online 8th September, 2015.
- Rahman, F., Khahet, J. K. Jumani, N. B. Ajural, M., Malik, S. & Sherif, M. (2011), Impact of Discussion Method on students' performance. International Journal of Business and Social Sciences. Vol.2 No. 7 special issues.
- Santrock J. W. (2006), Educational Psychology. Classroom update. New Delhi. Tata McGraw Hill Pub. Company Ltd.
- Sardereh, S.A., Saad, M.R.M., & Boroomend, R. (2012), Learning Strategies and Academic Achievement in pre-teaching EFL Learners. California. Linguistic notes. Vol 5. No 1.
- Sim, R.R., & Sim, S.J. (1995), Learning and Learning Styles. A Review of the future in the importance of Learning, understanding the importance for learning.. From <http://www.wki.com>.
- Sweigart, W., (1991), Classroom talk, knowledge development and writing. Research in the teaching of English. 25, 497-589. From <http://www.wikied.com>.
- Wekesa, N.W. & Onwunya, R.O. (2016), Project Based Learning on students' Performance. The concept of classification of organism among secondary schools in Kenya. Journal of Education and practice. Vol. 7 No. 16.

Wikipedia (2006), Dictionary of Encyclopedia. Retrieved from [http://www. Wikied.com](http://www.Wikied.com)

Wikipedia (2011), Dictionary of Encyclopedia. Retrieved from <http://www.Wilkied.com>.

Retrieved on April 20th 2015

Wikipedia (2015), Dictionary of Encyclopedia. Retrieved from <http://www.Wilkied.com>.

April 2015

Zimmerman, B.J, (1990) Self Regulated learning and Academic Achievement. An Overview of Educational Psychologist. Retrieved Online 8th Sept. 2015.