

Collaborative Versus Contextual Learning and Students' Academic Achievement in Biology

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Abstract: *The study on collaborative versus contextual learning and students' academic achievement in biology was conducted in Hallmark Academy secondary school, Omoku in OgbaEgbmaNdoni Local Government Area of Rivers State. Three objectives and three hypothesis guided the study. The study adopted a comparative research design, the population consisted of senior secondary school biology students (SS2) which was eighty (80) students, and census sampling techniques was used. Biology Achievement Test (BAT) was used as instrument for data collection which was validated with a reliability coefficient of 0.06. Two tail t-test was used as a statistical tool for the study. The findings reveal no significant difference between the mean scores of students who learned using collaborative approach and their contextual contemporaries. The study also revealed no significant difference between the mean score of male collaborative learners and their contextual counterparts. Furthermore it was found out that there is no significant difference between the mean scores of female collaborative learners and their contextual counterparts. Based on these findings, the study recommend that instructors should be selective in the choice of their teaching approaches for lesson delivery for improved students' academic performance.*

Keywords: *critical thinking skills, creative skills, real life uses*

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I. Introduction

The rapid changes and improvement in the world today presents new challenges and on our 21st century educational system. The 21st century education emerges to meet the need of the learners by providing them with new technologies and new approaches for teaching and learning in which collaborative and contextual learning is one of them for improved academic performances. Gomes (2010) noted that the lecture-note-taking scenario in our classroom setting is no longer yielding a better productivity among learners, therefore there must be a paradigm shift in the roles teachers and learners play in the teaching and learning environment. This prompt the emergence of various teaching strategies like collaborative learning, contextual learning, problem-based learning, blended learning etc. The collaborative learning strategies based its view on the constructivist model which opined that learners must be actively engaged in knowledge construction as opposed to the passively received information which is common the transmittal model. This approach focuses on content coverage to actively constructing knowledge which gives learners the opportunity to apply the concept of 4Cs (communication, collaboration, creativity, critical thinking) in their learning. Collaborative learning is an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product. Collaborative learning is based on the idea that learning is a naturally social act in which the participants talk among themselves Collaboration is a situation in which two or more people learn or attempt to learn something together, here learners who engaged in collaborative learning capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas, monitoring one another's work, etc.) More specifically, collaborative learning is based on the model that knowledge can be created within a population where members actively interact by sharing experiences and take responsibilities. Collaborative learning is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. In this approach student's work in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product Mitchelemore, and Kimamo (2011) investigated the effect of collaborative learning approach on mean achievement scores of Biology students in high schools. Solomon-four-non-equivalent-target population comprised 183 form two students in four high schools were used for the study. Students were taught biology topic for five weeks and collaborative learning approach was used in experimental groups while the conventional teaching method was used in control groups. Pre-test was administered before treatment and a post-test after treatment. A Biology achievement test (BAT) was used as an instrument for the study. T-tests,

ANOVA and ANCOVA were the statistical tools used for the study and hypotheses were accepted or rejected at significant level of $p (<0.05)$. the findings reveals that students taught using collaborative learning approach had significantly higher mean achievement scores compared to their contemporary taught using the conventional teaching method and gender had no significant influence on achievement. It was concluded that collaborative learning approach is an effective teaching approach which Biology teachers should be encouraged to use in their classroom teaching.

Bukunola and Idowu (2012) investigated the effectiveness of collaborative learning strategies on Nigerian junior secondary school students' academic achievement in basic science. The study adopted a quasi-experimental design. One hundred and twenty students (120) from the intact classes of the three selected junior secondary schools in South-West Nigeria participated in the study. The treatments were at two levels: collaborative learning strategies (learning together and Jigsaw II) and conventional lecture method, which was the control group. The moderating variable was anxiety (high and low). Achievement Test for Basic Science Students (ATBSS) and Basic Science Anxiety Scale (BSAS) were the main instruments used to collect data from the respondents. Descriptive statistics and analysis of covariance (ANCOVA) were used to analyse the data collected. Also, multiple classification analysis (MCA) was used to determine the magnitude of the mean achievement scores of students exposed to the different treatment condition. The results of this study indicated a significant main effects of treatment on all the dependent measures. Also significant main effects of anxiety on the students' post and delayed-post academic achievement scores in Basic Science. Furthermore, there were significant interaction effects of treatment and anxiety on the academic achievement of students at the post-test levels. The findings revealed that students in the two collaborative learning strategy (learning together and Jigsaw II) groups had higher immediate and delayed academic achievement mean scores than the students in the conventional lecture group. learning together and Jigsaw II collaborative teaching strategies were found to be more effective in enhancing students' academic achievement and retention in basic science than the conventional-lecture.

Regoonaden and Bordeleau (2008) conducted a study on collaborative through the use of internet at the college university of Saint- Boniface. The findings reveals that majority of the college students preferred more contact with the teaching staff and members of the virtual classroom as opposed to what is obtainable in internet learning in distance education. Gokhale (1995), opined that individuals are able to achieve higher levels of learning and retain more information when they work in a group rather than individually, this applies to both the facilitators of knowledge, the instructors, and the receivers of knowledge (students). For example, Indigenous communities of the Americas illustrate that collaborative learning occurs because individual participation in learning occurs on a horizontal plane where children and adults are equal.

The study outlined five approaches to collaborative learning which include;

- Learning is an active process whereby learners assimilate the information and relate the new knowledge to a framework of prior knowledge.
- Learning requires a challenge that opens the door for the learners to engage peers and synthesize information rather than simply memorization.
- Learners benefit when exposed to diverse viewpoint from people with varied backgrounds.
- Learning flourishes in a social environment where conversation between learners take place
- In collaboration learning environment the learners are challenged both socially and emotionally as they listen to different perspective, and are required to articulate and defined ideas.

This study is related to the study at hand in the aspect of academic achievement. However, the present study investigated not only students' achievement but their preferable teaching strategy. Contextual learning on the other hand is a learning approach which aim at helping students add meaning in their learning with the context of their daily life experiences. It helps teachers to relate the material lessons to real life situations which motivate students to relate their knowledge to life application. Cooper, (1990) defined contextual learning as a teaching and learning process which the materials and actions have a relationship with students experiences out of their school learning environment with the aim of solving problems. Dictionary.com (2017) defined contextual learning as an approach of teaching and learning that relates the materials and classroom activities to real situation and actual experiences focusing on the learning process leading to creativity, critical thinking, problem solving and being able to apply knowledge in their lives. Contextual learning consist of seven element which includes, constructivism, questioning, inquiry, learning community, modelling, reflection and authentic assessment.

Szoka (2013) in a study compared the effectiveness of contextual and collaborative teaching strategy in lesson delivery in rural schools. Fifty one students participated in the study, participants were grouped in to two groups, and the first group consisted of twenty one participant taught using contextual teaching strategy while the second group consisted of thirty one participant taught using collaborative teaching strategy, mathematics

achievement test (MAT) was used in data collection and at the end of the semester students in the contextual group had a higher mean scores than those in the collaborative group. It was therefore recommended that contextual teaching approach should be encouraged among teachers in the rural school.

The study was anchored on theory of constructivism by Jean Piaget (1975). Constructivism is a theory that is based on observation and the scientific study of how people learn. The theory believe that people construct their understanding and knowledge of the world through experiencing things and reflecting on their experiences. Constructivist are active creators of their own knowledge as they reconcile it with previous ideas and experiences, to achieve this they must ask questions, explore and assess what they know constructivism encourages learners to use active techniques such as experiments, problem solving etc to create knowledge and then reflect on what they are doing and how their understanding changes. Here the role of the teacher comes into play as the teacher must understand the learners' pre-existing conceptions, and guides class activities for learners to construct know knowledge, thereby encouraging learning and reflection process rather than to produce a series of fact. Constructivism transform learners from passive recipient of information to active participant in the learning process.

Constructivism is said to be individual or social constructivism. The individual constructivism emphasis on the individual learner constructing meaning from materials within the learning environment to be learnt with, while the social constructivism according to Vygotsky (1978) who opined that in social constructivism perspective, social context is necessary for initial knowledge construction before such knowledge can be appropriated by the individual. Social constructivist through social activities which involves active and social process which learners are directly involved. Vygotsky stressed on a zone of proximal development at which point a learner has gone beyond his own knowledge limit though still depends on his peers and instructors as scaffolds to develop his own knowledge.

Cognitive constructivist Piaget (1980) explained the mechanism through which a learner develops internal knowledge structure using his own experience and knowledge from the learning environment. These mechanism are assimilation and accommodation. In assimilation process, individuals build knowledge by incorporating new information into the already existing mental structure called "schema", while in accommodation individual learners build knowledge by changing or replacing the information in the mental structure with the new acquired information.

Statement of the problem

There is the ever increasing need for an improvement in academic achievement of our learners by all stakeholders, educators, parents, mentors, guardians and others related agencies. Competitiveness among students is still the order of the day, just as team spirit and team work is never pursued with all vigour. This is scenario that has promoted solitary learners who fail to appreciate the team spirit while pursuing a given taste. To add to this ugly scene, our learners rarely use the connection between academic content and their real life application. This is exactly the picture where learners are exposed to learning devoid of our contextual principles. It is therefore to confirm the strength of these two approaches that informed the pursuit of this empirical work to compare the performance of students taught with collaborative approach and those of contextual approach.

II. Objectives Of The Study

The aim of this study is to investigate the effect of collaborative and contextual teaching approach on students' academic performance in senior secondary schools in Rivers State. Specifically, the study intends to:

1. To compare the performance of students taught with collaborative teaching approach and those taught with contextual teaching approach.
2. To compare the performance of male and female students taught with collaborative teaching approach.
3. To compare the performance of male and female students taught using contextual teaching approach.

Research Hypotheses

The following null hypothesis guided the study

1. There is no significant difference in the mean scores of students taught with collaborative teaching approach and those taught with contextual teaching approach.
2. There is no significance difference in the academic performance of male and female students taught with the collaborative teaching approach.

III. Methodology

Design: The study is a comparative design one in the sense that two groups' achievement were compared at the end of a lesson that lasted for a period of two weeks, precisely four lesson periods of 80mins each.

Population: The population consisted of senior secondary school biology students in their second year (SS2). They were eighty (80) students in the school. The study was conducted at Hallmark Academy secondary school, Omola in OgbaEgbmaNdoni Local Government Area of Rivers.

Sample size: The population was used as sample, giving a number of fourth (40) in each category. Thus population standard deviation was used in the data analysis.

Instrumentation: Two distinct lesson plan labelled collaborative learning lesson plan (CLLP 1) and contextual lesson learning plan (CLLP 2), develop by the researchers were used. Also a 20-item text instrument (test instrument) was also used. The validity of these instrument were confirmed by the researchers themselves and also by an instructional designer in the researcher'saffiliation.The test instrument had a reliability co-efficient of 0.60, when it was subjected to reliability test via the reliability co-efficient test.

Hypothesis one

There is no significant difference between the mean scores of students who learned using collaborative approach and their contextual contemporaries.

Table 1.1: Summary of t-test on the differences between collaborative and contextual teaching approach.

Strategy	N	Mean	SD	Df	α-level	t-cal	t-cri
Collaborative	40	18	4.190	78	0.05	1.08	1.99
Contextual	40	17	4.071				

From the analysis in table 1.1 when subjected to t-test, a t-calculated value of 1.08 and a table value of 1.99 were realized using the standard value of 0.05, hence since t-cal (1.08) is less than t-critical (1.99) the null hypothesis was accepted which implies thatthere is no significant difference between the mean scores of students who learned using collaborative approach and their contextual contemporaries.

Hypothesis two

There is no significant difference between the mean score of male collaborative learners and their contextual counterparts.

Table: 1.2 Summary of t-test on the differences between collaborative and contextual teaching approach.

Strategy/ gender	N	Mean	SD	df	α-level	t-cal	t-cri
Collaborative male	28	16	3.93	52	0.05	0.92	2.00
Contextual male	26	17	4.04				

From the analysis in table 1.2 when subjected to t-test, a t-calculated value of 0.92 and a table value of 2.00 were realized using the standard value of 0.05, hence since t-cal (0.92) is less than t-critical (2.00) the null hypothesis was accepted which implies thatthere is no significant difference between the mean score of male collaborative learners and their contextual counterparts.

Hypothesis three

There is no significant difference between the mean scores of female collaborative learners and their contextual counterparts.

Strategy/ gender	N	Mean	SD	df	α-level	t-cal	t-cri
Collaborative female	12	19.33	4.68	25	0.05	0.38	2.06
Contextual female	14	19.86	4.26				

From the analysis in table 1.3 when subjected to t-test, a t-calculated value of 0.38 and a t-critical value of 2.06 were realized using the standard value of 0.05, hence since t-cal (0.38) is less than t-critical (2.06) the null hypothesis was accepted which implies thatthere is no significant difference between the mean scores of female collaborative learners and their contextual counterparts.

IV. Discussion of findings

The result of analysis presented in hypothesis one showed no significant difference between the mean scores of students who learned using collaborative approach and their contextual contemporaries. The result of this findings agrees with the findings of Laal, (2013) who opined that Collaborative learning approach fosters learners' development of metacognition, improvement in formulating ideas, and higher levels of discussion. It also teaches learners to monitor each other, detect errors and learn how to correct their mistakes which in turn improves their participation in formative assessment. The result of hypothesis two reveals is no significant difference between the mean score of male collaborative learners and their contextual counterparts. This result is expected because the both collaborative and contextual teaching approach helps students to integrate knowledge and also foster their level of understanding of the subject matter which can as well enhance a better learning outcomes. The finding agrees with that of Katie and Shank (2010) who asserted that there is no perfect teaching approach, however collaborative and contextual learning approach enhanced students' academic performance significantly. In testing hypothesis three the result reveals no significant difference between the mean scores of female collaborative learners and their contextual counterparts. The result is in agreement with that of Ghani (2012) who opined that gender have no significant effect on the learning approach used in learning biology. The finding of Aladejana (2008) also revealed that collaborative learning makes no significant difference in the performance of learners as compared to the traditional approach.

V. Conclusion

Based on the findings Students taught with both collaborative and contextual teaching approach had better academic performances, it was also realized that there is no significant difference in the use of both teaching strategies in teaching considering the gender of students.

Recommendations

The following recommendations were made based on the findings of the study:

1. Instructors should adopt suitable teaching approach that meets the learning style of the learners in delivering the content of the instruction since there is no best approach.
2. Gender should not be placed as a criteria in selection of teaching approach for lesson delivery since it has no effect in the academic performance of the learners.

References

- [1]. Aladejana, F. (2008). Blended learning and improved Biology teaching in the Nigerian secondary schools proceedings of the World Congress on Engineering and Computer Science, San Francisco, USA
- [2]. Bukunola, N, & Idowu, J (2012). "Collaborative learning: Shared inquiry as a process of reform", New Directions for Teaching and Learning. Matexpublishers.
- [3]. Cooper, J., and Robinson, P. (1990). "Small group instruction in science, mathematics, engineering, and technology." *Journal of College Science Teaching* 27:383.
- [4]. Ghani, E. K (2012). Blended learning implementation in accounting discipline. A study in a Malaysian Public University in Education.
- [5]. Gokhale, A. A (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education* 7, (1)
- [6]. Gomes, L (2010). YouTube's money question. Retrieved from <http://www.forbes.com> 2010 on 18/11/2017
- [7]. Katie, P & Shank, D. H (2010) *Motivation in education: Theory, research and applications* (3rded.) Upper saddle River, NJ: Pearson Education.
- [8]. Laal, J. (2013). Gender bias and academic achievement on the use of technology for learning among secondary school students. Retrieved from <http://www.google.com>
- [9]. Mitchelemore, C & Kimamo (2011). International design collaboration and mentoring for tertiary students. *Australasian Journal of Educational Technology* 5 (3).
- [10]. Piaget, J (1975) *Science of Education and Psychology of the Child*. New York: Viking press. Piaget, J (1980), *The Psychology of Intelligence*: New York: Routledge.
- [11]. Prinsky, M (2014) Digital natives' digital immigrants' part 2: Do you really think differently? On the horizon 3-16 <http://dx.doi.org/10>.
- [12]. Regoonaden, M. & Bordeleau (2008). "Is this collaboration?" *Collaborative Learning: Underlying Processes and Effective Techniques, Journal of education teaching and learning* 14 (9).
- [13]. Szoka, J (2013). Measured Result Demonstrate Enhanced Learning Outcome in the Collaborative Classroom. Retrieved from <http://www.emergingedtech.com>. On 18/11/2017.
- [14]. Vygostsky, L. S (1978). *Mind in society: The development of higher psychological process*. Cambridge, MA: Harvard University press.

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