Effect of Collaborative and Creativity Strategies on Academic Performance and Retention of Agricultural Science Students in Bonny, Rivers State

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Abstract

This study investigated the effect of collaborative and creativity strategies on academic performance and retention of Agricultural science students. The study adopted a quasi-experimental pre-test, post-test, non-randomized control group design involving two treatment groups and one control. The sample size was one hundred and eighteen (118) SS2 Agricultural science students from three government approved private secondary schools in Bonny Local Government Area of Rivers State. Three research questions were raised and answered, three hypotheses were formulated and tested at 0.05 level of significance. Purposive sampling and simple random sampling techniques were used to select three (3) schools. Three intact classes were randomly assigned to experimental and control groups. The instrument for data collection was a researcher made twenty (20) items objective test questions titled Agricultural Science Performance Test. (APT). The reliability of the instrument was determined using Pearson Product Moment Correlation and the reliability coefficient obtained was 0.94. Mean and standard deviation were used in answering the research questions while t-test, Analysis of covariance (ANCOVA) and post hoc multiple comparison via least square difference using the SPSS package to test the hypotheses. The result of the study revealed that students taught using collaborative teaching and learning strategy performed significantly better and retained higher than those students taught the same lesson using creativity learning strategy and interactive teaching method respectively. It also shows that gender had no significant effect on student's mean performance and retention scores. The study recommended that collaborative and creativity teaching and learning strategies should be adopted by Agricultural Science teachers as a teaching technique to improve student's performance and retention of concepts. Teachers should be encouraged to use collaborative strategy for group learning, especially in a large class size as obtained in our school system. This would enhance confidence and cognition of students and invariably bring about better academic performance. Furthermore, In- service training programs for Agricultural Science teachers in form of seminars, workshops and conferences should be conducted on how to use collaborative and creativity teaching and learning strategies in the teaching of Agricultural Science concepts.

Key Word: Collaborative, Creativity, retention, learning.

Introduction

In order to enable students' learn better, their advanced mental process skills have to be developed. In other words, the skills needed in order to create solution for problems and learn by comprehension instead of memorizing have to be given to students (Askoy, 2012).

Collaborative and Creativity Strategies are major innovative skills of the 21st Century. The both skills play vital role in the 21st Century classroom. The learners and the teachers need to demonstrate collaborative and creative abilities to remain relevant in this technology era. As a result of the relevance of the skills in the technology classroom, the International Society for Technology in Education (ISTE) has one of its features centered on students' collaborative and creativity proficiency. The ISTE learning standards supports that; an effective teaching must apply, promote, and model collaborative and creativity ideas. The novel classroom demands for promoting and modeling different technology skills such as the ability to collaborate and create meaningful innovative ideas.

The 21st century framework on learning and innovation skills also advocated for the promoting of collaboration and creativity as part of the essential skills to preparing learners for the future. For the teachers, the advocacy calls for deeper knowledge of their subject's content. It is expected that the 21st century Agricultural Science teachers should have the ability to create, apply and model the Agricultural Science technological skills to the learners so as to foster collaboration and creativity as well as to engage the learners. For the students, the advocacy demands that learners should be able to exhibit, apply, and solve complex problems.

Therefore, effective Agricultural Science teaching has to be done in the school. Accordingly, in teaching, the processes and skills for transmitting information is much more important than providing the available information for students.

The 21st century is a period distinguished with a lot of changes in the way of life and living. This was imposed by the advent of the new digital technologies. It has revolutionized how every human activity is done; ranging from personal life to family life, work life and career such as in medicine, banking, transportation, security, farming and of course education is not left out (Zeneri, 2010 in Victor Ishikaku, 2020). As such, some level of technology is now embellished with every human activity. The ubiquity of technology in this period has given it the terminology "computer age" (Ikeanumba, 2017). It is therefore a digital driven period.

Agricultural science is therefore, projected for inculcation of the necessary skills for the practice of agriculture for effective citizenship and contribution to food guarantee for national sustainability. Effective 21st century teaching brings about effective 21st century learning. Effective teaching and learning refers to the degree which goals are achieved through teaching. Effective teaching of Agricultural science will definitely give rise to effective learning of Agricultural science that is, attainment of goals of Agricultural science. Ability to apply suitable pedagogical approach is one sure way of achieving effective teaching and learning of Agricultural Science.{Odjugo, Awotua-Efebo & Okoro2018}. Agricultural Science therefore requires the application of learner-centered and innovative teaching strategies such as collaborative and creativity strategies in the delivery of instruction in agriculture. This is the gap this study seeks to fill. It is based on this premise that the Researcher seeks to investigate effect of Collaborative and Creativity learning strategies have on Academic Performance and Retention of Senior Secondary School students of Agricultural Science in Bonny, Rivers State.

This Chapter reviewed relevant literature related to the independent and dependent variables under the following sub-headings: Conceptual Framework, Theoretical Framework, Empirical Studies and Summary of literature reviewed.

The Concept of 21st Century Curriculum and Instruction

A curriculum consists of the standards of any given discipline that a student may need to undertake both by the teaching of the instructor and the educational institute which serves as the principle upon which the curriculum is based. It stipulates standards and acceptable practices that establishes students' performance and teachers' accountability. Curriculum is made up of the school's academic requirements for a leaner's graduation. These include the courses/subjects to offer and pass the number of credits units to be completed including other requirements, such as completing a project. Sometimes this could also include a certain number of community service hours. In some cases, there is misconception about curriculum, which is often misunderstood as just syllabus, textbooks, and content but it is much more than that. The 'curriculum' can be described as the whole events of a complete school environment involving all the courses and experiences that a student needs to undergo. The curriculum is all-encompassing term. It is a recognized, simplified and purposely selected portion of information and experience. The curriculum can be recognized as the foundation and pillar of education. It is typified to be a purpose driven process where the curriculum framers and developers plan, develop and actualize the curriculum, whilst having in mind the present and future necessities of the learners. It is important to acknowledge that the curriculum requires a lot of research and planning before implementation in education and should be organized and systematic. It is also the fundamental role of the curriculum to provide the total experiences and activities needed.

The Concept of Teaching:

Teaching is defined as a human undertaking whose purpose is to help people learn. Awotua-Efebo (1999) defined teaching as an interaction between a teacher and a student under the teacher's responsibility, in order to bring about that expected change in a student's behavior. It must be noted that teaching has not taken place except there is a noticeable change in behavior of the learner. The events of teaching maybe generated by a page of print, a picture, a television program, a computer or by any combination of physical objects under the directive of a teacher who has primary pre-planned the events. Rajagopalan (2019) viewed teaching as an interactive process, primary course involving classroom talk which takes place between the teacher and people learning the course during certain definable activities. A close look at the definition shows that teaching must be supervised and must have a defined program of activities. It must not be done in an anyhow manner.

The Concept of Learning: Learning is a highly complicated process. This is probably because it involves the whole person. The nature of human personality is very complex and since the learner has a personality one should expect it to be equally complex. Secondly, learning often involves a cognitive dimension- the structural, the physiological, the psychological aspects of knowing, as well as the whole chain of language acquisition, thinking, memory and intellectual capacity being used in the learning process. It is very difficult to observe these internal processes. Yet we know they are the

information-processing portions of learning. They form the chain that interprets precepts into adaptive behavior. Learning involves an affective dimension. As the child acquires adaptive behavior, as he acquires abstract categories, he is simultaneously involved in a complicated system of feelings, which may actualize, enhance, accelerate or retard the learning rate or process (Vikoo, 2015).

Concept of Instructional Technology for the 21st Century Classroom

In order for students to be prepared to navigate this 21st century world, they must become literate in 21st century literate, including multicultural, media, information, emotional, ecological, financial and cyber literacy. Vikoo, 2016. Collaborating with Agricultural Science students from around the world in meaningful, real-life projects is a necessary tool for developing this literacy. Agricultural Science students can learn that through collaboration, not competition, they can work together to make the world a better place. Students will use technologies, including the internet, and global collaboration to solve critical issues (Colon & Simpson,2003). Note that technologies are not an end in themselves, they are tools students use to create knowledge and to create personal and social change. There should be full access to technology. Buildings will need to be wired in such a way that students can access their files, as well as the internet, from any-where in the school, various laboratories and learning centers should be set up around the school. Art, music, theatre, television, radio and film studios can be created with relatively small expenditures.

Instructional Materials for Collaborative and Creativity learning Strategies.

Instructional materials are those materials that assist teachers in the discharge of their teaching functions. They are inevitable in the school system, since their usages make teachers to achieve effective presentations of their lessons and students learn faster, apart from other advantages. The teacher is an important facilitator of learning or knowledge and is thus an agent of accomplishing epistemological ends in education. Thus any process, institution or person that facilitates knowledge acquisition, transmission or development can be said to be involved in epistemological pursuits or in accomplishing epistemological ends. Precisely, teaching is said to comprise a set of events, which affects learners in such a way that learning is facilitated. The events may be generated by a page of print, a picture, a television program, a computer or by any combination of physical objects under the directive of a teacher who had pre-planned the events (Gagne & Briggs, 1989 in Vikoo, 2015). Thus, the teacher in an attempt to play his indispensable roles in epistemological pursuits utilizes appropriate learning resources or instructional materials to elicit positive response from the learner.

Academic Performance of Agricultural Science Students

Academic performance is seen as the outcome of the learning process.

According to Williams (2018) academic performance extends to achievement outside the classroom. Several factors point to a student's academic success. Academic performance involves scholarly achievement and skills (grades): impressive test scores (IQ tests, standardized testing or college entrance examination): extra-curricular accomplishments (consistently learning and mastering new skills, for instance poultry feed preparation), demonstrating competence in leadership (student

leadership) etc. Performance measures behavior that can be observed at any point in time. Amadi (2019) posed that; Academic performance refers to the scholastic studying of a student in terms of the grades obtained in a course or group of courses at a given moment or how the student is able to demonstrate his abilities in a test or examination. Academic performance and academic achievement point to excellence in all academic discipline and the attainment of educational goals. This is measured by continuous assessment, examinations and students' scores which depend on classroom teaching and experience. It is important to adopt the 21st century learning skills for effective delivery of instruction. In this sense, the efforts of the teacher, learners and institutions are highly necessary. Academic performance and academic achievement are interchangeably used by some researchers to mean the same thing.

Concept of Retention

Business Dictionary.Com and The Free Dictionary defines Retention as the act or condition of keeping or retaining something or acquired material, image or symbol in mind. It is the maintenance of information, idea or experience in storage. Retention is the ability to remember recall or organize what has been learnt, observed or experienced in such a manner that existing knowledge can be applied in new and strategic ways in future. Buchi in Ahmad (2014) defined retention as the ability to preserve and later remember information or knowledge gained after learning.

Concept of Gender

Gender has been viewed as sex which is a condition of being male or female.

However, sex is just a biological construct while gender is more of socio-cultural construct. Gender refers to the social, cultural and psychological attributes, characteristics, qualities, behaviors, roles and responsibilities which different societies ascribe to females and males (Ahimugu, Oluwagbemi and Oluroranti 2010). Gender thus is superimposed on sex to include the connotation of masculinity and feminity which influences the expectations, roles, characteristics, responsibilities, opportunities and need that society approves for its members. Gender is a set of characteristics distinguishing between male and female, particularly in the case of men and women. Depending in the context, the discriminating characteristics vary from sex to social role to gender identity.

The Challenges confronting the proper application of Collaborative and Creativity Strategies.

In all spheres, the young generation is entering a world that is changing scientifically, technologically, politically, economically, socially and culturally. The global economy and the status of education is being changed by the emergence of the 'knowledge-based' society. There is growing awareness among policy-makers, business leaders and educators that the educational system designed to prepare learners for an agrarian or industrially-based economy will not provide students with the knowledge and skills they will need to thrive in the 21st century's knowledge-based economy and society. UNESCO (1999) posited 'the new knowledge-based global society is one in which the world's knowledge base doubles. Every 2-3 years, 7,000 scientific and technological articles are published each day; data sent from satellites orbiting the earth transmit enough data to fill 19 million volumes every two weeks. Secondary school leavers in industrialized nations have been

exposed to more information than their grand-parents were in their life-time. There will be as much change in the next three decades as there was in the last three centuries. UNESCO {1999}in (National Schools Board Association, 2002).

Theoretical Framework

For the purpose of this research seven relevant theories would serve as bases for the study. These theories include: Jean Piaget constructivism theory, Lev. Vygotsky socio-cultural theory, Engagement theory, Discovery learning-Jerome Bruner, Cognitive Apprenticeship, Mayer's cognitive theory of multimedia and Theory of cognitive development by John Dewey. The study anchored on these theories in order to determine the effect of collaborative and creativity strategies on Academic Performance and Retention of Agricultural Science students,

Collaborative Teaching and Learning Strategy and Students' Academic Performance

Daodu (2014) examined the effectiveness of cooperative learning strategy on the academic achievement of Chemistry students with different learning styles. The reports show that there was significant difference between the academic achievement of Chemistry students taught with cooperative learning strategy and those taught with interactive lecture method. There was also significant difference in the achievement of male and female students exposed to cooperative learning and a significant difference in the attitude of Chemistry students before and after exposure to cooperative learning strategy.

Brown and Mezieobi (2017) conducted a study on the effect of cooperative learning method on Junior Secondary students' attitude towards citizenship education in social studies. Port Harcourt local Government Area of Rivers state Nigeria. The findings were that cooperative learning method significantly influenced students' attitudes towards citizenship education, there was a significant main effect of treatment on the student's attitude towards citizenship education.

Statement of the Problem

The most important role of education (teaching and learning) is to impact in learners the ability to learn, reason, think creatively and critically, make valid decisions, solve problems and work collaboratively. Recent educational literature is replete with theories and approaches to teaching and learning based on the idea that a teacher-centered instructional strategy dominated with lectures and demonstration, with rote drills and practices are inefficient ways to promote meaningful learning (Nbina, 2013). Despite several innovative teaching methods and strategies suggested by researchers that emphasized learner-centered activities in teaching Agricultural Science, poor performance, low retention of concepts, low interest and negative attitude towards Agricultural Science in particular and Science in general still persists as reported by scholars and WAEC Chief Examiners' reports (2017 and 2018). This has been attributed to the adoption of inappropriate instructional strategies in teaching and learning of Agricultural Science. As such, teachers constantly use the traditional method in teaching Agricultural Science and ignore instructional strategies which will foster critical thinking, creativity and collaboration among students' disciplines. STAN (2017) has outlined a number of factors responsible for the students' poor performance. Prominent among the factors is

the use of inappropriate teaching methods and strategies in the teaching and learning of Agricultural Science.

The underlying objectives which is translated into the Agricultural science syllabus, is designed to meet the much needed relevance of the needs of the society in its content, methods, process and application. Unfortunately, available evidence has revealed that students' performance in Agricultural science has been quite demoralizing (WAEC, 2015; 2016; 2017; 2018). The broad aim and expectation of any teaching and learning program is productivity and positively evaluated end-point, which in other words could be seen as achievement. Most quarters of the Nigeria society have frowned at the continued fall in the standard of education in external examinations like SSCE and NECO in science subjects, Agricultural science inclusive.

The use of inappropriate instructional teaching strategies in the delivery of instruction in Agricultural Science has been widely reported as one of the major challenges facing the effective implementation of Agricultural Science in the senior secondary school curriculum. These teaching methods and instructional strategies have resulted to lack of interest, poor performances and low retention of concepts in Agricultural Science, since they are not activity oriented and student centred. This, therefore draws the required attention to the need for collaborative and creativity instructional strategies. These creative and innovative teaching strategies which are activity oriented and learner-centred could be effective in realizing the goals of effective Agricultural science teaching. In this 21st century, a motivating, innovative and captivating approach is needed to help students learn better. This forms the baseline for this study.

Aim and Objectives of the Study

The aim of the study is to examine the effect of Collaborative and Creativity teaching/ learning Strategies on Academic Performance and Retention of Senior Secondary Students of Agricultural Science in Bonny, Rivers State. Specifically, the objectives of the study are to :

1. examine the effect of collaborative learning strategy on academic performance of students in Agricultural science concept as determined by their pretest and post test mean scores
2. determine the effect of creativity teaching/learning strategy on academic performance of students in Agricultural Science concepts as determined by their pretest and posttest mean scores.
3. ascertain the difference in the pretest and posttest mean scores of the students taught agricultural science concepts using interactive teaching and learning strategy (control group)?

Research Questions

The following research questions will guide the study:

1. What is the effect of collaborative learning strategy on academic performance of students in Agricultural Science concepts as determined by their pre-test and post-test mean scores?
2. How effective is creativity teaching/learning strategy on academic performance of students in Agricultural Science concepts as determined by their pretest and post-test mean scores?
3. What is the difference in the pretest and post-test mean scores of the students taught agricultural science concepts using interactive teaching and learning strategy (control group)?

Hypotheses

On the bases of the above research questions, the following null hypotheses will be formulated to guide the study at 0.05 level of significance.

1. There is no significant effect of collaborative teaching and learning strategy on academic performance of students in Agricultural Science concepts as determined by their pre-test and post -test scores.
2. There is no significant effect of creativity teaching/learning strategy on the academic performance of students in Agricultural Science concepts.
3. The pre -test and post -test mean scores of students taught Agricultural Science using interactive teaching and learning strategy do not differ significantly.

Method of Data Analysis

Mean and standard deviation (descriptive statistics for analyzing data) were used to answer the research questions, while t-test (inferential statistics) and Analysis of Covariance (ANCOVA) of the statistical package for Social Sciences were used to test the hypotheses at 0.05 level of significance.

Results and Discussion

This chapter dealt with the presentation of data analyzed based on the research questions and null hypotheses posited for the study.

The data and the outcome of each research questions and hypotheses were highlighted on separated tables with their respective summary. The findings were also discussed at the end of the chapter.

Table 1: Mean and standard deviation on the pretest and post-test mean scores of the students taught Agricultural science concepts using collaborative learning strategy.

Variable	n	Mean	Std	Gained mean
Post test		**15.27**	**2.39**	
Pre-test	**26**	**7.58**	**2.47**	**7.69**

Results in table 4.1 revealed that the students in collaborative teaching/learning strategy group had the means scores of 7.58 (SD = 2.47) and 15.27 (SD = 2.39) respectively at pretest and posttest periods. These imply that from the pretest stage to the post test stage they gained a mean score of 7.69. Thus, collaborative teaching/ learning strategy is positively effective on the students' performance in Agricultural science concept.

Table2: Mean and standard deviation on the pretest and post- test performance of students taught Agricultural science concepts using creativity teaching/learning strategy.

Test stage	n	Mean	Std	Gained mean
Post test		**14.55**	**2.13**	
Pre-test	**47**	**12.19**	**3.08**	**2.36**

In table 4.2, it is shown that the students who were taught Agricultural science concepts using creativity teaching/ learning strategy had the mean scores of 12.19 (SD = 3.08) and 14.55 (SD = 2.13) respectively at pretest and posttest respectively. Thus, from the pretest to the post- test stage they gained a mean value of 2.36 which indicates a positive effect, on the mean performance of the students taught Agricultural science using creativity teaching/ learning strategy.

Research question 3: What is the difference in the pretest and posttest mean scores of the students taught agricultural science concepts using interactive teaching and learning strategy (control group).
This research question was answered using mean and standard deviation, which were computed for both the pretest and the post test scores. This result obtained are presented in table 4.3.

Table 3: Mean and standard deviation on the pretest and post test scores of the students taught Agricultural science concepts using interactive teaching and learning strategy (control group).

Test stage	n	Mean	Std	Gained mean
Post test		**10.09**	**2.39**	
Pre-test	**45**	**9.37**	**1.95**	**0.711**

Results in table 3 revealed that the students in the group that were taught agricultural science concept using interactive teaching and learning strategy had the mean score of 9.38 (SD = 1.95 at pretest and the mean score of 10.09 (SD = 2.39) at posttest. These mean scores yielded a gained mean value of 0.711 from the pretest to the post test stages. Thus, interactive teaching and learning strategy has a little or no positive effect on the mean performance of the students in Agricultural science concepts.

Discussion of Findings

The discussion of finding was done under the following subheading:

1. The analyzed data were interpreted and discussed based on the seven (3) research questions and null hypotheses.
2. Creativity teaching and learning strategy (experiment group1I) on academic performance of students.
3. The mean scores of students taught Agricultural Science concept using interactive teaching and learning strategy (Control Group).

Conclusions

Based on the findings of this study, the following conclusions are drawn.

1. Collaborative teaching and learning strategy has significant effect on the students' performance and retention in Agricultural Science concepts.
2. Creativity teaching and learning strategy's effectiveness is dependent upon constant usage for high performance and knowledge retention.
3. Collaborative teaching and learning strategy was the most effective among creativity and interactive teaching and learning strategies.

Recommendations

Based on the findings of this study, the following recommendations are made;

1. Collaborative teaching and learning strategy should be adopted and incorporated into the teaching of Agricultural Science to enable students effectively learn and retain the concepts presented to them at the Secondary School Level.
2. Teachers should be encouraged to use collaborative and creativity teaching and learning strategies for group learning, especially in a large class size, this would enhance confidence and cognition of students and invariably bring out better academic performance.
3. In-service training programs for Agricultural Science teachers in form of seminars, workshops and conferences should be conducted on how to use collaborative and creativity teaching and learning strategies in the teaching of Agricultural Science concepts.

References

Ahimugu, Oluwagbemi and Oluroranti 2010). An evaluation of the impact of video diffusion in Nigerians higher educational institutions. Retrieved from *www.jiti.com*

Ahmad, Y. (2014). *Effect of Field-Trip on Retention and Academic Achievement in Ecology among Secondary School Students in Zaria, Nigeria*. A Thesis submitted to the School of Post Graduate Studies, Ahmad Bello University In partial fulfillment for the award of master Degree in Science Education.

Amadi, N.N. (2019*) Video-based instructional multimedia and cooperative learning strategy on chemistry students' academic performance and retention* in Owerri Municipal, Imo State. Retrieved from a thesis.

Askoy, G (2012). The effects of animation technique on the 7th Grade science and technology course. *Creative education 3,* (3), 304 – 308

Awotua-Efebo, E.B. (1999). *Effective teaching: Principles and practice.* Port Harcourt Paragraphics.

Brown, T. & Mezieobi, S.A. (2017). Cooperative learning method and Junior secondary students' attitude towards citizenship education in social studies in Rivers state Nigeria. *British Journal of Education*. 5(4),1- 8.

Colon, T.& Simpson, M. (2003). Silicon valley versus silicon glen: The impact of computers upon teaching and learning; a comparative study. *British Journal of Education Technology,* 34 (2), 137 – 150.

Daodu, H. (2014). The effectiveness of cooperative learning strategy on the academic achievement of chemistry students with different learning styles. *International Journal of Higher Education* 3(2), 132 – 140

Nbina, J.B. (2013). Demonstration teaching method on achievement of chemistry students of different levels of scientific literacy. *Journal of Research in Education and Society*, 4 (1) 28 – 33.

Odjugo, D.I.A., Awotua-Efebo E. B., Okoro, C. O. (2018). *21st century skills (4Cs) in the teaching and learning of agricultural science in secondary schools in Bonny Local Government Area of Rivers State, Nigeria*. Unpublished dissertation

Rajagopalan, I. (2019). Concept of Teaching. *Shanklax International Journal of Education*, 7 (2), 2019, 5-8, Doi:

STAN (2017). *Agricultural science for senior secondary schools*. STAN

UNESCO (1999). Information and communication technology: Guide. *Trends 52* (1) 24 – 25.

Victor –Ishikaku, E.C (2020). Information and communication technology in teachers education: A roadmap to sustainable. *National journal of Social and Economic Research* 13(2)92-98.

Vikoo, B. (2016) *Curriculum development - A process approach*. Pearl Publishers.

Vikoo, B. (2015). *Learning theories and instructional processes*. Pearl Publishers.

West African Examination Council (2017). *BECE Chief Examiner's Report*. WAEC.

West African Examination Council (2018). *BECE Chief Examiner's Report*. WAEC

Williams, E. (2018). What is the meaning of academic performance? *Work.chron.com/meaning-academic performance-17332.html.*