International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182, Print ISSN: 2349-5979; Impact Factor: RJIF 5.72
Received: 14-08-2019; Accepted: 16-09-2019
www.allsubjectjournal.com
Volume 6; Issue 11; November 2019; Page No. 94-98

Gender difference on the impact of activity-based instructional strategy in agricultural science

Ohaegbulem Amarachi Constance[1], Dr. Anekwe Josephine Uzoamaka[2]
[1, 2] Department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt, Nigeria

Abstract
The study investigated gender difference on the impact of Activity-Based Instructional Strategy on students' academic performance and retention in Agricultural Science among senior secondary school students in Imo state. Two research questions and two hypotheses guided the study. The study adopted a quasi-experimental design. The sample for the study comprised 118 Senior Secondary School two (SSS II) students that were drawn from two schools in Owerri Zone of Imo State. The instruments used for data collection were titled Agricultural Science Achievement Test (ASAT) and Agricultural Science Retention Test (ASRT). The instruments were validated by two (2) experts in the field of test and measurement. A reliability coefficient of 0.82 and 0.84 through Cronbach alpha method was obtained for ASAT and ASRT respectively. It was found out that female students exposed to Activity-Based Instructional Strategy had a significantly higher mean performance and retention scores than their male counterparts in the same group. In conclusion, Activity-Based Instructional strategy facilitates effective learning of Agricultural Science concepts. Based on these findings, it was recommended among others that, the teaching of Agricultural Science should be conducted in such a way that students effectively learn and retain the concepts presented to them and that the use of the Activity-Based Instructional Strategy seems to be relevant in achieving this goal hence, it should be incorporated into the teaching of Agricultural Science at the secondary school level.

Keywords: gender difference, impact of activity-based instructional strategy, agricultural science

Introduction

The role of gender play in the annals of human endeavour cannot be overemphasized. This scenario is buttressed in the attention gender receives in research work especially among research ventures concerning teaching and learning, students' performances in schools and people's values and attitude towards people, events, things or situation in the society. Consequent upon this state of affairs, many researchers such as Bichi, 2012; Usman, 2017; and Stanley, 2018; to mention but a few, have given attention to the studies involving gender difference in the educational/academic sector. For these reasons, the researcher deems it fit to study gender difference on the impact of Activity-Based Instructional Strategy on students' academic performance and retention in Agricultural Science among senior secondary school students in Imo state as a follow up in yet another study by the researcher.

According to Oakley (2013) [19], gender is the amount of masculinity and feminist found in a person and obviously while there are mixtures of both in most human beings, the normal male has a preponderance of masculinity and the normal female has a preponderance of feminist. For instance, based on social expectation and orientation, women are socialized in preparation for their role as wife and mother and they are expected to fulfil this role effectively while males are socialized and oriented in a manner that stands them in a good position to fulfil their social and cultural roles as fathers and husbands. Also, males are socialized and oriented to take up masculine jobs carrying high prestige, high skills and income. It has been reported by Stanley (2018) [22] that most girls choose to be successful in those subjects considered appropriate for females as a way of being a high achiever while at the same time maintaining their feminist nature. The question, therefore, is whether there will be a difference in performance and retention ability among male and female students when they are exposed to Activity-Based Instructional Strategy in Agricultural Science.

At the senior secondary school level, Agricultural Science was introduced for the purpose of giving foundational skills and knowledge for subsequent Agricultural Science studies at a higher level. The acquisition of appropriate skills and the development of mental, physical and social abilities and competencies for the individual to live in and contribute to the development of the society in which he lives, especially in food production and sustainability, has been a major concern of Agricultural Science. The subject views nature in a holistic approach and this makes it a discipline in its own right. The above explanation shows that the teaching and learning of Agricultural Science is not just a collection of data and facts neither is it an assemblage of sterile body of knowledge but that, it involves engaging in hands-on activities.

According to Inekwe (2012) [11], Activity-Based Instructional Strategy is the method that enables students to learn with the same vigour that marks their natural activity. David (2007) [6] expressed that element of joy, team spirit; respect for each other's opinions reduces the abstractness in science concepts. Mari (2014) [17] opined that in this method, the work is carried out in a friendly manner, gladly with motivating spirit and activeness throughout the whole lesson, even to an uninteresting topic. Activity-Based Instructional Strategy is in-line with Piagetian tasks as it affords the students a variety of activities and experiences that involve the use of concrete objects. This hastens the learners' ability to order events through application, knowledge and predict changes. According to Mari (2014) [17], adequate and appropriate use of this method through a

rich variety of stimulating experiences, progress from concrete to abstract and then a powerful conceptualization may be achieved. Thus, the learner now will reason or make hypothesis with symbolic ideas rather than needing objects, in physical world as the basis for thinking. The learner according to him can, therefore, use a hypothetical, deductive procedure that no longer ties his thought to existing reality but could consider all possible explanations to problem and can evaluate alternative explanations or solution to the problem.

The definitions and explanations given concerning Activity-Based Instructional Strategy suggest that the strategy will definitely improve students' performance and hence promote retention of concepts taught for its application in the wider society. However, how this scenario will play out between male and female students is yet to be investigated hence this study. Nevertheless, a brief explanation of retention ability, a concept associated with performance but seldom investigated at this juncture will suffice in view of its interest in this study.

The concept "retention" is the ability to retain and consequently remember items/things learned or experienced by an individual at a later time; this takes place when learning is coded into memory. Thus, the appropriate coding of incoming information provides the index that may be consulted so that retention takes place without an elaborate search in the memory lane (Oyedokun in David (2007)) [6]. The nature of the materials to be coded contributes to the level of retention. Thus, materials are related to the quality of retention in terms of their meaningfulness, familiarity, concreteness and image evolving characteristics, qualities provided by Activity-Based Instructional Strategy due to its learner centeredness.

Research carried out by Bennett, Barrie, Carol, Rolheiser-Bennett and Laurie-Stevahn (2014) [3], showed that learners of 19th and 20th centuries practised talk-chalk curriculum, which is usually traditional lecturing methods and text-based. Regrettably, 21stcentury learners who are known to be active and constructive learners are caught up with such Instructional Strategy which they see as abstract and non-beneficial to them because it does not allow them to express themselves and fully get involved in the teaching and learning process. Teachers must find suitable methods to teach the students in order to determine the best practices for classroom delivery and minimize achievement loss, using the resources available to them. However, the use of activity makes learning learner-centred, give students opportunity to make plausible hypothesis and test them to generate ideas, which are expected in their own language.

Teaching-learning strategies are traditionally referred to as methods of teaching (Kisirikio, Wachira & Malusu, 2008) [14]. A teaching method is a plan of action designed to achieve learning programme design for a learner (Merlot, 2015) [18]. It could be a masterplan or programme procedure schedule to achieve a particular objective (Aneke, 2015) [2]. Methods of teaching can be categorized into Field and Non-field related teaching methods. Field teaching methods include teaching carried out within or outside the school setting of which laboratory instruction is an example. Non-field teaching methods include classroom-based strategies of teaching. Some of these methods include discussion, problem-solving, and role-play among others.

Activity-Based teaching is a learning method in which students are engaged in the learning processes (Prince, 2014) [21]. Higgins (2007) [10] defined Activity-Based learning as the learning process in which student is actively involved in doing or in seeing something done. In this method, students learn by doing. It is employed when the teacher allows students to carry out a piece of work and learn at the same time. In Activity-Based teaching /learning environment, the teacher is a facilitator, motivator, guide and a coach not a sage on the stage (Stolen, 2009) [23].

In Activity-Based method, the learner examines learning requirements and thinks on how to solve a problem at hand. The students do not learn about the content, rather they learn about the process to solve the problem. As they go towards the solution of the problem, they also learn about the content (Churchill, 2013) [5]. Activity-Based method of teaching is applicable in subjects such as Agriculture, Home Economics, and Basic Science among others. In doing the activity, students should know the purpose before they become interested in it. According to Enekwe (2012), Activity-Based method of instruction enables students to learn with the same vigour that marks their natural activity.

The benefits of an Activity-Based method of teaching cannot be overemphasized. It is a successful teaching model in the field of the sciences such as Agricultural Science. Learning activities if based on real-life experience help learners to transform knowledge or information into their personal knowledge which they can apply in different situations (Edward, 2011) [7]. Activity-Based method introduces some elements of joy, team spirit, respects for each other opinions and reduces abstractness in science concepts (David, 2007) [6]. With Activity-Based method of teaching Agriculture, an uninteresting topic becomes interesting. In teaching students, the strategy that should be used should attempt to accommodate the diverse needs of the students in a class and allow for optimum learning by directly involving students in the teaching-learning process. The activity-based method addresses this concern.

Activity-Based teaching also helps students to construct mental models that allow for 'higher-order' performance such as applied problem solving and transfer of information and skills (Churchill, 2013) [5]. Activity-Based teaching, if carried out in an effective manner develops skills such as Team-working, Communication, Design, Leadership, Project management, Research, Problem-solving, Reflection and Life-long learning in the learners (Khan, Naiz, Maqsood, Fiaza & Sher, 2012). These activities, they said if based on the real-life experiences, can help students to apply the same in their practical life and hence, prepare students for future life.

Agriculture is an applied science. The teaching and learning of this course involve facts and figures, rules, laws, formulae, problem-solving, understanding of scientific principles and concepts as well as practical demonstration of how an activity is done. Agricultural activities can be done both in the laboratory and in the field. The laboratory is an ideal environment for both active and cooperative learning (Hass, 2010) [9]. Active engagement in laboratory exercises promotes a thorough understanding of the concepts described in lectures (Offei-Koranteng, 2013) [20]. According to him, further enhancement of the laboratory experience can be gained by encouraging students to interact with each other during the practical activity process. Engaging students in activities are very important for students not only for understanding Agricultural science but also for increasing the students' ability to solve problems.

Many Agricultural Science teachers use the traditional lecture method of teaching especially practical components which makes the students always acting as passive learners. When senior secondary school students are taught using Activity-Based Instructional Strategy, students are able to retain most of the concepts they learn, because teachers get the learners involved in the practical activity. Bichi (2012) [4] said understanding and retention of learned items are products of meaningful learning when teaching is effective and meaningful to students. Bichi, further reported that anything that aids learning should improve retention, whiles things that lead to confusion or interference of learned materials decrease the speed and efficiency of learning and accelerates forgetting.

Lagowski, (2010) [15] in the study of students' knowledge retention showed that students usually retain 10% of what they read; 26% of what they hear; 30% of what they see; 50% of what they see and hear; 70% of what they say; 90% of something they say while they are doing a task. Aneke (2015) [2] also reported that 90% of what we use our hands to do is retained.

Nonetheless, the dynamics of gender in an Activity-Based Instructional classroom on the study of Agricultural Science concepts have not been explored enough by researchers, thus creating a gap that requires filling. Hence, this study was designed to:

1. Determine the difference in academic performance between male and female students taught Agricultural Science using the Activity-Based Instructional Strategy.
2. Find out the difference in retention ability between male and female students taught Agricultural Science using the Activity-Based Instructional Strategy.

Consequently, the following research questions and their corresponding hypotheses guided the study:

Research Question 1: What is the difference in academic performance between male and female students taught Agricultural Science using the Activity-Based Instructional Strategy?

Research Question 2: What is the difference in retention ability between male and female students taught Agricultural Science using the Activity-Based Instructional Strategy?

$H0_1$: There is no significant difference between male and female mean performance score when taught Agricultural Science using Activity-Based Instructional Strategy.

$H0_2$: There is no significant difference between male and female students' mean retention score when taught Agricultural Science using Activity-Based Instructional Strategy.

Methodology

The design of the study is Quasi-experimental. Specifically, the pre-test, post-test, post-post-test non-equivalent, control group design. The population for this study consisted of all SSII students who offer Agricultural science in all the secondary schools in Owerri Education Zone (OEZ) of Imo State. The sample for the study comprised of 118Senior Secondary School two (SSS II) students that were drawn from two schools in Owerri Educational Zone of Imo State. The sample was obtained through multistage sampling technique. Two instruments, titled: Agricultural Science Achievement Test (ASAT) and Agricultural Science Retention Test (ASRT) were used for data collection.

The instruments were validated by two (2) experts in the field of test and measurement. A reliability coefficient of 0.82 and 0.84 through Cronbach alpha method was obtained for ASAT and ASRT respectively. Descriptive statistics mainly mean and standard deviation were used to analyse and answer the research questions while inferential statistics mainly t-test was used to analyse the null hypotheses at $p \leq 0.05$ level of significance. Furthermore, the pre-test scores generated were used to ascertain the equivalence of the groups before treatment. With the successful establishment of the equivalence of the two groups, comparison was thereafter focused on the students' post-test scores and post-post-test scores only as could be seen in the results.

Results

Research Question 1: What is the difference in academic performance between male and female students taught Agricultural Science using the Activity-Based Instructional Strategy?

$H0_1$: There is no significant difference between male and female mean performance score when taught Agricultural Science using Activity-Based Instructional Strategy.

To answer this research question and test the corresponding hypothesis, data generated via the Agricultural Science Performance Test (ASPT) were subjected to mean, standard deviation and t-test statistics to determine if there was any significant difference between the performances of the male and the female students after treatment with the Activity-Based Instructional Strategy. The result is as presented in Table 1.

Table 1: t-test Analysis of the Mean Scores of Post Test Data of the Male and Female Students Exposed to Activity-Based Instructional Strategy

Gender	n	$\bar{x}$	Sd	t_{cal}	df	$Sig.$	$Decision$
Male	36	23.03	2.92				
				1.421	58	.161	NS
Female	24	24.08	2.65				

NS = Not Significant, p (.161) > 0.05 level of significance

Table 1 showed that the male students had (M = 23.03, SD = 2.92) while female students had (M = 24.08, SD = 2.65). The result is that female students did better than the male counterpart. But on further statistical analysis, the calculated $t(58) = 1.421$, $p(.161) > 0.05$ level of significance, indicated not significant. Since the observed p-value was 0.161 which is greater than 0.05 level of significance. Therefore, the stated null hypothesis is hereby accepted (not rejected). The result is that there is no significant difference in academic performance between male and female students taught Agricultural Science using Activity-Based Instructional Strategy.

Research Question 2: What is the difference between male and female students' mean retention score in Agricultural Science when taught using the Activity-Based Instructional Strategy?

$H0_2$: There is no significant difference between male and female students' mean retention score when taught

Agricultural Science using Activity-Based Instructional Strategy.

To answer this research question and test the corresponding hypothesis, data generated through the Agricultural Science Retention Test (ASRT) that is the post-post-test were subjected to mean, standard deviation and t-test statistics to determine if there was any difference between male and female students' retention ability after two weeks of post-treatment. The result is as presented in Table 2.

Table 2: t-test Analysis of the Mean Scores of Post post-test Data of the Male and Female Students Exposed to Activity-Based Instructional Strategy

Gender	n	$\bar{x}$	Sd	t_{cal}	df	$Sig.$	$Decision$
Male	36	23.14	2.19				
				4.131*	58	.000	Significant
Female	24	25.33	1.71				

*Significant, p(.000) < 0.05 level of significance

From Table 2, the male students had (M = 23.14, SD = 2.19) while female students had (M = 25.33, SD = 1.71). This implies that female students retain better than their male counterpart in the same group. The calculated t-value was 4.131. This value was found to be statistically significant at 0.05 level of significance with df 58. Also, the P-value observed was 0.000 which is less than 0.05 level of significance. Hence, the stated null hypothesis is hereby rejected. The result is that there is a significant difference in retention ability between male and female students taught Agricultural Science using Activity-Based Instructional Strategy. This implies that the female students taught Agricultural science concepts using Activity-Based Instructional Strategy retained the learned concepts better than their male counterpart taught the same concepts.

Discussion

Gender difference in Academic Performance of Students exposed to Activity-Based Instructional Strategy in Agricultural Science

The result here revealed that female students exposed to Activity-Based Instructional Strategy have higher mean scores than their male counterparts in the same group. In addition, there was no significant difference in academic performance between male and female students taught agricultural science using Activity-Based Instructional Strategy. This implies that the level of performance of the male students exposed to Activity-Based teaching experiences is the same as their female counterparts. The result indicated that the Activity-Based Instructional Strategy is gender-friendly.

This finding agrees with the findings of Bichi (2012) [4] and Stanley (2017) that in their separate but similar works, said understanding and retention are products of meaningful learning when teaching is effective and meaningful to the students whether male or female. Thus, meaningful learning is the product of students' involvement in an act of learning such as seen in Activity-Based Instructional Strategy.

Also, this finding agrees with that of Ajayi (2017) and Manu (2018) who observed that the type of instructional strategy used does not discriminate between male and female. Therefore, the Activity-Based Instructional Strategy is gender-friendly as far as this study is concerned. Concrete and meaningful learning appears to be gender-friendly.

Gender difference in Retention Abilities when exposed to Activity-Based Instructional Strategy in Agricultural Science

On the issue of retention abilities, the study showed that female students exposed to Activity-Based Instructional Strategy had higher retention ability than their male counterparts in the same group. In addition, there was a significant difference in retention ability between male and female students taught Agricultural Science using Activity-Based Instructional Strategy. The female students taught Agricultural Science concepts using Activity-Based Instructional Strategy retained the learned concepts better than their male counterpart taught the same concepts.

This was, however, surprising because one expected that there will be no significant difference in retention ability between male and female students when taught with Activity-Based Instructional Strategy. Nevertheless, the researcher perceived that the observed significant difference could be attributed to female students' desire to pay more attention to the concepts/topics taught during treatment which are commercially oriented and more of feminine activities. For instance, 'Floriculture' basically flowers cultivating, production, tendering and beautification. This type of activity is more of feminine activity in our African set, the researcher perceives.

This finding disagrees with the findings of Ajayi (2017), Bichi (2012) [4], Iwuji (2012) and Stanley (2017), who in their separate but similar works said understanding and retention are products of meaningful learning when teaching is effective and meaningful to the students whether male or female. Thus, meaningful learning is the product of students' involvement in act of learning such as seen Activity-Based Instructional Strategy.

Conclusion

Based on the findings of this study, it was concluded that neither the male nor the female students performed significantly better than the other when Agricultural Science concepts were taught to them using either the Activity-Based Instructional Strategy. However, in terms of retention ability, female students retained significantly better than their male counterparts in Activity-Based Instructional Strategy.

Recommendations

On the basis of the findings and conclusions reached in this study, the following recommendations are made:

1. The teaching of Agricultural Science should be conducted in such a way that students effectively learn and retain the concepts presented to them. The use of the Activity-Based Instructional Strategy seems to be relevant in achieving this goal. It should, therefore, be incorporated into the teaching of agricultural science at the secondary school level.
2. Since gender does not play a significant role in students' performance but shows significant difference in retention ability in favour of the female students in Agricultural Science when exposed to Activity-Based Instructional Strategy. Curriculum planners should take this into consideration in curriculum planning.

References

1. Ajayi OV. Effect of hands-on activity-based method on

interest of senior secondary students in organic chemistry. Scholarly Journal of Education. 2017; 6(1):1-5. Retrieved from, http:// www.scholarly-journals.com/sje
2. Aneke CU. Enhancing students enrolment in Agricultural Education in Universities in South East States of Nigeria. Unpublished M.Ed thesis, Department of Technology and Vocational Education, Enugu State University of Technology, 2015.
3. Bennett, Barrie, Carol Rolheiser-Bennett and Laurie Stevahn. Cooperative Learning: Where Heart Meets Mind. Toronto, ON: Educational Connections, 2014.
4. Bichi SS. Effects of problem solving strategy and enriched curriculum on students' achievement in evolution Concepts among secondary students. An unpublished PhD Dissertation, Faculty of Education, ABU, Zaria, 2012.
5. Churchill D. Effective design principles for activity-based learning: the crucial role of 'learning objects' in Science and engineering education. Retrieved from, 2013, http://www.learnerstogether.net/PDF/Effective-Design-Principles.
6. David SO. Effects of Activity-based teaching method on the academic achievement of slow learners in chemistry at the senior secondary level. An Unpublished PhD thesis, Department of Education (Science) of the Faculty of Education, Amadu Bello University, Zaria, Nigeria, 2007.
7. Edward NS. Evaluation of a constructivist approach to students' induction in relation to student's learning styles. European Journal of Engineering Education. 2011; 26(4):429-440.
8. Enekwe T. The effective way of teaching in Agriculture senior high schools. Unpublished PhD thesis, Department of Agriculture, Kenyatta University, Kenya, 2012.
9. Hass MA. Student-Directed learning in organic chemistry laboratory. Journal of Chemical Education. 2010; 77:57-68.
10. Higgins. Activity-Based Learning in Elementary School Mathematics: Recommendations from Research. Information Reference Center (ERIC/IRC), The Ohio State University, Ohio, 2007.
11. Inekwe IO. Sensitizing students' learners of mathematics through effective means: A focus on the Universal Basic Education. Unpublished M.Ed thesis, Amadu Bello University, Zaria, Nigeria, 2012.
12. Iwuji NP. Effects of activity-based Instructional Strategy on academic achievement and retention in basic science concepts among junior secondary school students. Unpublished Master's Thesis, School of Postgraduate Studies, Ahmadu Bello University, Zaria, 2012.
13. Khan M, Naiz M, Maqsood M, Fiaza S, Sher AK. Impact of activity-based teaching on students' academic achievements in physics at secondary level. Journal of Academic Research International. 2012; 3(1):1-19.
14. Kisirikoi F, Wachira L, Malusu J. Distinction Education for Primary Teacher Education. Nairobi, Kenya: Kenya Literature Bureau, 2008.
15. Lagowski JJ. Retention rates for student learning. Journal of Chemical Education. 2010; 67:811-812.
16. Manu I. Enhancing senior high school students' performance in agricultural science using activity-based Instructional Strategy at Beposo senior high school, Bosomtwe District, Ghana. *Unpublished Master's Thesis*, Faculty of Education, School of Graduate Studies, University of Development Studies, Tamale, 2018.
17. Mari JS. The Effect of process skills instruction on reasoning ability among senior secondary school students in Kaduna state. Unpublished M.Ed thesis, Department of Education, Ahmadu Bello University, Zaria, Nigeria, 2014.
18. Merlot A. The effectiveness of three experiential teaching approaches on Methodology for (Time-Constrained) Young Scholars -Course Design and Methods of teaching agriculture (3rd ed). Upper Saddle River, NJ: Pearson, 2015.
19. Oakley A. Sex, gender and society. Great Britain: Redwood Book limited, 2013.
20. Offei-Koranteng K. Improving senior high school students' performance in organic chemistry using laboratory activity based method in Ledzokuku-Krowor Municipal Assembly, Ghana. *Unpublished PhD thesis*, University of Education, Winneba, Ghana, 2013.
21. Prince M. Does active learning work? A review of Researches. Retrieved from: http://ctlt.jhsph.edu/ resources/views/content/files/150/Does_Active_Learning_Work, 2014.
22. Stanley M. Indoor and outdoor laboratory experiences on Secondary school students' academic achievement and retention in Ecology in Kaduna state. Unpublished MEd thesis, Department of Education, A.B.U., Zaria, Nigeria, 2018.
23. Stolen M. Activity-based Learning Experiences in Quantitative Research Methodology for (Time-Constrained) Young Scholars -Course Design and Effectiveness. POMS 20th Annual Conference, Orlando, Florida, U.S.A, 2009.