

## Comparative Effects of Problem-Based and Cooperative Instructional Approaches on Students' Academic Achievement in Senior High School Economics

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### **Abstract**

*It appears the pedagogy of teacher education in Ghana creates a certain mindset about teaching that legitimizes the behaviourist instructional approach. Observations in the Economics classrooms in Ghana reveal a predominantly teacher-centred transmission model of instruction. This study, therefore, investigated the comparative effects of two constructivist instructional approaches (problem-based and cooperative learning) and one behaviourist or conventional lecture method. The quasi-experimental research design was employed for the study. One self-designed instrument, namely Test of Economic Understanding (TEU) for a pre-test was used, and a reliability index of 0.81 was obtained. The study sample comprised 377 Senior High School (SHS) students. The data were analyzed using mean, t-test and Analysis of Covariance (ANCOVA). The findings of the study showed that the mean achievement score of the Economics students increased by 16.25 after the treatment was applied to the various groups. The study also showed a significant main effect of treatment on students' achievement in Economics ( $F_{2, 222} = 16.261$ ;  $p < 0.05$ ). The study further revealed a significant main effect of gender on students' achievement in Economics ( $F_{2, 222} = 16.188$ ;  $p < 0.05$ ). However, the two-way interaction effect of treatment and gender ( $F_{2, 222} = 1.220$ ;  $p > 0.05$ ) as well as the interaction effect of treatment and age ( $F_{2, 222} = 0.753$ ;  $p > 0.05$ ) did not have any significant effect on students' achievement in Economics. The study recommended the training and retraining of Economics teacher on the use of problem-based learning and cooperative learning instructional approaches. The study also recommended the use of female role models with Economics background to whip up the interest of female students in the subject.*

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**Key Words:** Economics, problem-based, cooperative learning, quasi-experimental, instructional, Ghana.

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### **Introduction**

There are two main instructional practices found in the Ghanaian education system. One is the long-prevalent practice termed the transmission model of instruction. In this model, students are introduced to content through discussion, exposition, lectures, presentations and reading, and they are expected to absorb the transmitted knowledge in ready-to-use form. Although it is not a model of learning *per se*, the transmission model does make a pivotal assumption about learning which is that the message the students receive is the message the teacher intended. Within this model, students' difficulties in grasping a concept are interpreted as indicators that the presentation was not clear or forceful enough to be understood or that the student was not able or prepared to understand the information (Seimears, Graves, Schroyer, & Staver, 2012). There are several reasons why the transmission model is frequently being used in our classrooms. Prominent among these reasons is the fact that for most of the teachers, this instructional method was the only type

they were taught while under training. Not only does this model lack theoretical justification, but also there is compelling evidence that it is not the most efficient or effective model of instructional practice in Economics education.

The second major instructional practice is what has become known as the constructivist model of learning, constructivist epistemology, or at best constructivism (Mestre, 1991). This model expresses the need for learners to actively construct knowledge. The construction of knowledge is a lifelong process and at any time, the bodies of knowledge individuals have constructed enable them to interpret or predict events and phenomenon in their experiential worlds (Seimears *et al*, 2012). Advocates of constructivism claim that students are not sponges ready to absorb and use transmitted knowledge; the knowledge already written on their mental plates affects how they accommodate newly constructed knowledge. At the heart of constructivism is the idea that learning is neither passive nor a copying process. It is a process of active participation or learning (Lew, 2010).

Active learning “involves providing opportunities for students to meaningfully talk and listen, write, read, and reflect on the content, ideas, issues, and concerns of an academic subject” (Meyers & Jones, 1993, p.1). In much the same way, Bonwell (1992) is of the opinion that “learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing prepackaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate to past experiences, and apply it to their daily lives. They must make what they learn part of themselves” (Bonwell, 1992, p. 1).

Again, constructivist philosophy suggests that learning occurs best when students use past experiences, and or personalised constructs to internalise and expand upon their knowledge (Wright, 2008). Instructional approaches that are in tune with the constructivist model of teaching include problem-based learning, discovery learning, case studies, role-play, cooperative learning, and field studies among others. The core aspect of constructivism can be summarized in just one sentence: It is student-centered, emphasising students’ active exploration, discovery on knowledge, and active construction on the meaning of knowledge, rather than traditional teaching, which only transfers knowledge from teachers’ minds to students’ notebooks (Huali, n. d.).

There is no clear consensus on which particular teaching method is best used in classrooms. The selection of an appropriate method to teach a particular subject depends on many factors including students’ age, ability, level of development, the nature of the content, lesson objectives, resources, class time and the physical setting in which the lesson will take place (Abdulla, 2006). It is however believed that a thorough knowledge of a number of different methods of teaching could lead to greater teacher flexibility and efficiency. Therefore, the teachers’ ability to make use of different approaches is considered as a practice that can enrich his repertoire of teaching skills (Jin-Ping & Collins, 1995). In support of using different instructional approaches, Joyce, Weil and Calhoun (2004) argue that teachers should not only be knowledgeable in the subjects they teach, but should be committed to variations in their instructional approaches so as to cater for the diverse learning needs of students. Teaching methods and curriculum materials ought to be diverse (Reid, 2005) because one method of teaching may not suit all types of learning (McGee & Penlington, 2001; Westwood, 2006) due to the fact that students learn in different ways and at different rates. By logical implication, diverse techniques are required to achieve different learning objectives.

Cooperative learning is a teaching approach where students work in small groups to help one another learn academic material. In the groups, students are expected to help each other find answers to questions, rather than seeking answers from the instructor (Yamarik, 2007). Cooperative learning is not synonymous to collaborative learning as some would want to believe. In cooperative learning the instructor sets the task and has the students work in groups towards the “correct” answer. In collaborative learning however, knowledge is not set by the instructor but rather is acquired through consensus among students and the teacher (Barkley, Cross, & Major, 2005). Basic ‘ingredients’ of groups in a cooperative learning model include positive interdependence, promotion of individual and group learning, individual accountability for learning, use of interpersonal social skills, and review and consideration of group activities (Johnson & Johnson, 1991; Johnson, Johnson, & Smith, 1991; Slavin, 1990).

It is believed that teachers who employ cooperative learning methods could accomplish a number of important goals simultaneously. Johnson, Johnson and Holubec (1994) outlined how teachers could achieve such goals. Firstly, cooperative learning provides opportunities for teachers to maximize achievement and greater productivity of all students. Secondly, cooperative learning helps to create a positive environment where teachers build positive relationships among students. Thirdly, cooperative learning provides collaborative experiences for students, which are needed for health social, psychological, and cognitive development. It is also believed only cooperative learning provides opportunities for students to work on these three fronts at the same time, which places it above other teaching methods (Johnson et al, 1994).

Knowledge of Economics by high school students is relatively weak (Walstad & Rebeck, 2001), suggesting that work remains in raising “public literacy in a subject that is of central importance for citizens in many aspects of their lives” (Walstad, 2001, p. 208). Problem-based learning is an instructional approach that could be used in addressing this challenge. Problem-based learning restructures conventional instructional strategies to place the student at the forefront of the learning process by transforming the teacher into a coach who probes and challenges students towards constructing knowledge (Torp & Sage, 1998; Duffy & Savery, 1994).

In problem-based learning, students formulate and pursue their own learning objectives by researching a situation, developing appropriate questions, and producing their own solution to a problem (Nan, John, & Yolanda, 2005). Students work in small collaborative groups and learn what they need to know in order to solve a problem (Hmelo-Silver, 2004). It is focused, experiential learning organised around the investigation, explanation, and resolution of meaningful problems (Barrows, 2000). Problem-based learning is believed to have many functions. Barrows and Kelson (1995) suggest that this instructional approach is designed to help students; (a) construct an extensive and flexible knowledge base; (b) develop effective problem-solving skills; (c) develop self-directed, lifelong learning skills; (d) become effective collaborators; and (e) intrinsically motivated to learn.

The lecture approach consists largely of the instructor’s presentation accompanied by a slide delivery. Students have the opportunity to ask questions or make comments, but their inputs into the lesson comprise only a small proportion of the instructional time and mostly involve questions of clarifications (Capon & Kuhn, 2004). This approach is predominantly teacher-centred; learners are treated as passive recipients of the teachers’ “cooked” knowledge. The lecture is probably the oldest instructional format and today it is still the

most common form of instruction (Hrepic, Zollman & Rebello, 2007). Peek, Winking and Peek (1995) are of the view that the traditional lecture approach is preferred by many teachers because it is perceived as a strategy for establishing and maintaining order in the class and serves as safety net for new teachers who might be unfamiliar with using other approaches.

It is not surprising to note the immense usage of lectures as a mode of instruction (Becker & Watts, 1996, 2001), as it is a rapid way of transmitting factual information and it can be delivered in a manner that motivates and entertains students, for example, through the use of cartoons, videos, newspaper clips, and power point animations (Johnston, McDonald, & Williams, 2001). A lecture can also provide interactive learning by engaging students through direct questioning or short collaborative exercises within the lecture (Johnston et al, 2001). In addition, Good and Brophy (2003) are of the opinion that when lectures are presented in interesting and enthusiastic ways, then they can stimulate interest and raise questions that students will want to follow up. However, Becker and Watts (1996, 2001) research surveys indicate that these strategies are not often used in teaching Economics and that for the vast majority of lectures are spent using chalk and talk. Most recently, this may be whiteboard and talk, and even power point and talk (Abdulla, 2006).

The responsiveness and appropriateness of the various instructional approaches to students' age and cognitive development has not been adequately researched in Ghana. In Great Britain around the 1930's some academics frowned on the teaching of Economics in secondary schools. Their arguments had to do with the relatively lower age levels of the students in those institutions. Their bone of contention was on the "teach ability" of Economics at that level and not its desirability. As a former British colony whose educational system was modeled largely on the British system, Ghana appears to have suffered from the effects of this standoff. It took Ghana many years after the dust had settled in Britain to consider the introduction of Economics into the secondary school curriculum (Dare, 1992).

Gender differences in academic achievement are a common phenomenon in almost all the subjects offered in the Ghanaian Senior High Schools. Since genders have different behaviour, ways of knowing, experiences, needs for learning and development, and learning styles, it is pertinent for teachers to understand the relationship between gender and instructional techniques. The idea that male students are intellectually and educationally more variable than their female counterparts, dates back a long time and is embedded in cultural history (Williams, Waldauer & Duggal, 1992). It has been observed that based on the socially expected gender-appropriate behaviour, girls tend to receive less attention from their teachers, while boys are likely to require attention by asking questions in the classroom (Weiss, 2001). This behaviour is most likely to lower the self-esteem of female students which could ultimately affect their academic performance. With the increased interest in gender-sensitive teaching models, teachers should be trained on gender differentiated instruction so as to bridge the gender gap in academic achievement. The "one-size-fits-all" instructional approaches adopted by most teachers do not seem to help the female students in particular.

### **Review of Related Literature**

Globally, it has been observed that female students are underrepresented in Economics classes. Several factors have been attributed to this phenomenon, however up till now no consensus has been reached (Jensen & Owen, 2000). Ashworth and Evans (1999) claim that the lack of female role models in the classrooms affect female students' interest in

Economics. On their part, Dynan and Rouse (1997) attribute this phenomenon to the poor mathematical background of some female students. Other researchers (Feiner & Roberts, 1995; Ferber, 1995) claim that female students have different career aspirations and are, therefore, less interested in Economics. Other studies suggest that instructors are largely responsible for this trend, either by creating a classroom environment that is unfriendly to females (Hall & Sandler, 1982) or by adopting instructional and assessment practices that favour male learning styles (Becker, 2000). Females are more likely than boys to attribute academic difficulty to lack of ability, rather than lack of effort, particularly in Mathematics (Lloyd, Walsh, & Yailagh, 2005). It has also been established that self-esteem tends to be lower for females in general, which is thought to be partly attributed to the higher levels of serotonin released in female brains (Taylor, 2004).

A number of studies on gender difference in academic achievement suggest that there are differences between boys and girls in terms of scores. Gender is of utmost importance in Economics education because at any point in time, males tend to score better than females on Economics tests (Siegfried, 1979). This trend has persisted since Siegfried conducted his study. Myatt and Waddell (1990), and Evans (2014) in spite of controlling other extraneous variables, their study showed that female students performed significantly worse in Economics than their male counterparts. Wamdeo (2003) is of the view that such differences between males and females become more glaring when it relates to mathematical, spatial and verbal abilities. Females demonstrate superiority in measures of verbal fluency, while their male counterparts show superiority in mathematical and spatial abilities (Halpern, 1992; Stumpf, 1995). Ironically, Williams, Waldauer, and Duggal (1992) could not establish any evidence to confirm their hypothesis that significant and consistent gender difference exist in college students' examination scores in Economics.

The age factor is considered as an independent variable that could affect the performance of students. As the age of an individual increases, it affects the various developmental stages including the area of academic performance (Ukueze, 2007). Simpson and Sumrall (1979) conducted studies aimed at establishing the link between the students' age and academic performance. They found that mature students achieved higher grades/scores than youthful students did. However, their finding is at variance with similar studies (Lane & Porch, 2002; Diaz, 2003) which rather revealed that scores that were earned by younger students were significantly higher than the mature students. Momanyi, Too and Simiyu (2015) examined the effects of students' age on academic motivation and performance among high school students in Kenya. Their findings established that age has a significant effect on the students' academic performance. Their findings also revealed that the younger students (12 to 15 years) had the highest mean scores than the older students (16 to 19 years) and (20 to 23 years). In Australia, Jense (1982) investigated the difference in academic achievement and learning styles of 11 and 15 years old students. The results of their study revealed that the 15 years old students were academically superior to the 11 years students in terms of academic achievements. By their study, the older students had an advantage over their counterparts.

Research indicates that different instructional approaches produce different results. The identification of the best teaching strategy for a given set of students must be done if the best results are to be achieved (Filgona & Sababa, 2017). A broad array of quasi experimental studies has been conducted across a wide range of subjects on the effectiveness of various instructional approaches. For example in the area of Economics, Mergendoller, Maxwell and Bellisimo (2000) investigated whether traditional and problem-based



instructional approaches made a difference in students' attainment of Economic knowledge, and principles, and also the extent to which those approaches affected their attitudes towards the study of Economics. Their findings revealed that students in the traditional (lecture/discussion) classes showed greater positive pre-test and post-test scores relative to students in the problem-based classes. They argued that the problem-based approach limited students' acquisition of general Economic knowledge.

In a related study, Maxwell, Mergendoller and Bellisimo (2005), conducted a quasi-experimental study that compared instructional methods in high school macroeconomics. These instructional methods included problem-based and the traditional lecture-discussion approaches. Their investigations revealed that the problem-based technique enhanced students' learning of macroeconomics and accordingly recommended among other things that Economics teachers be given adequate training on teaching in the problem-based approach.

In a comparative study involving a randomly sampled 104 secondary school students, Umar, Dauda and Mutah (2016) investigated the effectiveness of demonstration and lecture methods in the learning of Economic concepts. Their study employed a quasi-experimental research design and examined the effect of treatment and gender on students' learning of Economic concepts. Findings of their study revealed that the lecture method was more effective than the demonstration approach to learning Economic concepts. Again the study could not establish any significant difference in the performance of male and female students who were exposed to either the lecture or demonstration methods of instruction.

Adeyemi (2008) examined the effects of three instructional approaches (cooperative learning, problem-solving and the conventional lecture/discussion) on junior secondary school students' achievement in Social Studies. With a sample size of 150 students (80 males and 70 females), the results of the study showed that students in the cooperative learning group performed better than their counterparts in the problem-solving and conventional learning approaches. The effect of treatment and gender on achievement revealed that the male students performed relatively better than their female counterparts under the cooperative instructional strategy. On the other hand, the females out-performed their male counterparts when they were taught with the problem-solving approach. Adeyemi (2008) therefore concluded that the cooperative and problem-solving instructional approaches in Social Studies are gender sensitive.

Filgona and Sababa (2017) investigated the effect of gender on senior high school students' academic achievement in Geography in Ganye educational zone in Nigeria. The sample size of their study consisted of 207 Geography students (120 males and 87 females). The main thrust of their study was to ascertain the academic achievements of male and female Geography students taught with the mastery learning strategy and the conventional method. Their findings revealed a significant interaction effect of treatment and gender on students' achievement in Geography. Male and female students who were exposed to Geography using the mastery learning strategy obtained higher achievement scores than their counterparts in the control group (lecture/discussion). Further to this, female students who were exposed to the mastery learning approach performed better than their male counterparts in the same group. Their findings suggest the need for Geography teachers to vary their instructional approaches so as to address the gender need of their students.

In a pre-test, post-test control design, Folashade and Akinbobola (2009) investigated the extent to which the problem-based approach and conventional instructional techniques

(lectures/discussion) could enhance the academic achievement of secondary school physics students. With a sample size of 105 physics students, their study sought to ascertain the influence of these instructional approaches on the academic achievement of male and female physics students. Their findings showed that the problem-based approach to the teaching of physics is more effective than the conventional methods. Again, their findings revealed that there was no significant difference in the achievement of male and female students who were exposed to the problem-based approach. They recommended among others that physics teachers should be mindful of the gender issues in their instructional choices and approaches.

In Osun State of Nigeria, Olatoye and Adekoya (2010) examined the effect of project-based, demonstration and lecture teaching strategies on secondary school students' achievement in an aspect of Agricultural Science. Their study revealed that the project-based strategy for teaching pasture and forage is more effective than the demonstration and lecture strategies.

Anyafulude (2013) undertook a quasi-experimental study to determine the effects of problem-based and discovery instructional strategies on secondary school students' academic achievement in Chemistry. Working with a sample size of 375 Form 2 chemistry students, the study sought to ascertain the influence of gender on achievement in Chemistry. Findings of this investigation revealed that students taught with the problem-based approach performed significantly better on the post-test than both the discovery and control (expository) groups. In addition, the mean achievement scores of female students were found to be significantly greater than that of their male counterparts irrespective of the instructional approach employed in teaching the same topic.

Adopting a non-equivalent pre-test, post-test control group research design, Folounrunso and Sunday (2017) examined the relative effectiveness of guided discovery and demonstration teaching approaches on students' performance in Chemistry in schools in Ile-Ife, Nigeria. Their sample size consisted of 84 students selected from three schools. The findings of their study showed a significant difference in the performance of male and female chemistry students exposed to guided discovery and demonstration teaching techniques. A post-hoc analysis further revealed that Guided Discovery Teaching Technique (GDTT) had a better significant effect on student academic performance than the Demonstration Teaching Technique (DTT) and Teacher Expository Teaching Technique (TETT). The post-hoc analysis also revealed that male and female students exposed to GDTT had the best retention ability of the concepts taught. These findings reinforce the need for Chemistry teachers to adopt gender sensitive instructional approaches.

In conclusion, the literature reveals that in most of the subjects cited, the student-centred instructional approaches appear to enhance students' achievement scores than the conventional lecture/exposition approaches. Gender differences in students' achievement scores in Economics appear to favour the male students than their female counterparts. As shown in the literature, the effects of instructional approaches, gender, and age, on achievement scores are inconclusive and mixed.

### **Statement of the Problem**

In the opinion of Tarhan, Ayar-kayali, Urek and Acar (2008), "the most important role of education is to give individuals the ability to learn, reason, think creatively and critically, make decisions, solve problems and function as part of a team" (p.296). There is an ancient proverb attributed to Confucius that reads: "*I hear, I forget, I see, I remember. I do, I*

*understand.*” The idea behind this saying is the driving force in many modern educational practices. Educational literature is replete with theories and approaches to teaching and learning based on the idea that a teacher-centred instructional approach, dominated by lectures and demonstration, with rote drill and practice, is an ineffective way to promote meaningful learning (Cooper, Bailey and Briggs, 2015).

Economics as an area of study is a problem-solving discipline. One of the main reasons for teaching Economics is to foster and promote critical thinking skills in the students (Siriopoulos & Pamaris, 2010). Students of Economics should therefore be able to interpret and offer solutions to Economic problems of their respective communities. However, the dominant teacher-centred approaches to Economics instruction as observed in Ghanaian classrooms may not help students to achieve these objectives. Unfortunately in Ghana, there is complete paucity of research on the effectiveness of alternative instructional approaches particularly in the area of Economics. Studies of this nature such as (Adeyemi, 2008; Folashade & Akinbobola, 2009; Anyafulude, 2013; Folounrunso & Sunday, 2017) were rather conducted in different subject areas and learning context. Notable quasi-experimental studies on the determination of instructional effectiveness in Economics such as (Mergendoller, Maxwell, & Bellisimo, 2000; Maxwell, Mergendoller, & Bellisimo, 2005; Olatoye & Adekoya, 2010; Umar, Dauda, & Mutah, 2016) were all undertaken in different learning contexts.

Male and female students’ responses to the various instructional approaches have not been adequately researched, particularly in Ghana. With the exception of (Olatoye & Adekoya, 2010; Umar, Dauda, & Mutah, 2016) who incorporated the gender element in their research, other studies inexplicably ignored it. In Ghana, studies on gender-tailored instructional techniques within co-educational institutions particularly as it relates to the teaching of Economics are scanty. The influence of the numerous instructional methods on academic achievement based on gender is not well researched. The “one-size-fits-all” instructional approach is rather being perpetuated. It appears this lack of empirical knowledge is partly responsible for gender differences in academic achievement, particularly in senior high school Economics.

At the moment, research findings in the educational literature regarding age and academic performance are inconclusive (Voyles, 2011). Plausible arguments have been raised by some teacher educators (Tamakloe, Amedahe, & Atta, 1996; Koomson, Amoah, Brown, Frimpong, 2016) to the effect that the age factor of the students should be considered when deciding on the instructional approach to employ. Unfortunately, there is little empirical evidence to support such arguments. For example in Ghana, it is extremely difficult to sight any quasi-experimental study on the effect of instructional approaches and students’ age levels on academic achievement.

Most of the previous studies on the effects of problem-based and other student-centred learning, suffer from methodological shortcomings (Colliver, 2000). One of these shortcomings is that in most studies, students were non-randomly assigned to the groups. By implication, such shortcomings were largely attributable to selection bias. Using a randomized experiment, this study tried to avoid any selection bias at the school, class and student level. In addition, unlike other studies which examine the impact of two instructional approaches (one student-centred and a typical lecture or teacher-centred), the current study investigated the effect of three approaches, that is, two student-centred approaches and one conventional lecture or teacher-centred approach.



The performance of students in Economics in the selected schools for this study has not been impressive. More than 76% of the candidates in each school scored below 50.00 (B4, Credit) (Chief examiner's report, 2014, 2015, 2016). Many contributory factors could be cited for this abysmal performance. However, since the Economics teachers in the 3 schools are highly experienced graduate professional teachers, perhaps their 'monotonous' instructional approaches could be a cause of this woeful performance. Under the circumstance, exploring alternative instructional approaches becomes compelling. This study was therefore designed to fill gaps in knowledge and research regarding the relative effectiveness of certain instructional approaches in Economics, particularly as it relates to the Ghanaian educational context. This could ultimately ameliorate the performance of students in the subject.

### **Purpose of the Study**

In broad terms, the study investigated the comparative effects of problem-based and cooperative instructional approaches on students' academic achievement in Economics. The specific objectives of the study were to:

1. Find out the differences in the students' pre-test and post-test mean achievement scores among the three groups
2. Determine the main effect of treatment (problem-based, cooperative and lecture methods) on academic achievement in Economics.
3. Establish the effect of gender on students' achievement in Economics.
4. Compare the interactive effect of treatment and gender on academic achievement in Economics among senior high school students.
5. Ascertain the interactive effect of treatment and students' age on achievement in senior high school Economics.

### **Research Questions**

1. Is there any significant difference in the students' pre-test and post-test mean achievement scores in both groups?
2. Is there any significant effect of treatment (cooperative, problem-based and lecture methods) on students' achievement in Economics?
3. Is there any significant effect of gender on students' achievement in Economics?
4. Is there any significant effect of treatment and gender on academic achievement in Economics among senior high school students?
5. What is the effect of treatment and students' age levels on academic achievement in Economics?

### **Research Hypotheses**

1. **H<sub>0</sub>**: There is no significant difference in the students' pre-test mean achievement scores and post-test scores in both groups.
2. **H<sub>0</sub>**: There is no significant main effect of treatment (cooperative, problem-based and lecture methods) on students' achievement in Economics.
3. **H<sub>0</sub>**: There is no significant main effect of gender on students' achievement in Economics.
4. **H<sub>0</sub>**: There is no significant interaction effect of treatment and gender on students' achievement in Economics.
5. **H<sub>0</sub>**: There is no significant interaction effect of treatment and students' age on achievement in Economics.

## **Research Design**

The study adopted a quasi-experimental design of pre-test, post-test control group only. Three levels of independent variables (treatment and control) and a dependent variable were investigated in the study. This design permits the establishment of causal relationship between the dependent and independent variables. The interactive effects of the three instructional approaches on learning outcomes by gender and age of students were determined. The three instructional approaches are the independent variables, while the learning outcome is the dependent variable. The quasi-experimental design helped to control for extraneous variables. Again, intact classes were used since it was not possible to randomize as in true experimental studies.

## **Population, Sample and Sampling Techniques**

The population of this study comprised all senior high school Economics students in the East and West Mamprusi District of Northern Ghana. The sample for the study was made up three hundred and seventy-seven (377) Economics students. This consisted of one hundred and ninety-seven (197) male students, and one hundred and eighty (180) female students. Three schools, namely Walewale SHS, Wulugu SHS, and Nalerigu SHS were purposively selected for the study. Two main reasons informed the choice of these schools, that is, to ensure homogeneity and comparability in terms of certain characteristics they possess. In other words, these institutions are all public, mixed, and boarding schools. Again, they are all located in semi-urban towns. These schools were randomly assigned to the experimental and control groups, while Economics students in the selected schools remained in their intact classes.

## **Instrumentation**

A test of pre-requisite knowledge in Economics based on the SHS Form 1 syllabus was undertaken by all the respondents. The instrument that contained these pre-test items was divided into 2 parts; section 'A' and 'B.' Section A considered the demographic characteristics of the respondents. This section also provided a blank column for participants to indicate their unique identification numbers. Section B consisted of 50 multiple-choice test items designed for 60 minutes. Face and content validity were employed to validate items in this instrument. This was done by giving the instrument to colleagues to comment on the content. The final draft of the instrument was produced by incorporating the opinions and suggestions that were made.

## **Reliability**

To check for the reliability of the pre-test instrument, the Test of Economics Understanding (TEU) was pilot tested in selected schools in the Cape Coast metropolis. The test was administered two times within three weeks intervals to 30 SHS Economics students. The test re-test reliability was used and a coefficient of 0.81 was obtained for the achievement test (TEU).

## **Procedure for Data Collection**

Six research assistants were recruited to help in the data collection exercise. Two of them were assigned to each of the three schools, while the researcher coordinated their activities. To start with, the researcher labeled the selected schools as 'I', 'II', and 'III', while the intact classes were tagged as 'A', 'B', and 'C'. The entire procedure involved three distinct stages. The first stage had to do with the pre-test which covered all the 377 students in the three groups, while the second stage involved the administration of the treatment. The third stage was the post-test. At the end of the instructional programme, a post-test was

administered on all the three groups involved in the study. The pre-test was administered four days to the commencement of treatment, and the post-test was administered a day after the last treatment. Each group was exposed to a 90-minute instructional session per week for eight weeks.

### **Instructional Manuals/Guide**

Three instructional manuals were prepared to guide teachers in the instructional approaches employed by this study. The teachers concerned were given adequate training on how to implement their respective approaches. In addition, each teacher was adequately resourced in terms of teaching and learning materials. Another point worthy of note is that the three teachers possessed the same professional and academic qualifications.

### **Lecture approach**

The lecture took the form of oral presentation of Economic content prescribed by the senior high school Economics syllabus. The teacher prepared a 45 minute lesson for each instructional session. The delivery was partly expository, since the Economics teacher explained concepts, principles, ideas and theories that related to the subject matter of study. As part of this model, the teacher made a number of analogies, illustrations and examples just to enhance clarity of understanding. Moderate pacing of the delivery was also encouraged. As required by this instructional approach, the students listened attentively to the teacher and wrote salient notes. In the course of the lesson, students were given the opportunity to seek clarifications on issues they did not understand.

### **Cooperative approach**

‘Think-pair-share’, a cooperative learning strategy proposed by Lyman (1992) was adopted for this study. By this strategy, groups were carefully organised so as to ensure the participation and learning of all group members in a cooperatively shared undertaking.

An instructional session often begun with a meeting of the entire class where the teacher engaged the students in a brief discussion, posed problems or questions for group discussion, and clarified directions for the group activities. Afterwards, the students went into their various groups comprising 4 members. The students worked cooperatively in each group to discuss ideas, clarify their understanding, thought and reasoned together, and solved problems. As required by this model, the Economics teacher moved from group to group, providing assistance and encouragement, and asking thought-provoking questions.

### **Problem-based approach**

The problem-based learning framework employed by Mergendoller, Maxwell and Bellisimo (2000) was adopted for this study. This framework has 8 stepwise components. They are; entry point, framing the problem, knowledge inventory, problem log, problem exit and problem debriefing. In each of these phases, the Economics teacher served as a facilitator and guide. Through simulations, students were guided to identify ill-structured Economic problems related to the topics specified in the senior high school Economics syllabus. In line with this framework, the students were also assisted to; formulate the problem, identify and search for the information needed in order to solve such problems, and how to organise such information in a meaningful conceptual framework.. In effect, the students engaged in self-directed learning, collected resources for themselves and their respective groups and took the necessary actions to solve the problems they had formulated. The Economics teacher periodically stepped in to engage them in brief discussion/teaching as and when it became necessary. In the final phase of each exercise, group members met in class to share their learning, exchange ideas, reflect, revisit the problem and go over it one more time.

### Scheme of Work

Week	1	2	3	4	5	6	7	8
Topic	The Theory of Production  (Production and Productivity in Agriculture)	The Theory of Production  (Location of Industries)	The Theory of Production  (Location of Industries)	The Theory of Production  (Localization or Concentration of Industries)	The Theory of Production  (Specialization and Division of Labour)	The Theory of Production  (Labour Intensive and Capital Intensive Methods)	Prices of Factors of production	The Theory of Cost and Revenue
Sub-Topic	The meaning of the concept of Production  The meaning of the concept productivity  Factors affecting productivity in Agriculture	Factors affecting productivity in industry  Meaning of location of industries  Factors affecting location of industries	Reasons why industries tend to be sited in urban areas  Reasons why industries should be sited in the rural areas	The meaning of localization of industries  Advantages of localization of industries  Disadvantages of localization of industries	The meaning of Specialization and Division of labour  Advantages of Specialization and Division of labour  Disadvantages of Specialization and Division of labour	The meaning of labour intensive method of production  The meaning of capital intensive method of production  The concept of appropriate technology in the LDCs	Factors determining the Demand for a factor of production  Meaning of a change in demand for a factor of production  Factors determining the supply of a factor of production  Meaning of a change in supply of a factor of production	The meaning of cost of production  The meaning of cost concepts in production  Factors determining the size of firms

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## Data Analysis

The data were analysed using paired sample t-test for research hypothesis 1 to compare the means scores for the pre-test and post-test. With respect to hypotheses 2 to 4, the ANCOVA (Analysis of Covariance) was used to compare the means for the scores of Economics students while Scheffe post-hoc was used to identify the most effective teaching method. The analysis of the results was carried out at  $p = 0.05$  significance level.

## Presentation of Results

1. **H<sub>0</sub>**: There is no significant difference in the students' pre-test mean achievement score and post-test score in both groups.

Table 1 presents a summary of the results of the paired sample t-test which was used to answer hypothesis 1.

**Table 1: Paired Sample t-Test**

		Mean	Std. Deviation	t	df	Sig
Pair 1	Pre-Test	47.081	8.764	-17.366	227	.000*
	Post-Test	63.331	11.764			

\*Significant ( $p < 0.05$ )

From Table 1, it can be observed that, the mean score for post-test ( $M = 63.331$ ,  $SD = 11.764$ ) is higher than the mean score for pre-test ( $M = 47.081$ ,  $SD = 8.764$ ). Thus, the mean score for the post-test exceeds the mean score for the pre-test by 16.25. Using the paired sample t-test, it can be stated that there is a significant difference in achievement score [ $t = -17.366$ ,  $df = 227$ ,  $p < 0.05$ ] for the pre-test and the post-test. That is, the mean achievement score of Economics students used for the study increased by 16.25 after the treatment was applied to the various groups.

2. **H<sub>0</sub>**: There is no significant main effect of treatment (cooperative, problem-based and lecture method) on students' achievement in Economics.
3. **H<sub>0</sub>**: There is no significant main effect of gender on students' achievement in Economics.
4. **H<sub>0</sub>**: There is no significant interaction effect of treatment and gender on students' achievement in Economics.
5. **H<sub>0</sub>**: There is no significant interaction effect of treatment and students' age on achievement in Economics.

Table 2 presents a summary of the Analysis of Covariance (ANCOVA) results for hypotheses 2, 3, 4 and 5.

**Table 2: ANCOVA of the effect of Treatment and moderating variables on students' achievement in Economics**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5882.111 <sup>a</sup>	5	1176.422	10.230	.000
Intercept	914470.001	1	914470.001	7951.870	.000
Treatment	3739.950	2	1869.975	16.261	.000
Gender	1861.633	1	1861.633	16.188	.000
Age	162.389	1	162.389	1.412	.236



Treatment * Gender	280.529	2	140.264	1.220	.297
Treatment * Age	371.000	2	92.750	.753	.557
Error	25530.138	222	115.001		
Total	945882.250	228			
Corrected Total	31412.249	227			

\*Significant (p<0.05)

In Table 2, there is a significant main effect of treatment on students' achievement in Economics that is, problem-based, cooperative and lecture methods of teaching [ $F_{2, 222} = 16.261$ ;  $p < 0.05$ ]. Again, there is a significant main effect of gender on students' achievement in Economics [ $F_{2, 222} = 16.188$ ;  $p < 0.05$ ]. However, the two-way interaction effect of treatment and gender does not have a significant effect on the achievement of students in Economics [ $F_{2, 222} = 1.220$ ;  $p > 0.05$ ]. Again, the two-way interaction effect of treatment and age does not have a significant effect on the achievement of students in Economics [ $F_{2, 222} = 0.753$ ;  $p > 0.05$ ].

It can be stated that because the main effect of treatment is significant but the interaction effect with gender and age are not significant, it implies that the treatment neither depend on gender nor age to be effective. Thus, the treatment is not gender sensitive as well as age sensitive and will be effective irrespective of the gender and the age of the student.

In sum, null hypotheses 2 and 3 are rejected, implying that there is a significant main effect of treatment on students' achievement in Economics. However, hypothesis 4 and 5 are accepted indicating that, there is no significant interaction effect of treatment and gender as well as treatment and age on students' achievement in Economics. Table 3 presents a further analysis on the significant differences in the mean performance among the three groups.

**Table 3: Univariate Test of the Mean Scores of the Three Groups**

	Sum of Squares	Df	Mean Square	F	Sig.
Contrast	3739.950	2	1869.975	16.261	.000*
Error	25530.138	222	115.001		

\*Significant (p<0.05)

In Table 3, it is evident that there is a significant difference in the mean performance among the three groups, problem-based, cooperative and lecture methods [ $F_{2, 222} = 16.261$ ;  $p < 0.05$ ]. This implies that, students performed significantly at different levels in the three groups. It can, therefore, be concluded that, the treatments may not be equally effective; hence, the need to compare the three groups two-by-two to identify the group (s) that cause (s) the difference.

Table 4 is a post-hoc analysis on the significant difference in terms of the treatment on students' achievement in Economics.

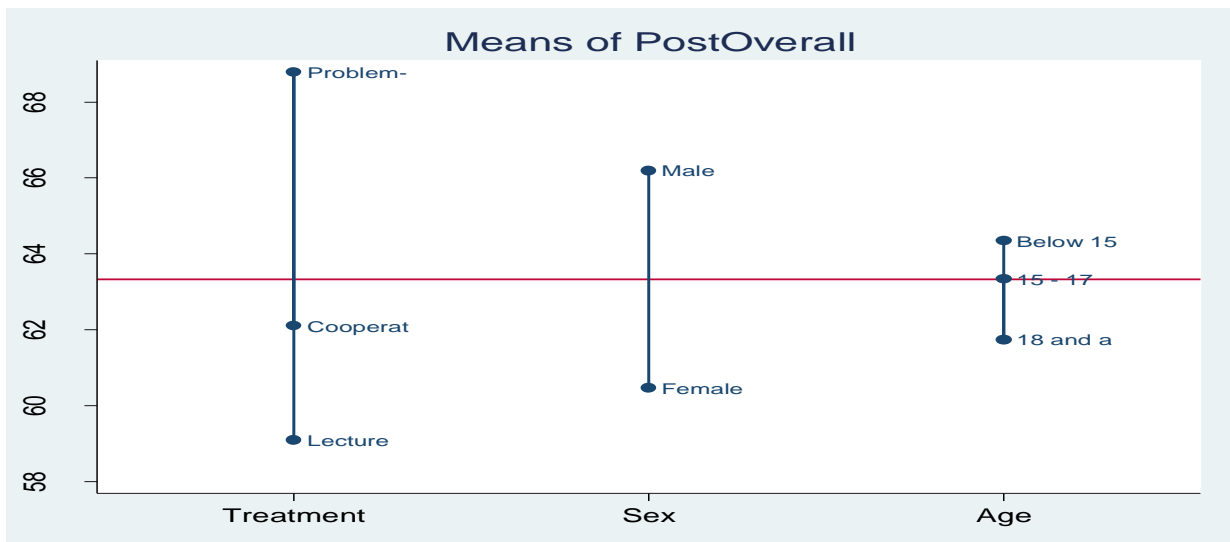
**Table 4: Pair wise Comparisons of the Three Groups**

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>
Problem-Based	Cooperative	6.684*	1.740	.000*
	Lecture	9.691*	1.740	.000*
Cooperative	Problem-Based	-6.684*	1.740	.000*

	Lecture	3.007	1.740	.085
Lecture	Problem-Based	-9.691 *	1.740	.000*
	Cooperative	-3.007	1.740	.085

\*The mean difference is significant at .05 level of significance

The pair wise comparison helped in explaining the cause of the significant difference reported in Table 4. By comparing the methods of teaching two-by-two, it can be observed that, there is a significant mean difference between problem-based and cooperative approaches to teaching Economics. The problem-based approach is significantly higher than that of the cooperative method. Also, there is a significant mean difference between problem-based and the lecture methods. The problem-based method is significantly higher than lecture method. This implies that, the problem-based approach appears to be the most effective instructional technique to be used in imparting knowledge of Economics at the senior high school level. Figure 1 presents the mean plots of the three variables (Treatment, Gender and Age).



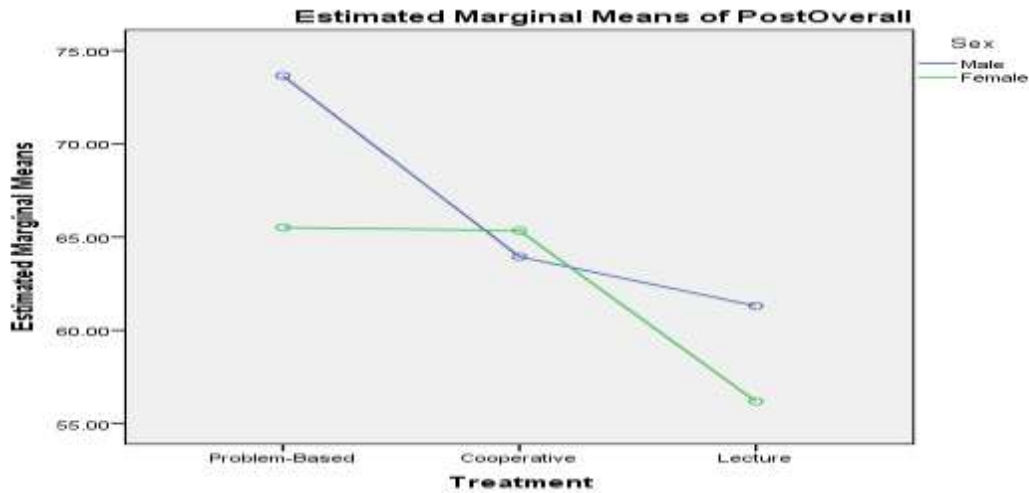
**Figure 1:** Mean plot of the three factors (Treatment, Gender, Age)

Figure 1 shows that, in terms of the treatment, the use of problem-based method resulted in an overall score of above average (as depicted by the red line). Again, a majority of males performed above average as compared to females, this was same in the case of age, where those below 15 years scored above average as compared to the other two age groups. Table 5 presents a summary of the mean scores of males and females in the three groups.

**Table 5: Mean Scores of Male and Female Students in the Three Groups**

Treatment	Gender	Mean	Std. Error
Problem-Based	Male	73.158	1.740
	Female	64.421	1.740
Cooperative	Male	63.842	1.740
	Female	60.368	1.740
Lecture	Male	61.566	1.740
	Female	56.632	1.740

From Table 5, it can be seen that male Economics students performed relatively better than their female counterparts. Thus, irrespective of the instructional approach adopted, the performance of male students exceeded that of the females. This is presented in Figure 2.



**Figure 2:** Mean plot of interaction effect of treatment and gender

In Figure 2, it can be observed that, male students performed better than their female counterparts when all three methods of teaching were employed. However, the most effective approach was the problem-based technique. That is, both male and female students recorded higher scores in the problem-based method relative to the other approaches. This was followed by the cooperative and lecture methods respectively. Table 6 presents a summary of the mean scores of age groups in the treatment groups.

**Table 6: Mean Scores of Age groups in the Three Groups**

Treatment	Age	Mean	Std. Error
Problem-Based	Below 15	72.923	3.078
	15 - 17	68.604	1.524
	18 and above	64.400	3.509
Cooperative	Below 15	64.800	2.481
	15 - 17	60.474	1.800
	18 and above	62.556	2.616
Lecture	Below 15	59.333	2.265
	15 - 17	59.372	1.692
	18 and above	57.167	3.699

From Table 6, it can be seen that Economics students below 15 years performed relatively better than the other age groups in the senior high schools except when the teacher adopts the lecture method where those between the ages of 15 – 17 years recorded a higher mean value. This is presented in Figure 3.

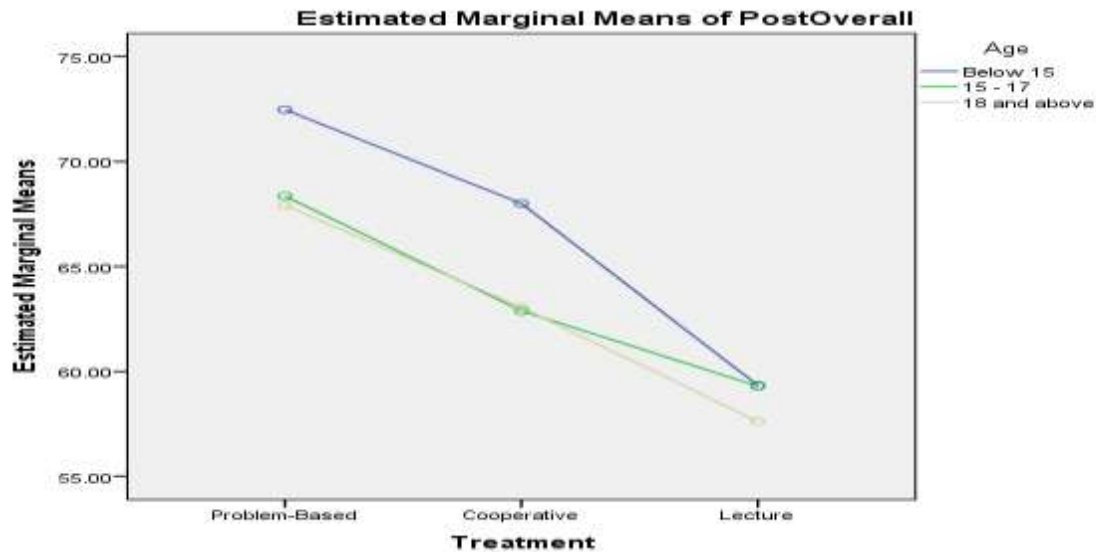


Figure 3: Mean plot of interaction effect of treatment and age

From Figure 3, it is evident that the mean score for all students irrespective of the age group is higher when the problem-based approach is adopted. Students below 15 years performed well when any of the methods are adopted. However, with the use of the lecture method, students between 15 to 17 scored the same as those below 15. The least mean scored was recorded for students of 19 years and above.

## Discussion

With respect to research question 1, the null hypothesis is rejected on grounds that there is a significant difference in the mean achievement scores of pre-test and post-test groups. This further implies that the treatment administered to the various groups had a positive effect on their learning of Economics. The change in the Economics students' learning outcomes, resulting from the treatment meted out is consistent with the results of similar studies such as (Adeyemi, 2008, Maxwell, Mergendoller, & Bellisimo, 2005). Again, the difference in the pre-test and post-test mean achievement scores, therefore, forms the basis for a determination of which intervention could be considered as the most effective instructional approach.

Hypothesis 2 was designed to find out whether the introduction of the three approaches to teaching (treatment) could influence students' achievement in Economics. The findings revealed that indeed the introduction of the three different approaches to teaching influenced students' achievement, and the results were significant. Further analysis revealed that comparatively, the problem-based approach was superior to the other two approaches in terms of influencing students' achievement. Thus, students taught by the problem-based approach performed better than those taught with the cooperative approach by 6.684. Again, students taught by the problem-based approach performed better than those taught with the lecture method by 9.691. These differences were statistically significant.

By implication, in order of comparative effect on students' achievement, the problem-based approach had the highest impact, followed by the cooperative and then, the lecture method. This finding is at variance with that of Mergendoller, Maxwell and Bellisimo (2000). Their findings revealed that students in the traditional (lecture/discussion) classes rather showed better scores relative to students in the problem-based classes. They argued that the problem-based approach limited students' acquisition of general Economic knowledge.

Differences in these two findings can be attributed to the fact that, whereas Mergendoller and his colleagues investigated this problem at the University level, this study operated at the secondary level with different content areas. However, findings of this study agree with that of Maxwell, Mergendoller and Bellisimo (2005) who found the problem-based approach as enhancing secondary school students' learning of macroeconomics. The current finding on this hypothesis is also at variance with that of Adeyemi (2008) who discovered that students in the cooperative learning group performed better than their counterparts in the problem-solving and conventional learning approaches in Social Studies. This could be due to the differences in subject areas.

Hypothesis 3 sought to find out the main effect of gender on students' achievement in Economics. Results of the study revealed that gender had a remarkable effect on students' achievement in the subject. The male students performed relatively better than their female counterparts. This finding supports earlier studies (Siegfried, 1979; Myatt & Waddell, 1990; Evans, 2014) in which the male students performed better than their female counterparts. This could be due to the mindset of students and others to the effect that Economics is generally meant for boys. Again, since certain aspects of Economics require quantitative analysis, female students as suggested by (Halpern, 1992; Stumpf, 1995) are most unlikely to perform well as compared to their male counterparts. Conversely, findings of this study do not seem to support that of (Williams, Waldauer, & Duggal, 1992) who could not establish any significant and consistent differences in college students' examination scores. The differences in findings could be due to the differences in the learning context of the students involved.

Hypothesis 4 was meant to find out if a combination of gender and treatment (methods of teaching) could influence students' achievement in Economics. The interaction effect means that, the gender of the student was combined with each approach to teaching; just to find out if that would have any effect on the mean scores of the students. The data revealed that the approach to teaching was completely independent of gender. Further analysis suggested that irrespective of the instructional approach, the male Economics students performed better than their female counterparts. Stated differently, in all the 3 instructional approaches, male students scored higher than the female students. These findings are inconsistent with that of Filgona and Sababa (2017) who investigated the effect of gender on senior high school students' achievement in Geography. Their findings revealed a significant interaction effect of treatment and gender on students' achievement in Geography. Male and female students who were exposed to Geography using the mastery learning strategy obtained higher achievement scores than their counterparts in the control group (lecture/discussion). In addition, findings of this study do not seem to agree with that of Folounrunso and Sunday (2017) who examined the relative effectiveness of guided discovery and demonstration teaching approaches in Chemistry. The findings of their study showed a significant difference in the performance of male and female chemistry students exposed to guided discovery and demonstration teaching techniques.

Hypothesis 5 was intended to find out if a combination of age and treatment (approaches to teaching) could influence students' achievement in Economics. The interaction effect meant that the age of the student was combined with each instructional approach to teaching so as to find out if that could have any effect on the mean scores of students. The study revealed that irrespective of the method of teaching, students below 15 years performed better than their other counterparts. Thus, in all the three methods, students below 15 years scored higher than the other age groups. The findings of this study therefore



believe the claims of (Tamakloe, Amedahe, & Atta, 1996; Koomson, Amoah, Brown, Frimpong, 2016) that the age factor of students should be considered when deciding on any instructional approach to use. Results of this study rather confirm the views of Bruner (1960) that any subject can be taught effectively in some intellectually honest form to any child at any stage of development.

### **Conclusion**

This study provides ample empirical evidence that the learning of Economics is maximized when students are actively involved in the teaching and learning process. The problem-based approach to the teaching of Economics has been shown to enhance students' achievement in the subject than the cooperative and lecture methods. In relative terms, the cooperative learning approach was also found to be more effective than the lecture method.

Corroborating similar findings in other studies, gender as an independent variable influenced achievement scores in Economics. However, the instructional approaches were independent of gender. The gender of the student did not find favour with any of the 3 instructional approaches. By implication, none of the 3 instructional approaches was found to be gender sensitive. In much the same way, none of instructional approaches was found to be age-sensitive. The age variation of the students did determine whether or not a student could perform better when exposed to any of the 3 instructional approaches

### **Recommendations**

Based on the findings and conclusions reached, the following recommendations were made.

- All senior high school Economics students should be given hands-on learning experiences without imposing content knowledge on them.
- Economics teacher education stakeholders should incorporate the problem-based and cooperative instructional approaches into their curriculum to train pre-service Economics teachers.
- Seminars and workshops should be organised for the retraining of in-service Economic teachers on the use of problem-based and cooperative instructional approaches.
- Periodically, female role models with Economics background should be invited into the classrooms to teach and interact with the female students. This could stimulate and sustain their interest in Economics.
- Professional career counselors could also be engaged at periodic intervals and through seminars; they could change the mindset of female students that Economics is purposely meant for males.

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