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APPRAISAL OF ACTIVE LEARNING STRATEGIES FOR TEACHING ECONOMETRICS TO ECONOMICS EDUCATION STUDENTS IN NIGERIAN UNIVERSITIES

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Abstract

Econometrics is a field of economics that lays emphasis on measuring relationships between economic variables by way of integrating economic theories, mathematical models and statistical tools. Econometrics is taught as a compulsory course to economics education students in most Universities. The aim of this study was to provide an appraisal of selected active learning strategies required for teaching econometrics to economics education students in Nigerian Universities. Qualitative research methodology was employed in the conduct of this study, while objectives were formulated and used as guide for literature review. The findings established that econometrics is taught to economics education students because the knowledge of econometrics helps in developing students' scientific and analytical skills, it provides students with statistical tools for testing the validity of economic theories, and enhances students understanding of the nature of economic relationships and the basis for public policy decisions. Furthermore, the study established that project-based, problem-based, experiential and Felder-Selman's learning are active learning strategies required for effective teaching of econometrics to students of economics education. However, poor teacher quality, students' knowledge of mathematics, absence of econometric laboratories and multi-media devices as well as econometrics software applications were identified as the major challenges to the use of active learning strategies in econometrics classes. The study concluded that active learning strategies should be employ in teaching econometrics to economics education students in Nigerian Universities. The study recommended among others that econometrics lectures should be student-centred, only qualified students should be admitted to study economics education and there is need for the provision of well equipped and functional econometrics laboratories and qualified econometrics lecturers in faculties or schools of education in universities that offer economics education.

Keywords:Active Learning Strategies, Econometrics, Economics Education, Nigerian Universities

Introduction

Learning is what students or learners are exposed to with the aim of changing their behaviours. Learning strategies are important factors in measuring learning outcomes. Therefore, every subject serves as a guide to both teachers who are the facilitators of learning and the students who are the target beneficiaries to choice amongst alternatives the most appropriate strategies that leads to meaningful learning. Thus, to achieve this educational goal, active learning strategies have been adjudged the most appropriate methods because when use, students are often made the focused of the learning process. This implies that effective learning of econometrics will require greater emphasis on active learning. This agreed with the view of Nguyen and Tirmrchi (2010) who rightly asserted that the skill of economic analysis had to be learned actively through exercises and problems

Econometrics is one of the courses economics students in Nigerian universities are expected to take as a prerequisite condition for their certification. Econometrics requires students to have adequate knowledge and understanding of economic theories, mathematical modeling skills and statistical ability to enable them represents, analyzes and interprets the relationship between variables (Johnson, Perry, & Petkus, 2012). The basic knowledge of econometrics will enable economics education students to understand public policy and how changes in such policies ultimately affect their own lives and the society. This is so because econometrics provides students with analytical skills that will enable them connect economic theories with real world economic challenges. Therefore, when these analytic skills are develop or acquired students will be able to model economic relationships, estimate them and predict future effects of changes in the variables and their implications on public policy. Many students and stakeholders have questioned the rationales for the teaching of econometrics to students studying economics education in Nigerian universities. Those who hold this view argued that econometrics should be made optional to students of economics education. Those who support the teaching of the course to economics education students maintained that when such students graduated and are suddenly employed as economics lecturers in the university system, they knowledge of econometrics acquired will enhance their efficiency and their ability to deliver in the classroom.

Economics educations students should be taught how economic theories can be model and incorporated into existing economics curricula to enable them learn on their own. According to Angrist and Pischke (2017), a modern undergraduate econometrics course should introduce students to linear regression, randomized experiments, and quasi-experimental method and other ways of estimating causal effects. This therefore implies that for quality teaching of econometrics to economics education students, the lecturer should not use strategies that make the teacher a reservoir of knowledge or skills to be learned by students are seen as passive followers. This is critical because econometrics is a quantitative subject; hence students are not only expected to know its

theories by mere reading them in text or presented to them by their teachers or lecturers, it involves practical classes, since modeling, estimation and diagnostic tests are critical in analyzing the relationship between variables and when testing the validity of others of economic theories. The students should be giving the opportunity to discover their knowledge while the lecturer plays the role of a facilitator in the entire process.

Although it is reported that the 'chalk and talk' strategy is by far, the most favoured form of instruction in undergraduate economics classes. Myers, Nelson and Stratton (2011) reported in a survey conducted on the assessment of the undergraduate economics major: a national survey that more instructors did use performance in games, simulations, and classroom experiments for grading purposes, given the rising popularity of experimental economics during this period both as a research field and as a teaching method. Empirical studies on learning strategies have yielded controversial results. The studies of (Mohammed, Heong & Kiong (2017; Ling, Basit & Hassan, 2017) revealed that visual learning strategies and sequential learning styles significantly affect students' achievement. These studies however, were not focused to the teaching of econometrics to economics education students in Nigerian Universities. Furthermore, while the most of the scholars used quantitative research methodology, this study employed the qualitative approach.

Objectives of the Study

The study focused on active learning strategies for teaching econometrics to economics education students in Nigerian universities. Specifically, the study sought to achieve the following objectives:

i. find out the rationales for teaching econometrics to economics education students in Nigerian Universities
ii. identify the active learning strategies required for teaching econometrics to economics education students in Nigerian Universities
iii. To identify the challenges to effective application of active learning strategies in teaching econometrics to economics education in Nigerian Universities

Conceptual Underpinnings:
Concept of Active Learning Strategies

Active learning strategies are method in which a subject or course can be made more interesting to students with different learning abilities. As the concepts suggests, active learning strategies are participatory or activity-based learning ways in which teachers or lecturers can be use in teaching econometrics to students for better understanding and retention. Nguyen and Tirmarchi (2010) argued that while there is

no precise definition of active learning, the strategies require students to go beyond the first phase of acquisition of raw information like lectures and texts to engaging students in higher-order thinking tasks such as analysis, synthesis, and evaluation. According to Van den Broek (2012), active learning strategies emphasizes communities of learners as a teaching model that stresses student-centered, and inquiry-based instruction oriented toward the development of higher- order thinking and understanding among students by means of complex tasks. Active learning strategies lay emphasize on case-based learning that is useful in solving new problems which need detailed and thorough analysis of goal achievement.

Active learning methods are primarily used in classrooms to evaluate students' understanding of material by giving them opportunities to apply knowledge and skills acquired new methods and concepts. These strategies include problem-based, project-based, experiential and invention learning strategies among others that promote active participation of the learning in the discovery of knowledge. Active learning strategy for teaching econometrics can take the form of invention or problem learning strategies where learners are provided with the problem and the steps to follow, while the teachers facilitates the learning process. In this case, the first thing to be done for meaningful learning of the curriculum content is to present the problem and allows students to provide answers to the problem to enhance their ability to recall, integrate or apply the knowledge or skill acquired. This implies that by attempting to solve the problems themselves, students develop knowledge structures that can be called upon when learning related new materials and tasks.

By and large, the concept of active learning suggests that learning is not a spectator sport because students do not learn much just sitting in classes listening to teachers, memorizing pre-packaged assignments and spitting out answers. Rather, they must be provided with an opportunity to talk about what they are learning, write about it, relate it to past experiences, and apply it to their daily lives, these attributes of active learning will help students to make what they learn a part of themselves. This is important because in getting started, students need help in assessing existing knowledge and competence, and in their classes also, students need frequent opportunities to perform and receive suggestions for improvement. At various points during classes, and at the end, students need chances to reflect on what they have learned, what they still need to know, and how to assess themselves. These tenets can only be developed in a learning environment where passive learning is substituted with active learning. In practical terms therefore, active learning means that students must do more than just attending lectures, take verbatim notes, read assigned texts, and work on suggested sample questions. The goal of active learning is for the students or learners to be able to transform the raw information from course materials into a coherent body of acquired knowledge that can be used in new or different situations such as work, subsequent courses, and experience outside the classroom.

Concept of Economics Education

Economics education as a field of study encompasses the what, how and why of the teaching of economics in relation to the content, teaching methods and assessment techniques. The concept economics education covers the content to be taught, methods of teaching and evaluation of those methods, and information of general interest to teachers of economics. Economics education can also be seen as the process of acquiring the needed economic skills and knowledge that will enhance the teaching of the theories, principles, laws, assumptions and techniques of economics to prospective economics educators. Nguyen and Tirmarchi (2010) defined economic education as a new research field that uses economic methodology and quantitative methods to address issues of interest to the teaching and learning of economics. It is a formal way of train-the-teacher opportunity geared towards making prospective teachers and lecturers of economics acquire basic knowledge that will enable economics students provide answers to the what, why and how of economics problems confronting man and the society.

Van Wyk (2015) noted that economic education focuses on the scholarship of teaching and learning economics as a subject. This suggests that the aim of economic education is to create responsible citizens and effective decision makers since it develops in individuals' rational thinking mindset that will enable them view themselves as integral parts of the wider society. Therefore, understanding this world requires education in basic econometric concepts and their application to a multitude of economic issues. This is so because as students learn related areas such as econometrics, students' economic attitudes and opinions take shape and influence their thoughts and actions over a lifetime, especially when face with real life problems that require such skills or knowledge. Ede, Oleabhiele and Modebelu (2016) viewed economics of education as an aspect of economics that is concerned with equipping individuals with the appropriate knowledge and skills needed to understand and tackle economic problems of the society. Economic education is a very crucial subject that many universities in Nigeria tend to overlook. The importance of economic education goes far beyond the goal of improving an understanding of the basic principles of supply and demand and the workings of the economy.

Econometrics for Economics Education Students

Econometrics is a science or field of study that deals with the measurement of economic relationships or relationship between variables using quantitative techniques. Economics students in Nigerian universities are taught two major branches of econometrics, namely theoretical and applied econometrics. The theoretical econometrics includes the development of appropriate methods for the measurement of economic relationships which are not meant for controlled experiments conducted

inside the laboratories (Stocks & Watson, 2015). The applied econometrics involves the application of the tools of econometric theory in the analysis of economic phenomenon and forecasting economic behaviour. Therefore, the application of econometric methods to specific branches of economic theory and problems like demand, supply, production, investment and consumption that goes beyond mere theories is strictly within the confines of applied econometrics. As a field of study, econometrics deals with the integration of economics, mathematical economics and statistics with the main objective of estimating the numerical values of the parameters representing economic relationships.

The relevance of economic theories in the study of econometrics is that such theories provide the basis for modeling behaviours and relationships mathematically which is an important feature of invention learning. Econometrics knowledge therefore is important because its results to invention learning or activities that prepare students higher thinking experiences or learning which is absent when conventional strategies are employ. In other words, while theories in economics can be presented as narratives or verbal statements to economics students, their functional form requires the application of mathematical and statistical techniques. When economics theories have been modeled mathematically, econometrics methods are then used to obtain the values or estimates of the parameters which essentially are the coefficients of the mathematical form of the economic relationships. This is important because the mathematical expression of the relationship shows the exact form of the relationship, but in real life situation, it is not possible due to some errors often referred to as in econometrics as stochastic disturbance terms. The interesting thing about econometrics is that it requires students to devoid enough time to learn its basic principles and assumptions that guides every analysis of economic relationship, and also provides studies with diverse modeling relationships.

Econometrics knowledge will enable students develop their perceptions of their economic world at an early age, which, as they progress through the educational process, develop into attitudes and opinions about the subject of economics. This implies that econometrics is an important field of economics that contributes in developing students analytical and research skills. Allgood and Bayer (2016) opined that econometrics it is important in improving students'ability to use quantitative approaches to economics and their ability to think critically about economic methods and their application. Econometrics lecturers in Nigeria universities, especially those teaching students of economics in faculties of education need to know the nature of the relationship between students' attitudes towards the course and learning strategies that can enhance students understanding of econometrics. Therefore, because of its relevance and the assumption that it is a difficult course, the teaching of econometrics in universities has shifted from a predominantly academic approach where the lecturer

or teacher is considered as reservoir of knowledge or skills to be learn by learners, toward active learning methods that lay more emphasis on teaching that meets the needs of students in their current and future lives.

Active Learning Strategies for Teaching Econometrics to Economics Education Students

Some selected active learning strategies considered relevant for the teaching of econometrics to students of economics education in Nigerian universities include the: **p**roject-based learning, experiential learning, problem-based, invention activity and felder-silverman's learning Strategies among others.

The project-based learning is a teaching method in education that helps students developed many skills. It is a modern form of teaching, starting with specific considerations on a theme and aims to achieve a goal through collaboration between the students and their active participation, focusing on the participation, rather than the final result (Brinia, 2016). This strategy supports and encourages the cooperation and multi-sensory approach in learning. Since this is a cooperative approach, it offers the chance to the students to take part in the management and implementation of "complex work plans, thus developing, critical thinking and collaborative skills", through social interaction between the classmates, the teacher and the broader social environment. It is widely used in many institutions, as it tries to integrate the knowledge of the students from different fields for finding a solution of a problem, and apply the acquired knowledge in practice.

Project-based learning involves the use of a wide range of problem, research, and research methods, to be focused on the real life situation. It is a significant practical unit of activity having educational value and aimed at one or more definite goals of understanding, involves investigating and finding a solution of a problem. This system allows students to gain knowledge, presentation skills and creating an environment for team building. Klein (2013) argued for embedding a research project into an econometrics course to give students experience using empirical tools, but it is also important that students gain a deep conceptual understanding of the tools such that they can recognize when and how each should and should not be applied. This teaching method provides a means for students' to gain awareness and understanding of their chosen subject thereby gaining skills needed and improved their conceptual view and understanding of field.

Experiential learning is a learning strategy in which educators purposefully engage with students in direct experience and focused reflection in order to increase knowledge, develop skills, and clarifies values. Unlike traditional classroom situations where students may have to compete or may have to remain uninvolved or unmotivated and where the teaching is more highly structured, students in experiential learning situations have the chance to cooperate and learn from one another in a more semi-

structured approach. This implies that using this strategy, teaching is designed to engage students with direct experiences which are closely tied to real world problems and real life situations. The teacher is more like a facilitator rather than a director of student progress. Davis (2011) pointed out that the focus of experiential learning is placed on the process of learning and not on the product of the teacher. The argument is that with experiential learning students are going to be more motivated to learn when they have a personal experience regarding the subject rather than being assigned to study and review a topic or read a chapter in a textbook. Experiential learning process comprised four basic building blocks: concrete experience, observations and reflections on that experience, formation of abstract concepts and generalizations, and finally testing implications of concepts in new situations (Kolb & Kolb, 2009b). In experiential learning, the phases of experiencing or doing, reflection and applying must be present and it is these stages of reflection and application that make experiential learning different and more powerful than other models commonly referred to as "learn-by-doing" or "hands-on learning''.

Problem-based instruction is intended to engage students in a set of student-driven investigations of the analytic challenges presented by the complex case studies at the center of the curriculum. In problem-solving learning, classroom activities, classroom management, and the balance between student-led and teacher-led instruction are intended to reinforce the pedagogical strategies provided to teachers during their professional development. This method helps the students to recognize the problems. The problems should be selected by the students themselves or imitated or identified by the teacher as objects to study. The teacher also helps students to clarify language, improve logic, become aware of ways of being more objective and understanding the subject matter and communicate more effectively with one another. The role of the teacher is reflective as he or she helps the students to understand themselves and present it more effectively in their own way.

The problem-based learning aims at as producing graduates who are creative, can think critically and analytically, and are able to solve problems with the teacher acting as a counsel or rather than an instructor. Problem-based learning, also known as problem solving learning helps students to develop critical skills such as the ability to think critically, analyze and solve complex and real world problems. The strategy also helps students to find, evaluate, and use appropriate learning resources; to work cooperatively in teams and small groups; to demonstrate effective verbal and written communication skills thereby helping them to use content knowledge and intellectual skills to become continual learners. Therefore, to ensure meaningful learning of econometrics, the economic problem should be identified by the teacher while students should be provided with the needed environment to learn or provide the solution through active participation

Invention activity learning focuses on providing students of econometrics with much more difficult problem in the subject in form of an activity or task that will force them to think outside the box because they have not been exposed to such a problem before. This agreed with the view of McGoldrick (2008) that students should not only be able to think like economists when they finish their undergraduate economics degree, they should also be able to act like economists and use the theoretical and econometric tools they have learned to solve real world problems. According to Taylor, Smith, van Stolk and Spiegelman (2010), an invention activity or learning is a teaching technique that involves giving students a difficult substantive problem that cannot be readily solved with any methods they have already learned. These activities help students to discover their own knowledge thereby prepares them to learn the expert's solution better than starting with a lecture on that solution.

Therefore, improving students' ability to apply methods they learn to new problems is particularly important in econometrics given the skills teachers want their students to learn. To make this learning strategy effective, the goal of the activity should be clear, and students should be given several cases with different characteristics and ask to evaluate their solution.. Douglas and George (2019) contended that the beauty of an invention activity is that students are not required to solve the problem completely to benefit from the experience. Instructors gently nudge them toward a good solution solely by pointing out interesting features and potential shortcomings of their work.

Felder-Silverman's learning strategy has four dimension namely, sensing or intuitive, visual or verbal, active or reflective and sequential or global. Sensing or intuitive learners are perception learners where students use perception learning to solve problems, and their tolerance for factual learning. These learners are students that prefer perceiving information through sights, sounds and physical sensations. Intuitive learners prefer to perceive information through memories, ideas and insights; they dislike repetition, routine and memorization of facts because they are innovative and are better at grasping new concepts. Visual or verbal learners are input learners whose ability to retain information is influenced by the way the information is presented. These learners prefer more visual modes of information intake using charts, diagrams, pictures, graphs and demonstrations, while verbal learners appreciate more verbal explanations such as written and spoken words and formulae. Willingham (2009) maintained that visual media make concepts more accessible to a person than text alone because they promote deep learning rather than rote learning, and help in recalling. Econometrics can be made more learners-friendly via this method, especially when students are required to use their manipulative skills in an econometric laboratory to solve problems using computer and software packages like econometric views, Statistical Package for Social Sciences (SPSS), STATA, AMOS, etc.

Active or reflective learners are processing learners that prefer being actively engaged in solving the problem through group discussions and practical application of

concept that have been learned. Reflective learners prefer introspective learning because they like to think over concepts taught before indulging in any practical application. Sequential or global learners are understanding learners that learn in a logical progression of small incremental steps. These groups of learners establish logical connections from one piece of information to another. Econometrics is logical in its analysis of the relationship between economic variables, hence exposing economics education students to logical learning skills will make them active learners in the teaching learning process.

Challenges to the application of Active Learning Strategies in Teaching Econometrics

Excellent and effective teaching demands a host of devices, techniques, and strategies not only to achieve cross critical outcomes, but because variety, itself, is a desideratum. The challenges to effective teaching of econometrics to students studying economics education in Universities in Nigeria are multi-faceted. One of the current problems with econometrics is the strategies teachers use to teach the subject. The majority of teachers are stuck on traditional methods that have been in practice for many decades event in this era of globalization; as a result, many students that take econometrics get very bored and uninterested in the material taught because of these outdated teaching methods. According to Joshi and Marri (2006),a specific example would be the chalk-and-talk method, which is defined as a traditional method of education in which the teacher addresses the students and uses the chalkboard to provide examples or illustrations. In such as cases, economics education students who had no knowledge of econometrics or are poor in mathematics are left in the dark because they are made passive listeners and consumers of knowledge. This implies that if econometrics teachers are able to use active learning strategies in the econometric topics they teach, their students would be able to comprehend the information better.

The quantitative nature of econometrics suggests that learners knowledge of mathematics is a necessary but not a sufficient condition for active learning. Sadly, mathematics is often seen as a subject for the gifted students in secondary schools and when such graduate got admitted to study economics related field in universities, they tend to perform purely because of their deficiency in basic principles of mathematics. Most economics education students prior to being admitted to study the course have no adequate knowledge of the courses as most percentage of them assumed economics is all about demand and supply and a little bit of statistics. Thus, when face with realities of econometrics which is considered a prerequisite for their certification, active learning is made difficult. Additionally, most lecture halls used for teaching and demonstrations of mathematical and graphical constructions are overcrowded due to infrastructural deficit considered a ‘‘new normal’’ in Nigerian universities. Nguyen (2010) rightly observed that the situation made it more difficult for students to initiate

and maintain student-instructor interaction in large classes. As a result, students are left to fend for themselves from the beginning to the end because the role of the instructor is practically reduced to giving mass lectures for a number of days weekly.

Econometrics is a subject that cannot be effectively learn in a normal lecture halls, using the conventional instructional materials like charts, graphs and the likes only; it involves the application of practical or manipulative skills. Economics departments are therefore required to have well equipped and functional econometrics laboratories. Unfortunately, most universities that offer economics and economics educations as fields of studies do not have these facilities, and where they are available, they are domicile in the departments of economics; students of economics education in such institutions go there to take their practical lectures, regardless of whether there are enough classes or not. With this challenge, econometrics learning is limited to the learning of theories, derivations and assumptions that cannot be econometrically validated by students because laboratories for doing so are not available.

According to Mateer (2011) using media engages students, aids student retention of knowledge, motivates interest in the subject matter, and illustrates the relevance of many concepts. Regrettably, projectors, computer, laptops, printers and software applications are needed for economics education students to effectively learn econometrics. Hall and Lawson 2008) reported that research shows that the use of multimedia can stimulate discussion in introductory classes, illustrate basic concepts and explain abstract concepts like game theory at an advanced level. Yet, these materials are lacking, and where they exist, they are not put to use by teachers who themselves where not taught how to apply them in the classroom setting and have not made efforts to learn their applications.

Attitudes of teachers can also serve as motivating or de-motivating factor in the learning of econometrics. Econometrics can be made interesting and captivating if the environment is hospitable because hospitality teaching entails the ability of the facilitator of learning process to create learning environment that is accommodating to all students for meaningful learning. However, the challenge in some universities is that econometrics most lecturers do not apply hospitality teaching principles in teaching or facilitating learning, especially when asked to teach classes that comprises of both economics major and economics education students. It is quite unfortunate that in such arrangements, economics education students are treated as outcast and as inferior students to those that majored in economics. The assumption is that nothing good can come from economics education students as far as the teaching and learning of econometrics is concern. Therefore, when teachers segregate or labeled students, the learning environment becomes boring thereby limiting the quantity and quality of knowledge and skills that such students can acquire because there is no way they will be active when the needed environment has been provided by the teachers.

The learning of econometrics also is challenged by the mode of admission of students of economics education in universities. Many have argued that some students

admitted into degree courses in economics education in Nigerian Universities have very limited knowledge of economics theory that is seen as the core of econometric modeling. There are instance where students that read courses like business education and accounting have been admitted to study economics education. Closely link to this problem also, is the involvement of non-professionals as supervisors' of economics education students' research projects and dissertations even when it is clear that most of them lack the basic knowledge of econometrics which is important in data analysis.

Conclusion

Econometrics is considered an important course for economics education students because it enables students to develop scientific and analytic skills that can help them test the validity of economic theories, and broadening their understanding of economic relationships and public policy decisions. Therefore active learning strategies such as project-based, problem-based and experiential learning that put the learner at the centre of the teaching learning process have been identified as strategies for meaningful teaching econometrics to students of economics education in Nigerian universities. The study also established that the major constraints to application of active learning strategies in the teaching of econometrics include poor teacher quality, students' prior knowledge of mathematics and absence of econometric laboratories and software applications among others. The study therefore concluded active learning strategies should be employ in teaching econometrics to economics education students in universities in Nigeria.

Recommendations

Based on the research findings and the conclusions drawn, the following have been recommended:

i. Econometrics lecturers teaching economics education students should employ student-centred learning strategy that make students active learners in the teaching learning process
ii. The Management of Nigerian universities should ensure only quality students are admitted to study economics education
iii. Universities should ensure that only qualified lecturers are employed to teach econometrics to economics education students
iv. Government should provide relevant instructional materials, well equipped and functional econometrics laboratories for active learning of econometrics by students of economics education in Nigerian Universities.

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