



Impact of Formative Evaluation Modes on Learning Outcomes among Senior Secondary Agricultural Science Students in Uyo, Akwa Ibom State

J. T. Ekanem^{1*}, E. B. Inyang² and I. M. Umoh³

¹*Department of Agricultural Economics and Extension, Faculty of Agriculture, Akwa Ibom State University, Obio Akpa Campus, Nigeria.*

²*Department of Agricultural Economics and Extension, Faculty of Agriculture, University of Uyo, Uyo, Akwa Ibom State, Nigeria.*

³*Department of Science, Agricultural Science Education Unit, Redemption Academy, Obio Etoi, Uyo, Akwa Ibom State, Nigeria.*

Authors' contributions

This work was carried out in collaboration among all authors. Authors JTE and IMU designed the study. Author IMU performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors JTE and EBI managed the analyses of the study. All the Authors managed the literature searches, read and approved the final manuscript.

Article Information

DOI: 10.9734/JESBS/2019/v32i430177

Editor(s):

(1) Dr. Theodore S. Kaniuka, Professor, Department of Educational Leadership, Fayetteville State University, USA.

Reviewers:

(1) Olutosin A. Otegunrin, Federal University of Agriculture, Abeokuta, Nigeria.

(2) Ranjit Sambhaji Patil, Mahatma Phule Krishi Vidyapeeth Rahuri, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/52521>

Original Research Article

Received 11 September 2019

Accepted 21 November 2019

Published 27 November 2019

ABSTRACT

This study examined the effect of formative evaluation modes on secondary school agricultural science students' learning outcomes in Uyo, Akwa Ibom State, Nigeria. It was a pre-test and post-test quasi-experimental/control group research that relied on multi-stage sampling technique in the selection of respondents. Five (5) instruments developed and validated by the researchers were used to generate data from 200 SS11 students exposed to Agricultural science and farming techniques in secondary schools. Collected data were analysed using mean scores and standard deviation as well as Analysis of Covariance (ANCOVA) at .01 level of significance. Formative evaluation modes with feedback and remediation, which enabled respondents, develop good study habit and positive interpersonal relationship with their instructors and peers have proved to be very

*Corresponding author: E-mail: jemimahekanem@aksu.edu.ng;

effective in the assessment and improvement of students' learning outcomes. The improvements in respondents' performances were observed in both achievements in and attitude to learning Agricultural science. It could thus be concluded from this study that formative evaluation modes with feedback and remediation are effective in improving farmers' achievement in and their attitude to learning more about Agricultural science. Formative evaluation modes with feedback and remediation enabled young farmers to engage in consistent studying. It allowed the farmers to be exposed to different formative evaluation techniques such as peer assessment, projects, group assignment instead of the usually test and individual assignment that they were used to. Need for Agricultural science instructors to acquire necessary skills in the development of various formative evaluation modes/techniques needed for the assessment of the cognitive and affective domains of the young farmers was raised. Such techniques include written quiz, end-of-lesson assessment, peer assessment, individualized task, project, group assignment, attitudinal scales, and socio-metric scale among others.

Keywords: Impact; formative evaluation modes; learning outcomes; students; secondary school; agricultural science.

1. INTRODUCTION

Agriculture has contributed immensely to economic growth in Nigeria since pre-independence era. Presently, it is considered a veritable tool to stabilize the economy and drive it out of recession. Despite the importance of agriculture to transformational development, agricultural production in Nigeria is still drudgery in nature depending on physical strength, which declines with age. This has therefore been observed as one of the major constraints to agricultural production in Nigeria [1]. Although young adults have desirable qualities that can promote agriculture, most of them have strong apathy towards it [1].

The development of the agricultural sector of the Nigerian economy depends on young people, more especially the young adults in secondary schools who offer agricultural science. The senior secondary school Agricultural Science students are relatively young; this category of people ought to be active, inquisitive and willing to learn to add to their knowledge [2]. Both the female and male students should be better informed about improved farming practices since they have been learning about it.

Literature and opinion of educationists have shown that there is growing concern about poor students' achievement in Agricultural Science. Agricultural students in Akwa Ibom State may or may not understand the driving force of their poor achievement in the subject but it is certain that the direction of their performance will definitely affect the cropping, animal rearing and soil management systems and cause serious decline in agricultural production in the near future. This

in turn may limit the successful implementation of the federal and the state governments' economy diversification strategies, which is focused on the agricultural sector.

The only approach of ascertaining whether the huge money sunk into education is profitable or not is through evaluation of students' performances. Evaluation of students' learning outcomes is fundamental to the realization of the objectives of education in any country. [3] Submitted that one of the functions of school is the certification of the individual learner under its purview. To effectively carry out this role, evaluation of one kind or another is a prerequisite. Rust [4] articulates that students are being evaluated for different reasons namely: motivation, creating learning opportunities, feedback (both to students and staff), to grade, and as a quality assurance mechanism (both for internal and external systems). Furthermore, evaluation involves the process of observing, describing, collecting, scoring, recording and interpreting information about a student or a group of students [5].

Formative evaluation, also known as formative assessment, periodic assessment or assessment for learning involves testing of students' achievement at regular interval to ascertain the level of learning accomplishment so that appropriate remediation are recommended and effected [6,7,8,9]. According to Onuka [10], formative evaluation is a systematic, comprehensive, and guidance-oriented method of determining the totality of all gains a learner might have gotten in terms of knowledge, attitude and skills, from the course of a given set of learning experiences. He states that the

formative evaluation that is effectively conducted could enhance students' performances. Formative evaluation system has a significant positive effect on examination scores. The implication of the above findings is that a well designed and implemented formative evaluation package could go a long way to improve students' examination scores or achievement.

A well designed and implemented formative evaluation is one that is being administered frequently and at regular intervals during the school year which promotes regular instructor-learner interactions. Onuka [10] opines that the main emphasis in formative evaluation is not that evaluation should be done non-stop, but that it should take place as often as possible (at some regular intervals) and not kept until the end of the term or year. The criteria which form the yardstick of judgement of students' performances are those covering the three educational behavioural objectives which are intellect (cognitive), manipulative skills (psychomotor) and feelings/attitude (affective). [11] as well as [12] posit that in order to cater for all aspects of learning, there is need to use several types of evaluation tools such as teacher-made tests, standardized tests, oral questions, discussion, projects, direct classroom observations, assignments, questionnaires, interview and so on. In addition, [13] lists formative evaluation methods to include oral quizzes, tests, take-home assignments, group work, hands-on or practical, and self cum peer assessment. However, the methods more commonly used in Nigerian schools are tests and take-home assignments. To confirm this, the study conducted by [14], which investigated the extent to which formative evaluation improved higher education learning achievement revealed that test and individual assignment are the most commonly used techniques for measuring students' academic performances, while other techniques such a project, peer assessment, class observation, group assignments were rarely used.

However, most of the formative evaluations done or carried out in the various schools in Akwa Ibom State are only measures of students' cognitive achievement while little or no attention is given to the affective and psychomotor achievements, thus neglecting the important roles these domains could play in students' academic achievement. Obioma in [15] asserts that in his bid to assess the performance of students, the affective behaviour domain was

ignored. This is to buttress the fact that most of the formative evaluation conducted in our schools focus on assessment of students' cognitive domain neglecting the affective domain.

Keith [16] submits that, attitude, which is one of the indices of affective domain, affects everything an individual does. [17] as well as [18] defines attitude as an organised predisposition to think, feel, perceive and behave towards a referent or cognitive object. Attitude is an important characteristic that determine students' success and most importantly learning outcomes in school. In his own submission, [19] declares that attitude is generally regarded as enduring though modifiable by experience and or persuasion and is also learnt rather than innate. This implies that young farmer's attitude towards Agricultural science reveals the type of behaviour he/she will put on in achieving success in the subject. Thus, attitude can promote or inhibit students' behaviour in the classroom, school, home, and choice of career.

Studies have shown that the practices of formative evaluation at all levels of the education system in Nigeria are not appropriately done as it is supposed to [15,17]. Often, instead of conducting formative evaluation systematically, comprehensively, and continuously using various forms of techniques such as written quiz, group assignments, end-of-lesson assessment (test), individualized task/assignment, project, and peer assessment, questionnaire as well as the provision of feedback and remediation to improve students' learning outcomes, it is being conducted once or twice in a term. Also, the types of formative evaluation techniques mostly used are tests and take home assignments.

In the light of the above revelations, this study examined the effect of formative evaluation modes: school-based formative evaluation [the use of written quiz, end-of-lesson assessment and peer assessment) and home-based formative evaluation (the use of project, individual task (take home assignment) and group assignment] on students' learning outcomes in Agricultural Science in Uyo, Akwa Ibom State, Nigeria. Based on the foregone, this paper examined the mean score of students in Agricultural Science achievement test based on each formative evaluation modes. Examined the mean score of young farmers' attitude to learning Agricultural Science based on each formative evaluation modes and ascertain whether there was no significant main effect of formative

evaluation modes on students' achievement in Agricultural Science as well as attitude to learning Agricultural Science.

2. METHODOLOGY

The study was conducted in Uyo Local Government Area which consists of Offot, Etoi, Oku and Ikono clans located within the capital city of Akwa Ibom State and situated from latitude 5.05° to 8.03° North and longitude 4.47° to 5.07° East.

The study was a pre-test and post-test quasi-experimental/control group design.

The research design is as illustrated below:

- $O_1 X_1 O_2$ - Experimental Group I – School based formative evaluation with Feedback and Remediation
- $O_1 X_2 O_2$ - Experimental Group II – Home based formative evaluation with Feedback and Remediation
- $O_1 X_3 O_2$ - Experimental Group III – School and Home based formative evaluation with Feedback and Remediation
- $O_1 X_4 O_2$ - Control Group - The conventional method of formative evaluation

Where:

- O_1 - Pre-test achievement in Agricultural Science for each group
- O_2 - Post test achievement in Agricultural Science for each group
- $X_1 - X_3$ - Represent the treatment groups
- X_4 - Represents Control Group - The conventional method of formative evaluation

2.1 Treatment Package I: School Based Formative Evaluation Mode with Feedback and Remediation Package

The school based formative evaluation mode package consisted of modules. These modules were weekly activities of the formative evaluation mode meant to measure the cognitive and affective domains of the learners. The formative evaluation techniques involved in this package were written quiz in agriculture, end-of-lesson assessment and peer assessment as well as attitude scale. The formative evaluation scripts for the cognitive domain and attitude scale for the affective domain were scored by the researchers while feedback and remediation for both domains

were provided at the next lesson to improve the performances of the young farmers. The students in this group were assessed using the school based formative evaluation modes battery which consisted of test which was a combination of fill in the gap and essay test items which were scored using marking scheme containing the keys.

2.2 Treatment Package II: Home Based Formative Evaluation Mode with Feedback and Remediation Package

The home based formative evaluation mode package also consisted of modules. Each module showed the formative evaluation techniques that were used to assess the students learning outcomes with the provision of feedback and remediation. The formative evaluation techniques involved in this package were group assignment, individual task (take home assignment) and project as well as attitude scale. The formative evaluation scripts and the attitude scale were scored by the researchers while feedback and remediation were provided at the next lesson to improve the performances of the young farmers. Students in this group were assessed using the home-based formative evaluation modes battery consisting of essay test items which were scored using marking scheme containing the keys (answers).

2.3 Treatment Package III: School and Home Based Formative Evaluation Modes with Feedback and Remediation Package

The school and home based formative evaluation modes package was a combination of the school based and home based packages as described above. Students in this group were assessed with The School-Home based formative evaluation modes battery consisting of test items which was a combination of fill in the gap and essay test items which were scored using marking scheme containing the keys.

2.4 Control Group: Conventional Formative Evaluation Package

The conventional formative evaluation package showed the conventional formative evaluation in which students learning outcome in the cognitive domain were assessed twice in a term using written test. The students were evaluated at the 5th week and the 8th week of the term using test.

The target population of this study comprised all the 611 Senior Secondary School II (SSSII) Agricultural Science students in Uyo Local Government Area. This class of students were chosen because they are stable; less worried about external examination and have been more exposed to the study of Agricultural science and practical farming in school and home.

This study adopted a multi-stage sampling technique in the selection of the respondents. There are four clans in Uyo Local Government Area; these are Ikono Clan, Etoi Clan, Oku Clan and Offot Clan and there are thirteen (13) secondary schools spread across the four clans. Stage one involved the purposive selection of one public secondary school from each of the clan resulting in 4 schools (3 schools were used as experimental groups and 1 school as control group). In stage two, an intact class of 50 SS II Agricultural Science students from each school was used. Two hundred (200) SSSII Agricultural Science students were used as participants/respondents for the study as shown in Table 1 below;

Five (5) instruments developed and validated by the researchers were used to generate data for the study. They were: School based Formative Evaluation Modes Battery, Home based Formative Evaluation Modes Battery, School and Home based Formative Evaluation Modes Battery, Agricultural Science Achievement Test and Attitude towards Learning Agricultural Science Scale. The school based formative evaluation modes battery comprised the test items for formative evaluation techniques including; peer assessment, written quiz in agriculture, and end-of-lesson assessment. The home based formative evaluation modes battery comprised the test items for; individual task, projects and group assignment. The school-home based formative evaluation modes battery comprised the test items for formative evaluation techniques such as peer assessment, written

quiz, end-of-lesson assessment, individual task, projects and group assignment.

The achievement test in Agricultural Science consisted of multiple objectives test with four options labelled A- D constructed by the researchers using a test blue print with 100 items derived from 8 topics in SS 2. The cognitive domains measured were Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. The objective test generated were trial tested and the difficulty and discriminating indices of the items were found. 100 respondents were used for the validation exercise. The items with difficulty indices between 0.40 and 0.75 as well as discriminating indices between 0.31 and 0.45 we retained. Therefore, 50 items were finally selected from the 60 items that survived the validation exercise. The reliability coefficient of 0.74 was determined using Kuder-Richardson 20 (KR-20). Attitude towards Learning Agricultural Science Scale was developed to determine students' attitude towards Agricultural Science. The instrument consisted of two parts: Part A was meant to elicit information on the personal characteristics of the students while Part B measured students' attitude towards Agricultural Science. The response format for the 30 items was strongly agree =4 to strongly disagree=1 with a reverse for negative items. 100 respondents were used for the validation exercise and the reliability of this instrument was 0.75 established using Cronbach Alpha. However, the items were reduced to 23 after validation process.

The researchers trained six (6) research assistants who under the supervision of the researchers administered the instruments on the subjects in their various schools after obtaining permission from the principals of the selected schools. The researchers and the research assistants carried out the pre-test on all the students in the treatment and control groups at the first week of the study. The Agricultural

Table 1. Selected schools for the study

| S/n | School names | Intact class | Treatment type |
|-----|---|--------------|--|
| 1 | C.S.C.S, Ikot Oku Ikono, Uyo | 50 | School based formative evaluation with Feedback and Remediation |
| 2 | Government Model secondary school, Aka Community, Uyo | 50 | Home based formative evaluation with Feedback and Remediation |
| 3 | Etoi secondary school, Etoi, Uyo | 50 | School and Home based formative evaluation with Feedback and Remediation |
| 4 | Fulga School, Afaha Oku, Uyo | 50 | The conventional method of formative evaluation |

Source: Ministry of Education, Akwa Ibom State, (research and statistics department, 2018)

Science Achievement Test and Students' Attitude to Learning Agricultural Science Scale were administered on the students as the pre-test. Implementation of the formative evaluation modes on the treatment groups was then implemented from the second week through the tenth week. The research assistants taught the students during the first and second lessons while formative evaluation for the cognitive and affective domains were conducted at the third lesson of Agricultural Science. The research assistants marked and scored the students' formative evaluation scripts and attitude scale after which feedback and remediation were provided at the next lesson for the treatment groups except the control group. Finally, the Agricultural Science Achievement Test and Attitude to Learning Agricultural Science Scale were administered on the students in both the treatment and control groups as post-test.

Descriptive statistics was used to get the group mean scores and the standard deviation of students' performance in Agricultural Science Achievement Test and Attitude to Learning Agricultural Science Scale. Also, the data collected through pre-test and post-test were analysed using Analysis of Covariance (ANCOVA). The ANCOVA was used to correct the initial differences in the dependent variables, using the pre-test scores as covariance

3. RESULTS

3.1 General Overview of the Achievement Level of the Respondents in Agricultural Science

The Level of achievement of the students in Agricultural Science was estimated using composite index approach. The index range lies within 0.00 and 1.00. As the respondents estimated index tends towards 1.00, it implies that the Level of performance/achievement of the students was extremely high and vice versa as it tends towards 0.00. However, for ease of analysis, the index of each item was distributed along a categorized level of performance based on equal interval, such that 0.00 – 0.33 indicates low performance level meaning that respondents in this category performed between 0 – 33%, 0.34 – 0.66 indicates average performance level (those who performed between 34 -66%) while 0.67 – 1.00 indicates high performance level (those who performed between 67 -100%).

Results on Table 2 shows the general performance of the respondents after the treatments (post-test). It shows that majority (80.0%) of the respondents have average level of performance in agricultural science, 15.0% performed highly while only 5.0% of the respondents fell into the low performance category. This shows that most of the sampled students performed highly in agricultural science after the treatments. They were knowledgeable about the fact that Maize, Millet, Guinea corn and rice belong to the group of crops called cereals. They knew that the farmer that is into large scale production of maize should store his produce in the silo. They knew that in the process of recycling carbon in nature, carbon dioxides are used by crops during photosynthesis. They are very familiar with the fact that early planting of groundnut in early cropping season's means that groundnut farmer should plant in Mid-March to early April. Performance is the glittering crown which reflects a sense of sincerity, candidness and perseverance on the part of achievers and also parents, teachers and all those helping to achieve it, and thus a result of bidirectional results. However, the findings of [20] in their work on Challenges, Attitudes and Academic Performance of agricultural science students in public secondary schools in Ibadan North, contradict this results as theirs found that majority of students obtained scores below 40%.

3.2 Overview of the General Attitudinal Disposition of the Respondents towards Agricultural Science

Table 3 gives insight to the attitude of the respondents towards Agricultural science. Students' attitude toward Agricultural science therefore was found to be variable between the pre-test and post-test mean performances. However, greater number of the students had favourable attitudinal disposition towards agricultural science during the post-test. The table shows a remarkable improvement from the pre-test in a lot of items during the post test. For instance, the mean attitude of the respondents in item 3 was raised from 2.90 to 3.24 after the treatments. They were impressed and felt they can do well in Agricultural Science if they put in more effort. The respondents in item 6, also concluded after the treatments that people fail Agricultural Science because they do not make enough effort. Summarily, the respondents submitted favourable attitudinal disposition to virtually all the items after the treatments. This

shows that a student who has a favourable attitude towards agriculture will perform well in reading and enhancing performance in the learning of skills. To sustain their interest in agricultural science, attitudes on reading must be encouraged by teachers through the use of different and motivating teaching methods and provision of adequate reading environment.

| Scale | Score |
|------------------------|-------|
| SA = Strongly Agree | (4) |
| A = Agree | (3) |
| D = Disagree | (2) |
| SD = Strongly Disagree | (1) |

3.3 Mean Scores of Students in Agricultural Science Achievement Test Based on Each Formative Evaluation Modes

The result in Table 4 revealed that the treatment groups showed improved mean scores in the post- test, as compared to the pre-test mean scores as follows; school and home based with feedback and remediation had the highest mean score (\bar{x} = 35.54), followed by school based with feedback and remediation (\bar{x} = 35.40), and then home based with feedback and remediation (\bar{x} = 26.87), while the conventional assessment method was (\bar{x} = 20.40). Also, school and home based with feedback and remediation had the highest mean gain (\bar{x} = 24.66) followed by school based with feedback and remediation (\bar{x} = 23.16), and then home based with feedback and remediation (\bar{x} = 11.15) while the conventional assessment method was (\bar{x} = 06.38). This implies that treatment group (school

and home based with feedback and remediation) gained more.

3.4 Mean Score of Students Attitude to Learning Agricultural Science Based on Each Formative Evaluation Modes

The result in Table 5 showed that the attitude of students in the treatment groups showed improved mean scores in the post- test, as compared to the pre-test mean scores as follows: home based with feedback and remediation had the highest mean score (\bar{x} = 89.99), followed by school-home based with feedback and remediation (\bar{x} = 84.70), then school based with feedback and remediation (\bar{x} = 74.00), while conventional evaluation method followed (\bar{x} = 65.10). Furthermore, home based with feedback and remediation (\bar{x} = 35.07) had the highest mean gain score followed by school-home based with feedback and remediation (\bar{x} = 29.78), school based with feedback and remediation (\bar{x} = 16.09), and then conventional evaluation method (\bar{x} = 10.18). The implication of this is that treatment group (home based with feedback and remediation) benefited more.

3.5 Analysis on the Effects of Formative Evaluation Modes on Students Achievement in Agricultural Science

Table 6 below shows that the F-value (8.332) for the treatment (formative evaluation modes), is significant at 0.01 level of significant. This implies that there is a significant main effect of formative evaluation modes on achievement in Agricultural Science. The partial Eta squared estimated was 0.513. This implies that formative evaluation

Table 2. Distribution of respondents based on level of achievement on agricultural science test (LAAS)

| LPAS interval | LAAS interpretation | Frequency | Percentages (%) |
|------------------|---------------------|------------|-----------------|
| Pre-test | | | |
| 0.0 - 0.33 | Low | 142 | 71.0 |
| 0.34 - 0.66 | Average | 36 | 18.0 |
| 0.67 - 1.00 | High | 22 | 11.0 |
| Total | | 200 | 100.0 |
| Post-test | | | |
| 0.0 - 0.33 | Low | 10 | 5.0 |
| 0.34 - 0.66 | Average | 160 | 80.0 |
| 0.67 - 1.00 | High | 30 | 15.0 |
| Total | | 200 | 100 |

Source: Computed from field survey, 2018

Table 3. Mean distribution of the respondents based on attitude towards agricultural science

| S/N | Attitude towards agricultural science | Pre-test means | Post-test means |
|-----|---|----------------|-----------------|
| 1 | Agricultural Science is a very difficult subject | 3.29 | 1.81 |
| 2 | Anybody taking an Agricultural Science examination is almost sure to fail | 2.91 | 1.62 |
| 3 | I can do well in Agricultural Science if I put in more effort. | 2.90 | 3.24 |
| 4 | If people have been failing Agricultural Science, I don't see how I can pass | 2.70 | 1.53 |
| 5 | Only lazy people hate Agricultural Science | 2.84 | 3.91 |
| 6 | People fail Agricultural Science because they do not make enough effort | 2.04 | 3.80 |
| 7 | Agricultural Science is a very interesting subject | 1.95 | 3.42 |
| 8 | I get confused whenever I'm given a problem to solve in Agricultural Science | 2.18 | 1.64 |
| 9 | Agricultural Science only involves the use of common sense | 2.37 | 1.91 |
| 10 | I am sure to fail Agricultural Science whether I read it or not | 3.22 | 1.52 |
| 11 | I have to practice my Agricultural Science every day if I want to pass | 1.72 | 3.40 |
| 12 | Agricultural Science is very boring | 2.90 | 1.55 |
| 13 | I like to make a career from Agricultural Science | 2.90 | 3.71 |
| 14 | No matter what method of teaching, the teacher uses, the students will still fail it. | 2.87 | 2.76 |
| 15 | Agricultural Science is not difficult. | 1.73 | 3.20 |
| 16 | Agricultural Science makes people think | 2.37 | 3.51 |
| 17 | Agricultural Science should be abolished | 2.22 | 1.98 |
| 18 | I will like to be employed in the Agricultural sector | 1.82 | 3.80 |
| 19 | I like Agricultural Science | 1.60 | 3.11 |
| 20 | I feel very happy just before agricultural exams or test | 2.30 | 3.18 |
| 21 | I wish the teacher could cancel the examination or test | 2.59 | 3.00 |
| 22 | I have a mind of coping somebody's work | 1.28 | 1.02 |
| 23 | I feel like sitting at the back so as to copy from my notes | 2.50 | 1.52 |

Source: Field survey, 2018

Table 4. Pre-test and post- test mean scores of students' achievement in agricultural science by the formative evaluation modes

| Treatments | Pre-test | | | Post-Test | | Mean gain |
|---|----------|-------|---------------|-----------|---------------|-----------|
| | N | Mean | Std deviation | Mean | Std deviation | |
| School based with Feedback and remediation | 50 | 12.24 | 3.365 | 35.40 | 8.235 | 23.16 |
| Home based with Feedback and remediation | 50 | 15.7 | 4.5 | 26.87 | 6.82 | 11.15 |
| School and Home based with Feedback and remediation | 50 | 10.8 | 1.816 | 35.54 | 11.2 | 24.66 |
| Conventional Assessment | 50 | 14.02 | 5.97 | 20.4 | 6.35 | 06.38 |

Source: Computed from field survey, 2018

Table 5. Pre-test and post- test mean scores of students' attitude to learning Agricultural Science by the formative evaluation modes

| Treatments | Pre-test | | | Post-Test | | Mean gain |
|---|----------|-------|---------------|-----------|---------------|-----------|
| | N | Mean | Std deviation | Mean | Std deviation | |
| School based with Feedback and remediation | 50 | 57.91 | 9.38 | 74.00 | 12.29 | 16.09 |
| Home based with Feedback and remediation | 50 | 54.92 | 8.24 | 89.99 | 12.4 | 35.07 |
| School and Home based with Feedback and remediation | 50 | 54.92 | 8.24 | 84.70 | 12.41 | 29.78 |
| Conventional Evaluation | 50 | 54.92 | 8.24 | 65.10 | 12.4 | 10.18 |

Source: Computed from field survey, 2018

Table 6. ANCOVA analysis on effect of formative evaluation modes on students' achievement in agricultural science

| Treatment groups | Mean | F-value | Sign 2-tailed | P-Value | Partial eta sq | Remarks |
|------------------|--------------------|---------|---------------|---------|----------------|---------|
| | | 8.332 | <0.001** | .01 | .513 | Sign |
| School based | 35.40 ^b | | | | | |
| Home based | 26.87 ^c | | | | | |
| Schl & Home | 35.54 ^a | | | | | |
| Control | 20.4 ^d | | | | | |

Source: Computed from field survey, 2018. **= Significant at .01

modes accounted for 51.3 percent of the variance observed in the post- test achievement test in Agricultural Science. Results of the post hoc test done to determine which of treatment group was significantly different shows that school and home based formative evaluation mode is the best (35.54) followed by school based formative evaluation with feedback and remediation (35.40), then home based formative evaluation with feedback and assessment (26.87) and control [conventional formative evaluation] (20.40) with the least mean. The result of pair-wise comparison is indicated as alphabetical superscript on the means of the different treatment groups.

3.6 Analysis on the Effects of Formative Evaluation Modes on Students Attitude towards Agricultural Science

Table 7 shows the F-value (30.978) for the treatment (formative evaluation modes) was significant at .01 level of significant ($p < .01$). This implies that there is a significant main effect of formative evaluation modes on students' attitude towards the learning of Agricultural Science. The partial eta square estimated was 0.322. This indicates that formative evaluation modes accounted for 32.2 percent of the variance observed in the post-test scores on attitude in Agricultural Science. The alphabetical

superscripts indicates the results of the post hoc test done to determine which of treatment group was significantly different. It shows that home based formative evaluation with feedback and remediation is the best (89.9) followed by school and home based formative evaluation with feedback and remediation (84.7), then school based formative evaluation with feedback and remediation (74), before conventional assessment (65.1) which was the least mean score.

4. DISCUSSION

The findings revealed that there was significant effect of formative evaluation modes on students' academic achievement in Agricultural Science. The students who were assessed using the school-home based formative evaluation mode had the best performance, followed by those assessed using school based formative evaluation mode. This result agrees with that of [8] who found that introducing in-course formative and continuous assessment positively affects the performance of students than the end of the semester examination. The introduction of in-course and formative evaluations together with feedback and remediation on coursework provided students with the mechanisms to help them understand more fully how the body works which led to improvement of students' academic achievement.

Table 7. ANCOVA analysis on effect of formative evaluation modes on students' attitude to agricultural science

| Treatment groups | Mean | F-Value | Sign 2-tailed | P-Value | Partial Eta Sq | Remarks |
|------------------|--------------------|---------|---------------|---------|----------------|---------|
| School based | 74.00 ^c | 30.978 | <0.001** | .01 | .322 | Sign |
| Home based | 89.99 ^a | | | | | |
| Schl & Home | 84.70 ^b | | | | | |
| Control | 65.10 ^d | | | | | |

Source: computed from field survey, 2018; **= Significant at .01

Also, the improvement revealed in the academic achievement of these students, could be as a result of the fact that the students had opportunity to consult relevant reading materials from the library and internet which helped them acquire an in-depth knowledge of Agricultural Science. Again, their parents could have provided feedback and remediation to them and they could have had access to home-teachers who provided feedback and remediation to them.

Findings also revealed that there was significant effect of formative evaluation modes on students' attitude to learning Agricultural Science. The students in home based formative evaluation mode and school-home based formative evaluation mode had the best performances in attitude towards learning Agricultural Science. The findings corroborates [21] and [4].

5. CONCLUSION AND RECOMMENDATIONS

Consequent upon the result, it is apparent that all the formative evaluation modes played significant roles in students' academic achievement in Agricultural Science because the use of various formative evaluation techniques in assessing students' academic achievement have helped to improve their study habits and commitment to learning. In view of the findings of this research, agricultural science instructors and trainers should conduct formative evaluation with the purpose of improving students' learning outcomes and not for grading purpose. Agricultural science instructors should not restrict or limit evaluation of students' performance to the cognitive domain alone rather they should also assess the affective domain of the learners. In addition, it is paramount that students should be adequately informed about the importance of exposing them to various evaluation techniques in order to engender improved performances on their own part as well as their teachers.

CONSENT

As per international standard or university standard, student's consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Muhammad-Lawal A, Omotesho O, Fala A. Technical Efficiency of Youth Participation in Agriculture: A Case Study of the Youth-in-Agriculture Programme in Ondo State, South Western Nigeria. Nigerian Journal of Agriculture, Food and Environment. 2015;5(1):20-26.
- Umoh ID. Knowledge of Climate-Change And Socio-Psychological Variables As Correlates of Household Agricultural Practices Among Senior School Agricultural Science Students In Akwa Ibom State. Unpublished M.Ed Dissertation, Institute of Education, University of Ibadan, Ibadan, Nigeria; 2012.
- Idowu AI, Esere MO. Assessment in Nigerian schools: A Counsellor's Viewpoint. Edo Journal of Counselling,. An Official Publication of Edo State Chapter of Counselling Association of Nigeria. 2016; 2(1):17-27.
- Rust C. The impact of assessment on student learning. Active Learning in Higher Education. 2012;3(2):145-158.
- Ekpenyong LE. Assessment: A missing link in Continuous Assessment of Business Courses. Journal of Quality Education. 2010;6(2): 80-87.
- Huhta A. Diagnostic and formative assessment. In Spolskey, B. and Hult, F. M. (Eds), The Handbook for Educational Linguistics. Oxford, UK: Blackwell. 2010; 469-482.

7. Chauhan SS. Advanced Educational Psychology, New Delhi' Vikas Publishing House (P) Ltd; 2015.
8. Stiggins R, Chappuis J. Using student-involved classroom assessment to close achievement gaps. Theory into Practice, Phi Delta Kappan. 2015;44(1):11-18.
9. Hassan T. Continuous Assessment: Concept and Technique. Blessed Book Publishers; 2018.
10. Onuka A. Improving Students' Performance through Feedback Mechanism in Secondary Schools. Ibadan, University of Ibadan; 2010.
11. Onuka A. Continuous Assessment as an Instrument of Achieving Learning Objectives. Unpublished Research Report, Ibadan, University of Ibadan; 2018.
12. Onuka AOU, Junaid IO. Influence of feedback mechanism on students' performance in economics in Kogi State, Nigeria. In International Journal of Distance Education (IJODE). 2017;2.
13. Nwana OC. 2013 Minimum standards and accountability in the Nigerian educational system – Keynote Address. In A. Osilaye (Chair). Minimum standards and accountability in the Nigerian educational system. 18th Annual Congress of the Nigerian Academy of Education, University of Port Harcourt, Port Harcourt, 10th – 14th November; 2003.
14. Onuka AOU, Durowoju EO. Nature, causes, methods, effect and solutions to examination malpractices in Nigeria. A presentation made at the Interactive Session on Examination Malpractices; 2011.
15. Bruce-Agbogidi ET. Continuous assessment: Implementation by secondary school teachers in Port Harcourt. An unpublished M.Ed thesis in Institute of Education, University of Ibadan; 2015.
16. Keith DA. The interpretation, assessment and conservation of ecological communities and ecosystems. Ecol. Manage. Restor. 2010;10:3–15.
17. Adegoke BA. Integrating animations, narratives and textual information for improving Physics learning. Electronic Journal of Research in Educational Psychology. 2013;8(2):725-748.
18. Kerlinger F, Lee H. Foundations of Behavioural Research. Orlando, FL: Harcourt College Publishers; 2000.
19. King M. Research in composition: A Need for a Theory. Research in the Teaching of English. 2017;8:6-13.
20. Otekunrin OA, Oni LO, Otekunrin OA. Challenges, Attitudes and Academic Performance of Agricultural Science Students in Public Secondary Schools of Ibadan North, Nigeria. Journal of Scientific Research and Reports. 2017;13(1):1-11.
21. Sodique F. Bee-Honey Production: Strategy for Poverty Alleviation among Youths in Nigeria. Annals of Child and Youth Studies. 2016;1(1):113 –124.

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