An Evaluation of Low and High Achievements in Mathematics in Ekiti State Secondary Schools

Adebule, S.O., Onijigin, E.O., Balogun, E.A. & Adebule, H.T.
Faculty of Education, Ekiti State University, Ado-Ekiti

Abstract
Mathematics ideas are needed in the day to day activities of human beings. It is the nucleus of technological growth and economic development. This paper examined the performance of students in Mathematics, environment and mathematics, qualities of a good mathematics teacher, students and mathematics achievement, sources of underachievement, problem solving strategies and concluded that effective teaching will improve achievement of students in mathematics.

Keywords: Mathematics, Achievement, Secondary Schools, Ekiti State

Introduction
The role Mathematics plays in every facet of life cannot be underestimated. It is regarded as the mother of all science subjects because every step taken in science field requires the use of Mathematics. It is a helper for art subjects in as much as for every research undertaken, in their day-to-day activities, Mathematics ideas are needed to determine how accurate, how much, how far and how well. This important subject must take a very prominent position in both elementary and secondary schools so as to inculcate in every child, at least the introductory aspect of it, which would enable him to handle day-to-day activities to some extent of perfection.

One does not need a fortune-teller to tell him or her about the importance of Mathematics to an individual and his society. This single subject has been highly rated among others and for this reason it is described as the queen of all sciences and the servant to all disciplines. Perhaps it is against the basis that the Federal Government of Nigeria under the auspices of the curriculum planning body of the Federal Ministry of Education decided to make it a core subject. This seems to help in the achievement of the National objectives in Nigeria which among other things include the building of a strong and self reliant nation and a land of great and dynamic economy (FGN 2004 revised).

Mathematics plays a fundamental role in the economic development of any nation. In every society, regardless of the stage of economic development, it may have attained, mathematics has to be taught to an increasing number of future engineers, chemists, physicists, biologists, medical scientists, economists and many highly trained scientific researchers and technical experts whose services are urgently needed for the development and expansion of the economy Adebule (2002), Balogun (2012). Mathematics is the science of number and shapes.
including arithmetic, algebra, geometry, statistics and trigonometry. It is a logical development of fundamental abstract ideas, given substance through words, numbers and symbols. It holds a very unique position in our society today as it is the nucleus of technological growth and that any impediment to success in mathematics is an obstruction to technological growth. These impediments as a matter of urgency must be removed. This urgency justifies the various investigations that have been carried out to ascertain the status of mathematics teaching and learning at all levels of education.

Mathematics is seen to be the foundation of science and technology and indeed in all fields of human endeavour. Nsuh (1991) expressed the importance of mathematics as not only does mathematics open the door of the treasure house of modern sciences with all its fabulous materials, riches and powers, it offers us a key to a better understanding of the laws that govern the mysterious universe in which we find ourselves. According to Okediji, Anene and Afolabi (2006), Mathematics has been identified to serve as a means of communicating quantifiable ideas, training for the discipline of though and logical reasoning and as a tool in the development of engineering, science and technology. Without mathematics no blue prints for new building can exist, in fact all engineering construction works will suddenly cease. Banks will close since it will not be possible to compute interest or even make change and balancing of accounts will be difficult. All commercial activities will suddenly be grounded to a halt except primitive method of barter and no train or flight schedule can be made. There will be no method of measuring time, weight, capacity, pressure and so on. Without mathematics our activities will be reduced to those of the pre-civilization period in history, hence mathematics is a direct or indirect solution to human problems.

Mathematics is one of the core and compulsory subjects in the secondary school curriculum. This is a most needed subject but it is also the most dreaded subject by most students. Most students have no interest in the subject and seem to perform very poorly in the subject. The importance of Mathematics cannot be overemphasized since it is very useful in everyday’s life. Without passing this subject at the senior secondary school certificate examination (SSCE) level, it may be difficult if not impossible to gain admission into any higher institution. There is hardly any subject one does in the tertiary institution without the knowledge of Mathematics.

Mathematics is not a mere subject that prepares students for higher academic attainment or job qualification in the future. It is not all about practise and calculation in algebra, statistics and algorithms that after all, computers are capable of doing, it is more about how it compels the brain to formulate problems, multifaceted challenges that every human being encounters on a daily basis. People encounter numbers every day, in memorizing phone numbers, buying groceries, cooking food, balancing a budget, buying bills, estimating gasoline consumption, measuring distance and managing one’s time and all these require Mathematics.

In Nigeria, many people, organizations and Chief Examiners of Public examination bodies are complaining about the poor performance of students in Mathematics. Chief Examiner Reports of West African Examination Council (WAEC, 1993, 1996) on Mathematics results of students (Adebule, 2002). Akinsola (1999) also noted the inability of students to apply the knowledge acquired in the classroom environment to other situations outside the classroom environment because they lack understanding of the subject. Also Nzewi and Osisioma (1994) observed lack of appropriate cognitive skills by the students in the subject. They lack the ability to perform tasks of varying complexity. It is possible that the inability of the
students to relate what they learnt in the classroom to real life situation or solve mathematical problems have a significant relationship with higher order of thinking. Perhaps the students are deficient in these areas; hence they perform poorly in Mathematics examination.

Adebule (2002) and Balogun (2012) noted that the alarming rate of failure and poor performance of students at both the internal and external examinations are pointers to the need for a workshop for an improvement. Many researches confirmed that students achievement in mathematics at both primary and secondary schools have worsened over the years and it is a common phenomenon to put the blame on students for not performing excellently well in the subject (Adebule & Ayodele, 2006). As a result of this, students continue to develop negative attitude towards the learning of the subject.

If any of secondary school students is asked to comment on the Mathematics classroom situation, he/she will probably say that it is not interesting. Some may complain about the teacher’s cane, while some will complain about the abstract nature of the subject, some will tell one that the pace at which the teaching is going is too fast and so many other responses of such. A lot of researches have been done on the general poor performances of students in Mathematics and the blame of the poor performances has been shifted on the students and the teachers.

**Teacher’s Factor**

At this juncture one cannot but speak on the teacher’s factors on the achievement of students in Mathematics. Many Mathematics teachers see the subject as a set of manipulation tricks which he/she has to pass on to the students. This haphazard method of teaching emphasizes memorization at the expenses of understanding basic mathematical concepts. It takes a good Mathematics teacher to apply the adequate methods in his/her presentation to arouse the interest of his students and to make the best use of available structure to achieve high goals. Mathematics teacher should be able to present Mathematical concepts lucidly in order to impact some mathematical knowledge to the students and equally hope that they would understand. However, one of the problems of poor achievement identified by Mathematics educators is traceable to the fact that most mathematics teachers are unable to teach effectively because they are handicapped in and are ignorant of some of the mathematics contents in the syllabus they are required to handle and appropriate teaching strategies to be used for concepts formation, generalization, computational skills as well as problem solving skills in Mathematics (Adebule & Ayodele, 2006). In many cases, teachers teach mathematics in a rather abstract way because of inadequate preparation, poor teaching methods and lack of instructional materials. A serious factor among many that affect learning and understanding of Mathematics is the quality of the school Mathematics teachers as regards his knowledge based on; Mathematics contents, epistemology and pedagogy. The ways some Mathematics teachers present their lessons do a lot of damage to the brain of the students and bring fear instead of love into them. Many Mathematics teachers come to the classroom with worked examples copied from textbooks and dictate or write them on the chalkboards for students to copy without questioning.

**Under achievement in Mathematics**

The fact still remains that most of the teachers in our secondary schools today are examiners either with WAEC, NECO, NABTEB or NTI and their experiences with these bodies should be brought into the classroom situation (Alonge, 2003). The issue of under achievement in
Mathematics could also be discussed from the social aspect. The social aspect includes learning environment which has the role to encourage students to be independent and manage to foster respect among them in producing different strategies in problem solving. Studies on learning environment have been done by several researchers and the findings have shown that there exists consistent relationship between the learning environment and students cognitive and affective outcomes. Learning environment has become the predictor while classrooms have been the criterion variable in past studies (Majeed, et al, 2002).

The teacher occupies a pride of place in the teaching and learning process. He is the heart and soul of the educational enterprise and life wire of the school system charged with the divine professional obligation of building highly responsible, discipline and useful Nigerians (Mkpa 2002). Babarinde (2003) supported this stance by high-lighting the role of teachers in the upbringing of the youth as well as serving as loco parentis and added the effort to foster good character and inculcate worthwhile learning would be achieved with greater case and mutual benefit. According to National Policy on Education (Revised 2004), teacher education would continue to be given a major emphasis in all our educational planning because no educational system can rise above the quality of its teachers. The teacher’s knowledge of the subject matter and the methods of teaching it are known to be highly important in bringing about good performance among the students.

Some researchers who have expended efforts in finding solutions to the perennial students’ under-achievement in science and mathematics are Akinsola (1994), Adesoji (2000), and Osegbo (2004). Their studies highlighted some contributing factors to students under-achievement in science and Mathematics to include anxiety and lack of preparation among candidates, poor understanding of Mathematical languages by both the student and the teacher, poor conceptualization by both teachers and learners, over-loaded mathematics content, stereotype teaching method, inadequate number of qualified science and Mathematics teachers, poor Mathematics classroom environment and gender associated problems. They have reported that over fifty percent (50%) of these factors are either attitudinal factor from students and Mathematics teachers or to the poor analytical patterns of teaching Mathematical ideas by the teachers to the student.

Balogun (2012), Akinsola (1994) and Adetunji (1994) reported that teacher characteristics such as level of educational attainment, experience, attitude towards the teaching of Mathematics affect their student’s performance in Mathematics. Other students reported that students and teachers appear to hold inadequate knowledge of Mathematics to an extent that their traditional beliefs of the dreadful nature of the subject still dominate the search for deeper understanding of the subject which could enhance their performance. The writer strongly views preparation of teachers as a very important step towards their educational empowerment, no wonder then that the adoption of education as a veritable instrument par excellence for effecting national development (NPE 2004 revised). Today, many organizations have sprung up to assist students have better performance in Mathematics. Such organizations include Olympiad Mathematic Competition, Cowbell Mathematics Competition, National Academy of Science Mathematics Competition and others. These provide collaborative efforts in promoting the teaching and learning of Mathematics nationwide. Presenting their annual report on performance in Mathematics for 2010, the Chief examiners stated as follows:
“Candidate performance is generally poor, as model marks for most of the centre is in between zero and ten marks. Evidence of poor preparations for the paper is abundantly manifested in the answers of many candidates as some of these candidates did not go beyond writing down the questions” (WAEC, CE’S Report, 2010), and Ekiti State WAEC and NECO result.

Table 1:

<table>
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<tr>
<th>MALE</th>
<th>FEMALE</th>
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Sources: Ministry of Education and Technology Ado-Ekiti and Balogun (2012)

Table 2:

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<th>%</th>
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<th>FEMALE</th>
<th>TOTAL</th>
<th>%</th>
<th>MALE</th>
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Sources: Ministry of Education and Technology Ado-Ekiti & Balogun (2012)
Table 3:
Performance of Candidates in Mathematics WASSCE from 2001-2010

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<tr>
<th>Year</th>
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<th>Percentage with Pass and Below (%) D7-F9</th>
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<tr>
<td>2002</td>
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<td>2003</td>
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<tr>
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<td>2006</td>
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<td>77.00</td>
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<tr>
<td>2009</td>
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<tr>
<td>2010</td>
<td>25.9</td>
<td>74.01</td>
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Sources: WAEC Statistics Division and Balogun (2012)

A cursory look at the results of examinations on Table 1 reveals that there has been persistent mass failure of students in Mathematics in public examination (WAEC) in this country. The problem of effective teaching and learning of Mathematics at the secondary school level has become a sensitive issue that should be taken with all seriousness. In view of the foregoing, the challenge in the educational programme of the country is to examine some of the teachers’ factors vis-à-vis organizing instructions which can facilitate productive teaching and learning. Indeed, the challenge in the teaching of Mathematics is being geared towards organizing instructions that will facilitate productive learning by the students in order to enhance academic standard. Indeed, studies further confirmed that poor quality instruction impairs the learning of both high and low intelligent students. On the other hand, they noted that high quality instruction assisted most students to achieve approximately the same high level in spite of difference in intelligence aptitudes or entry behavior into learning.

Considering the fact that quality of teaching is a product of many variable such as teacher’s personality which includes the length of training undergone, the number of teaching hours per week, the level of certificate, ability to teach effectively, his proficiency, mastery of the subject matters, status in public examination and his experience, school environment and class size. Attitude towards the teaching and learning of mathematics is of great importance as it affects performance. The relationship between attitudes and performance is certainly the consequence of a reciprocal influence, in that attitudes affect achievement and achievement in turn affects attitudes. Attitude towards Mathematics was found to be one of the variables that significantly predict student achievement in Mathematics at the thinking level. This view was corroborated by Akinsola (1999) that other socio-psychological factors such as study habit, self concept, future aspiration and Mathematics achievement at the lower levels are more important than the other factors in predicting students’ achievement in senior secondary school Mathematics at the thinking level. When poor achievement persists, it could cause the formation of poor attitude to the subject prior to learning which could lead to poor achievement. Negative attitude developed through repeated failure has often been blamed on the teacher. It is therefore, the teachers’ responsibility to explore those variables in teaching...
and learning which assist the learning to be proficient, Ike (1976) in a study on causes of poor results in Mathematics observed that Federal Government Colleges achieve good results because of the high quality of their staff and the facilities provided for their pupils. This may appear to be a simplistic assessment of the variables that account for students’ results but it is good to suggest the fact that teaching variables are very potent in the prediction of students’ achievement. In supporting this claim, quality achievement in school science (including Mathematics) requires a teacher who is trained in relevant skills. This emphasizes the importance of the training of the mind as being very crucial in the understanding of the world around one, and the acquisition of appropriate skills, abilities and competencies. The learner through the acquisition of reasoning acquires relevant skills and attitudes that may enable him develop general scientific attitude which can equip him to deal with any problem in the field of human endeavour, from the real life fact and to transmit them into scientific statement, draw correct conclusion on the basis of accepted logical individual and national development.

Environment and Mathematics

Balogun (2012) confirmed that problem solving skills enable the students to apply their skills to both familiar and unfamiliar situation thereby giving them the ability to use tests theories and also create their own before applying them. By developing problem solving strategies, students learn to understand problems, device plans, carry out plans, analyse and review the accuracy of their solutions. The methods involved problem solving, develop the use of reasoning, careful and reasonable argument and decision-making. The sustained poor achievement status of secondary school students in Mathematics has become nationally too embarrassing for comfort. Several factors are deemed responsible for this malady, prominent among which is the abstract way Mathematics is been taught in schools. It is generally believed that if the abstraction in Mathematics education is minimized, there would be positive differences in students’ achievement of the subject (Iykekpoler, Adamu and Ayuba 2011). A number of research studies have investigated and documented the major factors, which contribute to secondary school students’ poor achievement in their study of Mathematics. Some of the factors of poor achievement identified include low levels of teachers cognitive competence in Mathematics (Igbokwe, 1994), students negative attitudes toward Mathematics (Bayelo and Olaleru, 1987), lack of qualified Mathematics teacher (Adeniran, 2003) and the abstract methods used by teachers in teaching Mathematics (Azuka, 2006 and Kurumeh, 2006). No effort should be spared in search of sustainable remedy to this malady of dismal performance profile. Hence, it is important to also consider the environmental variables that may help to improve students’ performance with a view to consider their effects on teaching and learning of also the subject. The teaching and learning of Mathematics according to Alonge (2003) will not be complete unless the students taught are examined, their script are marked and their results are released as at when due. The situation hereby students are not attend to in the classroom and where we have backlog of examination results should be a matter of great concerns to all stakeholder of the education sector.

Mathematics is defined as the foundation of hard-core science and technology and it is a liable index of the potential for development. Obodo (2001) describes mathematics as the language for computer in the new millennium and that the advancement of technology is deeply rooted in mathematics. Haber (2000) conceptualized Mathematics as culture, which affords man the opportunity to know and assess things and objectives within his immediate and remote environment; the vantage position of Mathematics in the society as evidence from the above statement is equally recognized by the Federal Ministry of Education (NPE, 2004),
when it included the inculcation of permanent and functional numeracy as one of the general objectives of the primary education. The success of Mathematics teaching and learning in secondary schools depends to a large extent on the solid foundation laid for its study at the grass root level of the nation’s educational system. This view was upheld by Adetunji (2000) when he opined that a sound Mathematics education in the primary school would greatly enhance achievement in the subject at higher levels. The under-achievement record in Mathematics in Nigeria over the years in External examinations is a strong pointer that something positive has to be done at the primary and secondary levels of our educational system in the direction of learning and teaching of the subject.

Qualities of Mathematics Teachers
Mathematics teachers’ perception of the subject and impact of his preparation affect a student’s performance. Behind every successful lesson is a good teacher. It takes a good teacher to apply the correct method in his presentation to arouse the interest of his students and to make the best use of available structure to achieve higher goal. Akinola (1994) states that the symptoms among many that affect learning and understanding of Mathematics is the quality of the school Mathematics teacher. The quality of Mathematics teacher is defined as his or her knowledge based on Mathematics contents, epistemology and pedagogy.

Mathematics content refers to the breadth and more importantly the depth of the Mathematics knowledge possessed by the teacher. A teacher who is not well grounded in the content to be delivered might try to ‘panel beat’ his teaching thereby hindering students understanding of the content at hand. It is an important component because it affects both what the teacher teach and how they teach it. Knowledge of epistemology on the other hand includes the teacher’s understanding of how students learn Mathematics. Teachers must understand fundamental psychological principles of learning if effective teaching is to take place. Knowledge of pedagogy similarly refers to teacher’s ability to implement psychological principles, that is, their skills to teach and to blend with the above factors or else it will impair their teaching and this could hinder student’s ability to understand instruction. Burten (1980) asserts that organizing ability promotes or inhibits mathematics learning. If a teacher is used to making plan in advance and informing his students of his intention, such teacher will teach mathematics differently from somebody else who is not in the habit of programming his daily work.

Teachers are generally seen as moulders and builders of the society. Teacher’s quality therefore is an index of educational development of any nation. The potential of any education system is related to the ability of its teachers. The quality of education depends to a great extent on the quality of the teacher. The teacher is an inevitable factor in the execution of any given curriculum. The teacher is expected to have a broad educational background and professional competence in his field to be able to meet the need of the learners while responding to the challenges of the time and place. The services of teachers are what influence the lives of a nation’s youth and future. It is therefore expected that the cognitive achievement of student is entirely on the quality and competence of our teachers. Hence, training of teachers for the success of the UBE programme is a priority. Effective Mathematics teacher is indispensable in the teaching of Mathematics. An effective teacher of mathematics should be capable of making the subject understandable, meaningful, interesting, sensible and application to his students and possesses an adequate background in Mathematical content. In many of our schools, Mathematics is taught by people who are
neither interested nor qualified in it. This painful situation shows the animosity in the teaching of Mathematics.

Student and Mathematics Achievement
Numerous problems emanate from the side of the Mathematics students that water down the quality of performance in Mathematics. Most of these are attitudinal. The attitude of the students constitutes problem to their grappling Mathematical knowledge. The assumption that Mathematics is just a read-and-understand subject like liberal Arts is a major problem of a mathematics student. Commonly, students shun practices of Mathematics not knowing that a true understanding of Mathematical system depends largely on the amount of time devoted to practicing it, unfortunately, they have not been able to apply them to appropriate situations. They are found of memorizing solutions and formulae without any attempts to understand or query their derivation or relevance. Little wonder, they are often in a fix when they are required to solve problem which are new to them, as this method of learning by role gives little or no room for mental development and creativity. Despite the importance and the contribution of Mathematics to nation building, mathematics is still been dreaded by secondary school students (Oyeniran, 2011). Some students consider Mathematicians to be special people. They believe Mathematics is highly structured and abstract that its study required some intellectual talent. “How would any person in fairness expect our poor and innocent children to be as courageous as to face something which is capable of making even an adult to be mad?” Obodo (2001) observed that Mathematics is not as bad or difficult as it is painted by some students, but that students sometimes prefer doing other difficult things than attending Mathematics class because of their hatred for the subject which invariably leads to student’s low achievement in the subject. Akinsola (1999) and Kurumeh (2006) observed that students’ performance in Mathematics is low because Mathematics students are not acquiring the skills and understanding they needed to participate effectively in the culture, political and scientific environment later in future.

Sources of Student Under achievement
Several scholars have identified the source of students under achievement in Mathematics in Nigeria but Akinsola (1994) stated it as follows:

i. Poor method of instruction
ii. Lack of problem solving abilities
iii. Students negative attitude toward the students
iv. Limited background preparation in Mathematics and
v. Mathematics fright

The programme of instruction should inculcate in the learners the spirit of critical investigations, conjecturing, hypothesizing and experimentation for them to be able to prove their skills as they come actively engaged in doing Mathematics through problem posing, problem analysis, problem solving and accelerated classroom discourse. There is a need for the adoption of some learners centered activity. This could enhance learners understanding and this improves their academic performance. A poor interest towards Mathematics is thought to plague learners at every level of schooling. The fear of answering Mathematics questions, in classroom and / or taking Mathematics test often escalate to a level termed Mathematics anxiety which contributes to the poor performance in Mathematics. Fakuade (1983) attributed three principal factors as inhibiting to Mathematics achievement among secondary school students. These are:
i. Home background problem which occurs during the early childhood period,
ii. Environmental background limitations which occur as the child develop through childhood to adolescent; and
iii. Edifying background preparation in Mathematics in the primary school, a condition he termed to be a carryover effect.

Kline (1996) was categorical about attitude and commented that there was no special gift or qualities of mind to learn Mathematics. It is stressed that the subject is within the grass of anyone. This attitude of pupils who are incapable of performing well in Mathematics can hence be related to their wellness to choose, to grasp or not to grasp the subject. Laziness, nonchalant attitudes, indifference, abandonment, unwillingness, disinterest or downright surrender are elements which can be deduced from Kline’s principle on studying Mathematics as a subject. Therefore, the students’ attitude towards the teacher many be important in the formation of Mathematics attitude.

Effectiveness of Problem Solving Strategy and Students Performance in Mathematics

It is possible that the inability of the students to relate what they learnt in the classroom to real life situation or solve Mathematics problems have a significant relationship with higher order of thinking (Popoola 2004). Students are not positively disposed to the study of Mathematics and perhaps they do not have sufficient opportunity for problem solving activities. Students do not consistently demonstrate certain desired level of critical thinking which can facilitate their understanding of Mathematics. Popoola (2004) asserts that problem-solving strategy developed by the researcher which was used to teach Mathematics concept consists of nine major procedural steps which include:

i. Presentation of problem by teacher
ii. Identifying the variables in the problem
iii. Student to define the problem in his language
iv. Making plan to solve the problem
v. Carrying out the plan
vi. Exploring alternative approach
vii. Observe and tabulate the result in step iv and vi
viii. Check the result by looking back to step i-vii
ix. Generalize and apply approach to similar problem as in step i-vii

Pulos and Sneider (1994) believe that for teachers to meaningfully enhance learning and enhance interest in Mathematics, they should tap heavily from devices which have direct sensory appeal and at the same time exhibit and clarify Mathematical concepts and relations, such that include heuristic problem solving strategy. The proper use of such strategy has complete psychological justification. This kind of instructional technique is likely to facilitate student’s Mathematical problem solving abilities so as to improve student’s performance in the subject.

Conclusion

Effective teaching is one of the ways of improving the achievement of students in Mathematics. The teaching of mathematics should be done to help the learner’s see, evaluate and appreciate the beauty and inherent universal usefulness in all sphere of the economy and improve their achievement in the subject.
References


