

## Effects of Formative Assessment on Econometrics Test Anxiety and Students Academic Achievement in Nasarawa State University, Keffi, Nigeria

Salihu, Abdullahi Galle<sup>1</sup> and Isaac, Jangson. Kukwi<sup>2</sup>

<sup>1,2</sup>Department of Educational Foundations, Faculty of Education,  
Nasarawa State University, Keffi, Nigeria

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**Abstract:** The study of econometrics as branch of economics which served as a core course for all the economics students in the Nigerian Universities because of the vital role it plays in enhancement of growth and development of the nation. A shortfall in the knowledge of the students in econometrics due to level of anxiety would led to failure in dream goal, therefore the need to improve lecture strategies for solving anxiety to minimize students failure in the subject. This study investigated the effects of a formative assessment on econometrics test anxiety and students academic achievement in Nasarawa State University, Keffi, Nigeria. Quasi-experimental research design was adopted. The population of study consisted of 420 year three economics students 2018/2019 academic season and a simple random sample of 92 year three students were selected for the study from two faculties. Econometrics test anxiety scale and econometrics achievement test were used for data collection. Data were analyzed using descriptive for answering research question and inferential statistical techniques were used for testing hypotheses at .05 level of significance. The finding reveals that formative assessment reduced anxiety level and significantly increased econometrics academic achievement of the students. It was recommended that university lecturers should be trained and re-trained to acquire knowledge in education to apply the use of formative assessment for making the teaching and learning of econometrics more interesting and gratifying.

**Keywords:** Formative assessment, econometrics, test anxiety, achievement

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### I. Introduction

Literally, econometrics means measurement (the meaning of the Greek word metrics) in economic. However, econometrics includes all those statistical and mathematical techniques that are utilized in the analysis of economic data. The main aim of using those tools is to prove or disprove particular economic propositions and models (Hall & Asterion, [1]). Econometrics, the result of a certain outlook on the role of economics consists of the application of mathematical statistics to economic data to tend empirical support to the models constructed by mathematical economics and to obtain numerical results. Gujarat [2] defined Econometrics as the quantitative analysis of actual economic phenomena based on the concurrent development of theory and observation, related by appropriate methods of inferences. According to Wooldridge [3] that Econometrics is based upon the development of statistical methods for estimating economic relationships, testing economic theories, and evaluating, implementing government and business policy.

Based on the importance of Econometrics, National University Commission (NUC) implementing the study Econometrics into Economics curriculum for under graduate students to study and pass to a tolerant level. This will go a long way to develop rational thinkers that will use their intelligent, knowledge to predict and design positive ideas that will be benefiting generations in the society and the world at large. But, when there is a shortfall of knowledge, underperformance or low achievement in the study area a nation will continue facing low growth and development since the undergraduates' youths are the key engine that predict national development when they acquire sound knowledge.

Of course, test of knowledge and examinations at all stages of education, especially at the higher education level, have been considered an important and powerful tool for decision-making in our competitive society, with people of all ages being evaluated with respect to their achievement, skills and abilities. Amos [4] posited that "the era in which we live is a test-conscious age in which the lives of many people are not only greatly influenced, but are also determined by their test performance." Students consistently perceive test/examination as a source of increased anxiety and a situation engulfed with uncertainty/unfairness in letting them demonstrate their true achievement (Spielberger, [5]). Such feelings among students limit their potential

achievement during the test situation, resulting to higher test anxiety and directly causing a drop in the students' achievements.

Therefore, test anxiety can be seen as a measurement error that accompanies the assessment of students' achievements since tests are not meant to measure students' achievement under intimidating situation but to know their level of achievement in an environment fair enough to let them demonstrate their abilities to the fullest. Test anxiety is bound to manifest among students anytime a test is sequenced. Indeed, moderate anxiety is necessary to motivate excellent performance, but anxiety prompted by lack of preparedness for test has damaging effects on learners (Anikweze, [6]). When individuals are pressurized to make high scores in a test, their anxiety is bound to increase (Deffenbacher, [7]). Amos [8] found that individuals with high levels of anxiety tend to do worse on cognitive tests. Therefore, Goldman concluded that individuals with high test anxiety worry about not doing as well as they would like to do on a test. Most people find examinations stressful and may focus on expectations of failure and the undesirable consequences of personal inadequacy (Smith [9]).

Despite the fact that econometrics plays role significant to man's daily life, students generally develop little interest in the course and subsequently performs poorly. Over the years, some of the factors responsible for poor achievement in econometrics, mathematics and statistics by students in tertiary institutions as identified by Adelakun [10] include: lack of dedication and resourcefulness, lack of appropriate use of suitable teaching methods and lack of teaching experience on the part of the Lecturers. While on the side of students, poor reading habits, abstract nature of the course (due to unrealistic assumptions) and emotional state of the students during examination, this generated massive failure of students in Econometrics test/examination. The academic results revealed students inability to score high in Econometrics assessment. There has been mass failure rate in Econometrics examinations. For instance, the results of year three students in Econometrics for the period of 2014-2018 academic years, 10.23% pass rate at credit level while 89.77% failed in Nasarawa State University, Keffi, Nigeria (Economics of department Exams & record, [11]).

Other factor leading to students failure are pressure of scoring high in tests, fear of passing/failing a course, environment of the examination hall and lack of clarity in instruction for students are some of the reasons for test anxiety in students. High anxiety level has a damaging effect on students' academic achievement (Nelson, [12]). Thought lecturers are not exempted from the blamed, their method of teaching contributed to students' high anxiety level. Teachers teach using conventional teaching methods as well as teaching without adequate preparation of lessons. Many students go to school without textbooks or writing materials. The results are lack of interest, fear and mathematics test anxiety leading to students' poor academic performance (Ugodulunwa & Okolo, [13]). Educational policymakers, teachers, and researchers are increasingly interested in formative assessment as it reflects and supports student learning (Bell & Cowie, [14]; Torrance & Pryor, [15]; Wiliam, [16]). Formative assessment it is viewed as an essential strategy for reaching the targets set in many Organisation for Economic Co-operation and Development (OECD) countries and for acquiring qualifications in education. In many countries, guidance books have been developed to assist teachers in implementing formative assessment to meet its objective. This objective can be achieved if the questions are active and effective at determining the learner's depth of knowledge (McMillan, [17]).

Conventional or traditional assessments focusing on the written or oral examination of knowledge can be effective in assessing the student's ability to memorize and redefine the knowledge-based components of the task. However, they are insufficient to measure learning and skills unless traditional assessments are integrated with performance-based assessments, such as formative assessment, to reflect the achievement of expected standards (Biggs & Tangs, [18]). Formative assessment is generally carried out throughout a course or project. It referred to as continuous assessment or educative assessment' is used for obtaining continuous feedback to both the teachers and the learners for the purpose of determining the progress of learning during a course of instruction and for improving learners' performance through remediation (Anikweze, [19]). According to McManus [20] defined formative assessment as a process in which teachers and students provide feedback during instruction to organize the learning and teaching process in order to increase student achievement. Formative assessments inform teachers about whether the students have learned and they have an indicator qualification for how the teachers should plan their next lessons (Wuest & Fiset, [21]).

Formative assessment contributes to teachers' professional development as well as to students learning by transferring professional development practices to the lesson plans (Koh, Lim, & Habib, [22]). The impact of formative assessment arises from the strength of the feedback provided to students about their learning and to teachers about their teaching (Andrade, Lui, Palma, & Hefferen, [23]). Teachers use a range of assessment activities and strategies in the classroom to gain comprehensive insight into how much students learn as part of formative assessment. Several literatures shows that formative assessment has contributed significantly among the recent studies are Abdullahi [24] finding has high impact size in terms of student interest and success, Ozan & Kincal [25] finding reveals that application of formative assessment was notably positive. In addition to providing feedback to the students, they analyze the information, comment on it, and use it to inspect and organize teaching. Ugodulunwa & Okolo [26] findings revealed that formative assessment reduced anxiety level

and improved mathematics performance of the students. They not only participate in learning and teaching activities, but also use assessment information to identify goals, make decisions about their own development, and develop an understanding of how qualified a work will be (Berry, [27]). It was observed from the previous studies, formative assessment has a positive impact on many student behaviors, especially with regard to learning outcomes. In literature, formative assessment is ranked at the top of the list in studies comparing many teaching strategies, methods, and techniques in terms of the degree of impact on students' academic achievement. The lessons within the formative assessment package is learner-centred and designed in such a way that teachers will teach to foster deductive learning and also help to reduce anxiety level in students and improve performance in econometrics. Research has suggested that formative assessment could improve both learning and examination results and also reduces test anxiety (Ajogbeje & Alonge [28]). They reported that students who are systematically taught using formative assessment perform better than those who are taught using conventional methods.

However, this study anchored on theories of learning hierarchy by R.M. Gagne and the theory of learning by discovery by J. S. Bruner. These theories have had a profound impact on curriculum development and the methodology of teaching econometrics at tertiary level. Gagne [29] postulated that learning is best achieved when teaching is organized from simple to complex. He suggests that concepts acquisition takes place in an orderly, sequential, integrative and hierarchical manner. The present study employed Gagne's theory in the arrangement of the learning tasks within the Formative Assessment Package. As a result, the tasks in the learning package are sequentially and hierarchically structured moving from simple task to complex ones and from known to unknown. Efforts are also made by teachers before teaching any concept to ascertain what prior knowledge students had and to use that as prerequisite for new learning. Bruner's [30] theory of learning by discovery promotes the acquisition of knowledge through discovery. This becomes necessary where the instructional strategy is learner-centered. Learners have to respond to the teachers' questions to enable them discover new ideas, theories and concepts in econometrics.

**Research Questions**

1. What is the perception level of econometrics test anxiety on year three economics students?
2. What are the mean Econometrics achievement scores of students' in experimental and conventional lecture groups?

**Hypotheses**

The following hypotheses were tested at 0.05 level of significance:

1. There is no significant difference between the post-test Econometrics achievement mean scores in experimental and conventional groups students when the moderating effect of pretest is controlled.
2. There is no significant difference between pretest and post-test of Econometrics test anxiety mean scores of students in the experimental groups.
3. There is no significant difference between the pretest and post-test Econometrics achievement mean scores of students in the conventional groups.

**II. Material and Methods**

**Design**

The researchers adopted quasi-experimental design, non-randomized pretest-posttest control group. The choice of this design and its significance to this study was considered suitable because the randomization of subjects was not feasible as intact classes constitute the two groups that were used for the study. This is in agreement with the view of Uzoechi [31] that "the use of such designs that do not involve randomization is called the quasi-experimental design". The study comprised one experimental group and one conventional group. The experimental groups were exposed to the use of formative assessment while the conventional groups were exposed to the used use of conventional lecture. The selection was based on the two faculties namely: faculty of social science and faculty of education year three economics students that were lectured on econometrics topics covered include the econometrics analysis, single-equation (regression models), Normal linear regression model and practical aspects of statistics testing. The testing procedures were the same within the two groups (experimental and conventional groups). The design is symbolically represented in fig1.

|                     |       |       |       |       |       |       |
|---------------------|-------|-------|-------|-------|-------|-------|
| Experimental Groups | $O_1$ | $X_1$ | $O_2$ | $O_3$ | $X_1$ | $O_4$ |
| Conventional Groups | $O_1$ | —     | $O_2$ | $O_3$ | —     | $O_4$ |

*Fig1: Illustration of the Design*

Where:

$O_1$  = Pretest with Econometrics Achievement Test

O<sub>2</sub> = Post-test with Econometrics Achievement Test  
X<sub>1</sub> = Experimental groups (formative assessment)  
— = Conventional groups (conventional lecture)  
O<sub>3</sub> = Pre-test with Econometrics Anxiety Scale (EAS)  
O<sub>4</sub> = Post-test with Econometrics Anxiety Scale (EAS)

### **Population and Sample**

The population for the study consisted of all 420 year three economics students 2018/2019 academic season and a simple random sample of 92 year three students were selected for the study from two faculties in Nasarawa State University, Keffi. The year three economics students at this level were assumed to have acquired some basic concepts, knowledge and skills in econometrics analysis, single-equation (regression models), Normal linear regression model and practical aspects of statistics testing to enable them answer the pretest with Econometrics Achievement Test (EAT) and Econometrics Anxiety Scale (EAC).

Before obtaining the sample size, lottery method of simple random sampling was employed to selected sample size of 92 from two faculties thus: faculty of education 47 economics students and faculty of social science 45 economics students. Serial numbers of the elements on pieces of papers folded and mixed thoroughly before respondents were asked to pick at once without replacement. This technique gave equal opportunity to the respondents thereby reducing the bias effect that may interfere with the validity and reliability of the study. Experimental groups are faculty of education economics students were subjected to the used of authentic assessment package and faculty of social science economics students were subjected to the conventional lecture method.

### **Instrument for Data Collection**

Econometrics Achievement Test (EAT) and Econometrics Anxiety Scale (EAS) were used as the instruments for data collection. The researchers developed the items after the item analysis of the multiple choice questions prepared in the econometrics course given in the second semester of 2018-2019 academic session. According to the item analysis, questions with a degree of discrimination of more than 0.30 were selected in such a way that they would not prejudice the validity of the test. A 40 items multiple choice questions contained in the econometric achievement test and 10 item statements in Econometrics Anxiety Scale were reviewed by year three economics lecturers that were teaching econometrics for content validity.

### **Validity and Reliability of Instrument**

Econometrics Achievement Test (EAT) and Econometrics Anxiety Scale (EAS) were developed and subjected by experts for face and content validity. This was determined through the judgment of four experts, who are knowledgeable in the skills being measured, by checking for appropriateness, comprehensiveness and relevance of the items, clarity of expression and size of print. Three economics lecturers that were teaching econometrics and two experts' in educational measurement and evaluation who are knowledgeable in econometrics Nasarawa state university keffi validated the instruments. Items that did not measure what they ought to measure were deleted or modified, while good items were retained. The experts verified if the items were in line with the content and objectives stated in the curriculum. The consensus of the experts judgment for EAT yielded 0.92 validity index and 0.89 validity index for EAS.

The Kuder-Richardson method was used to determined reliability of the internal consistency of the Econometrics Achievement Test (EAT) for the study. Pilot study was conducted on small portion of the population (20 economics students) who are not part of the sample of this study, result for EAT gave 0.88 reliability index and 0.84 reliability index for EAS was determined using Cronbach Alpha. The reliability results of EAT and EAS were compared with the guidelines for interpreting alpha coefficients suggested (Ugodulunwa & Okolo, [32]) that “ $\alpha \geq 0.9$  excellent,  $\geq 0.8$  good,  $\geq 0.7$  acceptable,  $\geq 0.6$  questionable,  $\geq 0.5$  poor,  $\leq 0.5$  unacceptable”. Therefore, the results of the reliability enabled the researchers to use the instrument for both pretest and posttest, since the correlation was considered high and significant.

### **Procedure for Data Collection**

Two research assistants were trained by the researchers to assist in administering the instruments and lecturing the topics selected for the study. Each of the research assistants was an economics lecture with six years lecturing experience and yet, the researchers monitor their activities. A week training programme was organized with the research assistants. The training programme was to acquaint the research assistants with how to use the components of the formative assessment package with the experimental groups. The following features were addressed during the training: the objectives of the package, topics, contents, duration, lectures' and students' activities, methods and how to use formative assessment techniques, test administration, scoring.

Administration and scoring of tests papers were discussed and research assistants were given the opportunity to demonstrate the use of the packages in teaching before the commencement of the treatment.

The training ensured that the teaching was comparable, applying the same teaching skills with little or no variation in their teaching effectiveness. Items for the tests lasted for one hour fifteen minutes. During the period of testing, the researchers and research assistants ensured that the students were not cheating. Test items was given to the students as a pretest for the purpose of ascertaining the prior knowledge of the students in measurement of building works and tendering for construction before the treatment was given to the experimental groups. Students were required to encircle the correct option out of five alternatives (A, B, C, D, E) provided for each question on the answer sheet. After the time allocated for the test, the scripts were collected marked and scored using a marking scheme. The experimental groups were taught using the formative assessment package using year three Economics students.

The formative assessment package was developed by the researchers, using the year three Economics students curriculum. The components of the package are multiple choice items, contents taught on econometrics analysis, single-equation (regression models), Normal linear regression model and practical aspects of statistics testing; twenty four lessons taught within seven (4 time lessons in every week); weekly formative assessments and feedback which focuses on correction of misconceptions and process error analyses. The daily topic was developed into a lesson plan purposively to achieved aim of the treatment. The multiple choice items were tested using formative assessment during the lessons. Assessments were conducted at the beginning of each lesson, during lesson delivery to observe students 'strengths and weaknesses, and at the end of the lesson assignments were also given for each lesson, weekly; feedback and remediation of process errors encountered during instructions to facilitate teaching and learning.

At the end of the seven weeks of teaching the posttest on EAT was administered to both the experimental and conventional groups. The posttest lasted for one hour, twenty minutes. The pretest and posttest result using EAT was compared to obtain the gain scores of the experimental and conventional groups. Means, standard deviation were used for answering research question and t-test, and analysis of covariance (ANCOVA) using IBM SPSS version 23 were used for testing hypotheses at 0.05 level of significant. The results are presented in below tables.

### III. Results

**Research question one:** What is the perception level of econometrics test anxiety on year three economics students?'

**Table 1: Descriptive Statistics for Students Perception on Econometrics Test Anxiety**

| Statements  | Agree         | Disagree      | Mean        | Std Dev     |
|---|---------------|---------------|-------------|-------------|
| I lose sleep over worrying about econometrics examination.  | 82(89.1%)     | 10(10.9%)     | 3.21        | 1.29        |
| Few minutes to start econometrics test, I find my hands and arms trembling.                                       | 67(72.8%)     | 25(27.2%)     | 2.61        | 1.51        |
| During econometrics test, I find myself sweating in an unusual manner.  | 82(89.1%)     | 10(10.9%)     | 3.21        | 1.29        |
| I sometimes feel my heart beating very fast during econometrics examination.                                      | 87(94.6%)     | 5(5.4%)       | 3.55        | 1.01        |
| After econometrics test, I frequently experience stomach upset and headache.                                      | 72(78.3%)     | 20(21.7%)     | 3.02        | 1.32        |
| During econometrics test, I mostly get so nervous that I forget facts I know.                                     | 65(70.7%)     | 27(29.3%)     | 2.60        | 1.52        |
| I often remember the answers to questions after the test is over.   | 50(54.3%)     | 42(45.7%)     | 2.51        | 1.61        |
| My mind goes blank whenever an econometrics test is announced.  | 80(86.9%)     | 12(13.1%)     | 3.31        | 1.51        |
| Before taking an econometrics examination, I feel confident and relaxed   | 30(32.6%)     | 62(67.4%)     | 1.91        | 2.09        |
| While taking an econometrics test, I find myself wondering whether the other students are doing better than I am. | 74(80.4%)     | 18(19.6%)     | 3.01        | 1.33        |
| I always feel comfortable in econometrics test whenever I study well.   | 58(63.1%)     | 34(36.9%)     | 2.61        | 1.58        |
| <b>Pool results</b>   | <b>73.00%</b> | <b>27.00%</b> | <b>2.86</b> | <b>1.46</b> |

**KEY:** Anxiety Levels: Low=0-42%, Average=43-59%, High=60-100%

Findings from the study in Table 1 reveal students' perception on econometrics text anxiety. Pooled results indicated 73.00% of the respondents agreed while 27.00% disagreed on the statements. 2.86 pooled mean and 1.46 standard deviation. Implication of this finding indicated that there is high level of anxiety on year three students whenever lecturer announced econometrics tests. This may properly happens due to lecturers lecture methodology or students like of interest in the econometrics. The anxiety levels of year three Economics students are presented in the column chart figure 1 below.

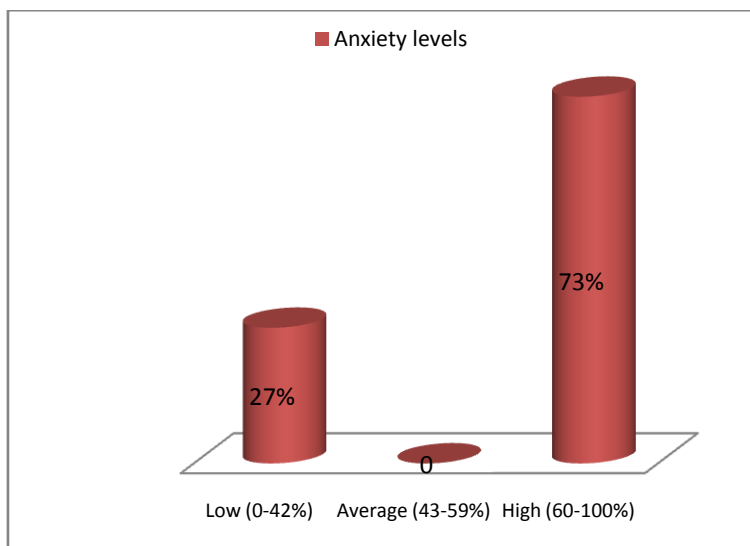


Figure 1: Anxiety Level of Econometrics Students

**Research question two:** What are the mean Econometrics achievement scores of students’ in experimental and conventional lecture groups?

Table 2: Descriptive Statistics for Experimental and Conventional Groups

| Groups       | N  | Minimum | Maximum | Mean     |           | Mean Gain | Std. Dev |           |
|--------------|----|---------|---------|----------|-----------|-----------|----------|-----------|
|              |    |         |         | Pre test | Post test |           | Pre test | Post test |
| Experimental | 47 | 54.00   | 70.00   | 19.4468  | 61.4894   | 42.0426   | 7.28849  | 5.26627   |
| Conventional | 45 | 24.00   | 52.00   | 16.4444  | 41.5111   | 25.0667   | 3.85861  | 5.77070   |

Table 2 shows descriptive statistics for the groups. Experimental group had 42.04 mean achievement gain and conventional groups had 25.06 mean achievements gain respectively. The experimental groups had a high mean achievement gain than the conventional groups as reflected. The implication finding is an indication that formative assessment package has more effects on students’ that were taught econometrics than their counterpart in conventional groups. The pretest, posttest and mean achievement gains for the groups are presented in the column chart figure 2 below.

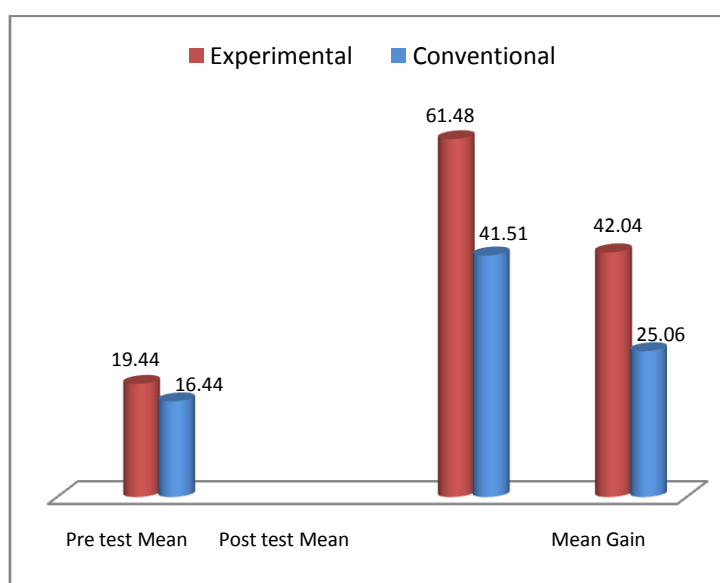


Figure 2: pretest, posttest and mean achievement gains

**Hypotheses**

**Hypothesis one:** There is no significant difference between the post-test Econometrics achievement mean scores in experimental and conventional groups’ students when the moderating effect of pretest is controlled.

**Table 3: ANCOVA Tests of Between-Subjects Effects for Experimental and Conventional Groups**

| Source          | Type III Sum of Squares | Df | Mean Square | F      | Sig. |
|-----------------|-------------------------|----|-------------|--------|------|
| Corrected Model | 565.283 <sup>a</sup>    | 1  | 565.283     | 18.563 | .000 |
| Intercept       | 191.575                 | 1  | 191.575     | 6.291  | .014 |
| Pretest         | 565.283                 | 1  | 565.283     | 18.563 | .000 |
| Error           | 2740.673                | 90 | 30.452      |        |      |
| Total           | 33042.000               | 92 |             |        |      |
| Corrected Total | 3305.957                | 91 |             |        |      |

a. R Squared = .171 (Adjusted R Squared = .162)

ANCOVA result in Table 3 shows that there was a significant difference in the post-test Econometrics achievement mean scores in experimental and conventional groups after controlling for the effect of the pre-test on Econometrics scores (df:1,90=91,F=18.563, p< 0.05.). The Bonferroni post hoc test confirms that the corrected difference between the experimental and conventional groups was significant, (I-J) = 2.64. The Levene’s test of equality of error variances was used to test the difference between subjects’ effects when pretest Econometrics achievement test scores were controlled. This implies that formative assessment enhanced achievement of students in Econometrics.

**Table 4: Result of Independent Samples t-test for Econometrics Students Posttest Scores for two Groups**

|              | Levene's Test for Equality of Variances |      | t-test for Equality of Means Difference |    |                 |           |              |   |           |
|--------------|---|------|---|----|-----------------|-----------|--------------|---|-----------|
|              | F                                       | Sig. | t                                       | df | Sig. (2-tailed) | Mean Diff | S.Error Diff | 95% Confidence Interval of the Difference Lower | Upper     |
| Experiment   | 51                                      | 0.01 | 3.23                                    | 91 | .927            | 34.54000  | 8.66025      | -111.03896                                      | 109.03896 |
| Conventional |   | 0.00 |   |    |                 | 16.0211   |              |   |           |

P < 0.05

Findings from Table 4 reveal experimental groups mean of 34.54 and conventional groups mean of 16.02. (t=3.23, df = 91, p<.05) This reveals that there was a significance difference in the academic achievement of students in experimental groups and their counterpart in conventional groups. The null hypotheses (Ho1) was rejected, hence, there was a significant difference between the post-test Econometrics achievement mean scores in experimental and conventional groups’ students.

**Hypothesis two:** There is no significant difference between pretest and post-test of Econometrics test anxiety mean scores of students in the experimental group.

**Table 5: t-test Analysis of Pretest and Posttest in Econometrics test Anxiety Mean Scores in Experimental Groups.**

|                                   | N  | r*   | Mean  | Std Dev. | df | t   | Sig  |
|-----------------------------------|----|------|-------|----------|----|-----|------|
| Pretest Econometrics Test Scores  | 47 | .536 | 62.73 | 13.22    | 46 | 7.1 | .000 |
| Posttest Econometrics Test Scores | 47 | .716 | 41.43 | 5.35     |    |     |      |

P < 0.05

The paired samples correlations t-test analysis in Table 5 reveals that there is a significant difference between pretest and post-test of Econometrics test anxiety mean scores of the experimental group (pretest M = 62.73; SD = 13.22) and their posttest mean score (posttest M = 41.43; SD = 5.35, df=46) at alpha level, p<.05 .The null hypothesis is, therefore, rejected. This implies that econometrics pretest score was significantly higher than their mean score on the posttest. Hence, formative assessment package effectiveness improves academic achievement and reduces students’ test anxiety scores from high to the moderate level in econometrics after the treatment.

**Hypothesis three:** There is no significant difference between the pretest and post-test Econometrics achievement mean scores of students in the conventional group.

**Table 6: t-test Analysis of Pretest and Posttest in Econometrics test Anxiety Mean Scores in Conventional Groups**

|                                   | N  | r*    | Mean  | Std Dev. | df | t    | Sig  |
|-----------------------------------|----|-------|-------|----------|----|------|------|
| Pretest Econometrics Test Scores  | 45 | 1.506 | 63.73 | 7.22     | 44 | 0.15 | .062 |
| Posttest Econometrics Test Scores | 45 | 1.516 | 63.77 | 7.29     |    |      |      |

$P > 0.05$

The paired samples correlations t-test analysis in Table 6 reveals that there is no significant difference between the pretest and post-test Econometrics achievement mean scores of students in the conventional group. (Pretest  $M = 63.73$ ;  $SD = 7.22$ ) and their closely related posttest mean score (posttest  $M = 63.77$ ;  $SD = 7.29$ ) at alpha level,  $p > .05$ . The null hypothesis is, therefore, retained. The implication of these findings shows that there was no reduction in the anxiety levels of students in conventional group at end of exposure to the conventional method of teaching econometrics.

#### IV. Discussion

Findings from the study in Table 1 reveal students' perception on econometrics text anxiety. The Econometrics anxiety scale that was used to measure students' level of anxiety by their pooled results indicated high level of econometrics text anxiety. Implication of this finding indicated that there is high level of anxiety on year three students whenever lecturer announced econometrics tests/exams. This may properly happens due to lecturers lecture methodology or students like of interest in the econometrics among the year three students in Nasarawa State University, Keffi. This corroborated with earlier findings (Biggs & Tangs [18]) that conventional or traditional assessments focusing on the written or oral examination of knowledge can be effective in assessing the student's ability to memorize and redefine the knowledge-based components of the task, however, they are insufficient to measure learning and skills unless traditional assessments are integrated with performance-based assessments, such as formative assessment, to reflect the achievement of expected standards. The higher level of students' anxiety, the poorer will their academic achievement. This is in agreement with the findings of Ugodulunwa & Okolo, [13] that the results are lack of interest, fear and mathematics test anxiety leading to students' poor academic performance.

Furthermore, Table 2 shows descriptive statistics for the groups. Experimental group had high mean achievement gain than their counterpart in conventional group. The implication of finding is an indication that formative assessment package has more effects on students' that were taught econometrics than their counterpart who were exposed to conventional lecture method. Drawing inferences from the hypothesis testing, ANCOVA result in Table 3 shows that there was a significant difference in the post-test Econometrics achievement mean scores in experimental and conventional groups after controlling for the effect of the pre-test on Econometrics scores. The Bonferroni post hoc test confirms that the corrected difference between the experimental and conventional groups was significant. The Levene's test of equality of error variances was used to test the difference between subjects' effects when pretest Econometrics achievement test scores were controlled. Findings from Table 4 reveal that there was a significance difference in the academic achievement of students in experimental groups and their counterpart in conventional groups. The null hypotheses ( $H_0$ ) was rejected, hence, there was a significant difference between the post-test Econometrics achievement mean scores in experimental and conventional groups' students. This findings is in agreement with the earlier findings of Abdullahi [24], Ozan & Kincal [26] that application of formative assessment was notably positive. In addition to providing feedback to the students, they analyze the information, comment on it, and use it to inspect and organize teaching. This implies that formative assessment enhanced achievement of students in Econometrics.

Finally, the paired samples correlations t-test analysis in Table 5 reveals that there is a significant difference between pretest and post-test of Econometrics test anxiety mean scores of the experimental group and their posttest mean score. The null hypothesis is, therefore, rejected. This implies that econometrics pretest score was significantly higher than their mean score on the posttest. Hence, formative assessment package effectiveness improves academic achievement and reduces students' test anxiety scores from high to the minimal/moderate level in econometrics after the treatment. The paired samples correlations t-test analysis in Table 6 reveals that there is no significant difference between the pretest and post-test Econometrics achievement mean scores of students in the conventional group and their closely related posttest mean score. The null hypothesis is, therefore, retained. The implication of these findings shows that there was no reduction in the anxiety levels of students in conventional group at end of exposure to the conventional method of teaching econometrics. This is in agreement with the findings of Ugodulunwa & Okolo [26] findings revealed that formative assessment reduced anxiety level and improved mathematics performance of the students. They not only participate in learning and teaching activities, but also use assessment information to identify goals, make decisions about their own development, and develop an understanding of how qualified a work will be (Berry, [27]). It was observed from the previous studies, formative assessment has a positive impact on many



student behaviors, especially with regard to learning outcomes. In literature, formative assessment is ranked at the top of the list in studies comparing many teaching strategies, methods, and techniques in terms of the degree of impact on students' academic achievement. The lessons within the formative assessment package is learner-centred and designed in such a way that teachers will teach to foster deductive learning and also help to reduce anxiety level in students and improve performance in econometrics. Research has suggested that formative assessment could improve both learning and examination results and also reduces test anxiety (Ajogbeje & Alonge [28]). They reported that students who are systematically taught using formative assessment perform better than those who are taught using conventional lecture methods.

## V. Conclusion

This study was design to establish the effectiveness of formative assessment as an approach to minimize econometrics test anxiety level of year three students and improve the academic achievement. This will go a long way to resolve the challenges confronting student in econometrics as a course in Economics for undergraduates. The findings of the study has shown that formative assessment could be used to minimize Econometric test anxiety to a tolerant level so as to enhance academic achievement of year three students in the University. Nonetheless the findings have implications for lecturers' who are teaching Econometrics in the department of Economics, need to be trained and re-trained to acquire knowledge in education to apply the use of formative assessment would making the teaching and learning of econometrics more interesting and gratifying. This will go a long way in meeting the learning needs of students in econometrics and resolving the challenges that warrant year three students failure in Econometrics.

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### **Authors Biography:**

#### **Biography:**



Salihu Abdullahi Galle (Ph.D)

Position: Assistant Lecturer.

Since joining the University in 2018, Galle has been involving in expanding the horizon of knowledge through teaching, research and articles on contemporary issues bothering quality education. Galle is a member of the professional bodies: TRCN, ASSEREN, United Nations-Africa on IPSDGs etc.

#### **Contact Information:**

Faculty of Education,  
Nasarawa State University Keffi, Nigeria, West Africa  
No 18, AngwanAffi street, Akwanga  
Nasarawa State, Nigeria, West Africa.

#### **Biography:**



Prof. Iaac J. Kukwi

Since joining the University in 2002, Kukwi has been involving in expanding the horizon of knowledge through teaching, research and articles on contemporary issues bothering quality education.

#### **Contact Information:**

Faculty of Education,  
Nasarawa State University Keffi, Nigeria,

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