

# THE USE OF TECHNOLOGY ASSISTED INSTRUCTION IN SCIENCE TEACHING AND LEARNING: AN INDEX FOR THE ACHIEVEMENT OF NATIONAL DEVELOPMENT

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## **Abstract**

In the last three decades, education has been greatly advanced due to technology where students are able to learn on a global scale. In view of this, the paper has given the highlight of how TAI can be used in the teaching and learning of sciences in order to enhance student's performance. The paper further explains how Technology Assisted Instruction (TAI) can help in the achievement of national development. Among other suggestions the paper suggested, that students should be engaged in learning science as a composite discipline in working with hands and tools, as well as design more advanced activities and analysis on issues surrounding their environment and the nation in general. Systematic experimentation as a tool to discover/verify theoretical principles and work on locally significant projects involving science and technology should be an important part of the curriculum.

Science and technology plays a vital role in the socio- economic development of all nations. In view of this, developed countries like Britain, Australia, United States of America, Japan, to mention but a few are stressing the need for discoveries in fundamental materials of importance in all fields of sciences. Adinoyi (2005) suggested that if development is to be accomplished in a nation like Nigeria, then technological development and scientific literacy has to come first. However, the low performance of students in sciences as reported by the National Center for Science Education NCSE (2006) has put science education in the nation in a state of crisis. Bala (2010) pointed out that in Nigeria, various factors have contributed to the decay in the educational

systems among which are inappropriate teaching skills, lack of up to date information and poor funding. Other problems are poor teaching skills, non application of science to production activities, lack of teaching resources, poor funding and non implementation of research findings. The culmination of the above problems has made it difficult to produce scientifically literate individuals capable of promoting the country scientifically and technologically forward.

(NTI, 2007) reported that the mastery of science concepts cannot be fully achieved without the use of instructional learning materials; hence the teaching of science without learning materials will certainly result to poor academic achievement, consequently the students will become unproductive. Franzers, Okebukola and Jegede (1992) stressed that a professionally qualified science teacher cannot put ideas into practice if equipments and materials necessary to translate competence into reality are lacking. Yusuf (2009) described instructional or teaching materials as those items used by the teacher to pass information to students. Achimugu (2000) posited that students comprehend and remember better when

teaching materials are employed in the teaching-learning process. It is therefore envisaged that instructional materials if carefully and properly planned may enhance the teaching and learning of science. Adesoji and Raimi (2004) suggested that better programs should be adopted for the teaching of science subjects with the hope of attaining and achieving effective classroom teaching that can produce individuals who will at the end acquire the necessary process skills, achieve and retain better what they have learnt in order to be productive in the society. Betiku (2000) and Ayua (2011) revealed that there are materials which can be used to teach science in order to make learning experience effective and beneficial. It is in this regard that the paper highlights on how technology assisted instruction (TAI) can be utilized in the learning of science with a view to producing highly skilled individuals that can help in achieving National Development

### **What is Technology Assisted Instruction (TAI)?**

Walker, Voce, and Ahmad (2012) defined Technology Assisted Instruction as the application of information and communication technology in the process of teaching and learning. While Roberts (2003) viewed Technology Assisted instruction (TAI) to be synonymous with equipment and infrastructure; it is an “online facility or system that directly supports teaching and learning. Bling, Munro, and Eynon (2008) narrated that what is more commonly found in practice is that technology is used to replicate or supplement traditional teaching technique. Technology Assisted Instruction is of various kinds; for example, computer based instruction, interactive multimedia board instruction, internet based education or on- line education, virtual field instructional

strategy to mention but a few. Also, after the adoption of technology for education in California, Cuban (2001) observed that an overwhelming majority of teachers employ technology to sustain existing patterns of teaching rather than to innovate. Dahlgren (2005); Marton and Saljo (2005) stated that computer mediated interaction provided a highly structured context which successfully engage students and supported their performance. However, the teaching method that is commonly practiced in the teaching of sciences in Nigeria is the lecture method, comprising of reading and memorization of textual materials. (Yoloye 1983) explained that the consequence is that students were being trained mainly to "remember" but not to "understand", to "think", or to "produce" or to “feel”. On the other hand, the United Nations’ International Children’s Education Fund (UNICEF, 2007) described quality education as the key to sustainable development, and a major key to the attainment of Millennium Development Goals (MDGs). Nigeria, just like other countries of the world is a partner in the attainment of these goals (United Nations, 2007). Hence, one of the biggest challenges facing Nigeria at present is the provision of quality education for all the citizens. Nigerian government has persistently emphasized the need for the provision of high quality education in Science, Technology, and Mathematics Education (STME). In agreement with these, Amoo and Efunbajo (2003) pointed out that a strong background in STME is crucial for many careers and job opportunities in today’s increasingly technological society.

### **Benefits of Technology Assisted Learning**

Suwaid (2013) stated that technology assisted learning may serve as a foundation for the achievement of a deep understanding of complex ideas that are embedded in ICT as well as provide an avenue for the constant practice and mastery of science process skills; the application of which can foster national development. Ringstaff and Kelly (2002) explained that the use of technology-assisted instruction can foster more of student-centered learning and can help to extend the period of interaction from in class to out of class settings; thus the place of interaction is no longer limited to classroom. Osland, Kolb, and Rubin (2001) stressed the importance of learning through experience; in such a case technology assisted learning may be more effective since an effective learning begins from reflection and conceptualization to action followed by enhanced experience.

Funmilola, Musa, and Hussain (2014) pointed out that the use of information communication technology in the education sector has helped in strengthening awareness about the importance of preservation of information of all kinds and sharing of knowledge by promoting the free flow of ideas and universal access to information. For example in a study conducted by Bork (1978), the study described the way in which physics was taught at Irvine in the fall of 1976 to approximately 300 students. The

students had a choice of using a standard text book or extensive use of various computer aids. The course was self-phased; so students were given the choice of using their own pacing strategy. The course was designed as mastery based course along the lines of a “Keller plan” or Personalized System of Instruction (PSI), in which the course is organized into smaller modules. Each module is presumed to be developed around a carefully set of objectives and at the end of each module, students are given a test, until a satisfactory level of achievement is reached; they are not permitted to move to the next module. The findings of the study showed that the students that used computer aids were significantly faster and better in their task accomplishment

In another related study, Muddassir (2011) investigated the importance of ICT in empowering teachers and learners thereby enhancing student’s performance. In this study, student-teachers’ ability, gender influence was examined. A sample of 382 subjects was used for the study (181 males and 201 females). Data was collected by using a questionnaire, and was analyzed using percentages, mean, and Chi-square statistics. The findings revealed that the majority of the subjects had positive attitude towards the use of ICT. However, there was no significant difference established between the attitude and competence of male and female subjects. The only problem is that the student-teachers lack the necessary competence in the full integration of ICT in the curriculum. This underscores the need to improve the ICT contents of teacher education programme in universities in developing nations.

### **Technology Assisted Instruction for national development.**

Technology Assisted Instruction is not only about imparting a ready- made knowledge but also about the ability to see and be able to utilize the technological devices both within and outside the classroom. Technology is redefining the way we do almost everything hence serves as a ready- made tool for all strata of the society (Fumilola, Musa and Hussaini (2014). In this regard the various governments and people around the world have started appreciating the tremendous impact of technology assisted instruction in enhancing science learning there by stimulating rapid development in all sectors of the economy. In most developing nations, the various stages of achieving development in various aspects of the society; for instance, public administration, urban, and rural development, transport sector, etc., is being taught in the classroom using the conventional face to face lecture method, the progress of which is very slow. However, the diffusion of ICT into the nations’ educational system has started showing improvement in the growth and the manner with which the nation’s economy can be improved. Consequently, if the use of technology enhanced learning is assimilated into the nation’s education curriculum, there will be tremendous improvement.

In another development, Muonome (2013) cited in Woermer, Rivers and Vochell (1991) stated that “hands on” laboratory experience in learning science concepts is the most acceptable way of teaching science in all educational institutions, regardless of the level. The “hands on” approach of teaching and learning is based on the cognitive levels of development originally outlined by Piaget and which in Chinese proverbs implies “ I hear I forget, “ I see I remember, I do and I understand.” Muonome (2013) further explained that students are learning, adopting, and using technology at a much faster rate than their adult counterparts, and many adults have great fears or rather, they are not comfortable with most of the technological tools that are in use today. Therefore, it becomes imperative that educators incorporate various technologies into their educational toolkits in order to reach students’ capability and interest thereby becoming relevant in changing the society at large. Generally the plethora of creative and communication aspects offered by interactive multimedia as a form of technology assisted instruction

presents a clear picture of real life applications from multiple user perspective; hence it clears the path to a sustainable national development.

Hamza (2007) emphasized that the use of technology assisted instruction in our educational setting can help to expand the horizon of the people through the visual impact and the technical expertise experienced by the pupils in the process of teaching and learning which in the long run, can assist the individuals in building a dependable nation. In other words, greater awareness is being enhanced as past, future, forecasting, and current issues are easily being accessed and addressed. Furthermore, Hamza (2007) went on to say that with the advent of technology assisted instruction, things strange to people in other parts of the world are brought to their acquaintance.

Agbonlahor (2005) reported that education and training involves the process of communication between the providers of information and the receivers therefore with the advent of information communication technology (ICT) and its advantages, there have been improvements in the education sector particularly in the area of course delivery. ICT has served as a facilitator in the general development of the educational environments due to the fact that the use of ICT has greatly improved in the area of teaching and learning. For instance, the adoption of technology assisted instruction has generally enhanced learning in a variety of ways, like general schools management and the like; the impact of which will be reflected in achieving the nation's objectives.

### **Conclusion**

The employment of technology assisted instruction in the teaching of science concepts will help to improve the flow of applicable knowledge, skills, capability, and expertise. It will also encourage students to develop interest in the learning process. Other benefits of the use of technology assisted instruction in the teaching and learning of science is that it will help to engage students fully, thereby making them respond well in ways that can engage them adequately in the teaching and learning process; and can help to foster greater enthusiasm for learning, increase motivation, participation, collaboration, as a result of clearer, more efficient and dynamic presentations which in the long run will help individuals to forge ahead and use the knowledge that they acquired in solving developmental issues.

### **Suggestions**

- Students should be engaged in learning science as a composite discipline in working with hands and tools. As well as designing more advanced activities and analysis on issues surrounding their environment, and the nation in general.
- Systematic experimentation as a tool to discover/verify theoretical principles and working on locally significant projects involving science and technology should be an important part of the curriculum.
- Since most scientific concepts are abstract in nature, and scientific methods are complex, then specially designed technology for specific instructional purposes should be adopted in science classrooms in order to support students to learn related scientific concepts better.
- Students should be allowed to practice the use of various technological devices in the learning environment as it provides an excellent means of developing science process skills and higher order thinking skills.

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