
Technology Assisted Instruction an Index for the Acquisition of Science Process Skills for Entrepreneurship and National Development

SAUDAT SHEHU BALA

*Department of Integrated Science,
Federal College of Education, Kano,
Kano State, Nigeria.*

Abstract

Technology-Assisted Instruction (TAI) is an effective means of teaching and learning science concepts. In line with this paper, TAI can serve as an index for the acquisition of science process skills in science classrooms, and the acquisition of science process skills is an essential factor in the area of entrepreneurship. Technology Assisted Instruction (TAI) like other technologies can be used in a variety of ways, and its usage depends on the user and the context. This paper therefore tried to briefly explain the concept of technology assisted instruction, the concept of Science Process Skills, and the impact of TAI in science classrooms. And furthermore the paper tried to figure out the relationship between science process skills and entrepreneurship for National Development. In conclusion the paper concluded that if the use of TAI is encouraged in science classrooms, students will be able to acquire the necessary science process skills that can be used as tools for entrepreneurship, and consequently bring about National development. The paper finally suggested that the use of technology assisted instruction (TAI) should be encouraged by school proprietors and various government agencies through the provision of teaching and learning materials like computers and the like. Therefore non Governmental Organizations (NGOs), Parent Teachers Associations (PTA), and other stake holders in education should provide adequate funding for the purchase of various technological devices.

The teaching and learning of science in Nigerian schools hardly follows the nature of science, what is rather obtained is shallow rooted instruction that leads to superficial acquisition of knowledge which cannot be appropriately applied in or out of school situation or lead to a successful achievement in learning. This has rendered the learning of science to be difficult, un- interesting, abstract, and in some cases meaningless. In view of this 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. It is in this regard that this paper intends to

discuss how the use of technology assisted instruction can improve the acquisition of science process skills for entrepreneurship and national development.

Betiku (2000) and Ayua (2011) also revealed that there are materials which can be used to effectively teach science in order to make learning experience effective. It is in this regard that this paper attempts to discuss how the use of technology assisted instruction can help students to acquire the necessary science process skills, which may encourage the spirit for entrepreneurship, thereby improving the chances for National development in Nigeria.

What is Technology?

The word technology is derived from a Greek word “techen” meaning art or skill and “logia” meaning the making, modification or usage of tools, machines, techniques, crafts and so on in order to solve a problem, or improve a pre-existing solution to a problem. The term technology can be applied to specific areas, for example construction technology, medical technology and information communication technology among others. Karl (2001) defined the term technology as material and immaterial entities created by the application of mental and physical efforts in order to achieve some values. In this usage technology refers to tools and machines that may be used to solve real-world problems. It is a far reaching term that may include simple tools, such as a crowbar or wooden spoon, or more complex machines such as a space station, a computer, a projector and the like. Technology has affected man in a number of ways both positively and negatively. For instance, the development of more advanced economies, rise in pollution level, depletion of natural resources to mention but a few. Various implementations of technology influence the value of the society and raise new ethical values. Therefore this paper tried to figure out how technology can be used in science learning so as to acquire the science process skills that are necessary for the development of the spirit of entrepreneurship in students which can serve as a tool for the achievement of growth and national development in Nigeria.

The Concept of Technology Assisted Instruction (TAI)

Walker, Voce, and Ahmad, (2012) described Technology-Assisted Instruction (TAI) as the application of information and communication technology in the process of teaching and learning. Roberts (2003) reported that Technology-Assisted Instruction (TAI) is considered to be synonymous with equipment and infrastructure. It is an online facility or system that directly supports teaching and learning. Technology-Assisted Instruction (TAI) is of various kinds, for example computer based instruction, interactive multimedia board instruction, internet based education, virtual field instructional strategy to mention but a few.

Some researchers like Munro (2008) and Luftenegger (2012) have recognized and advocated the importance of the use of educational technology for the promotion of life long- learning. Ringstaff and Kelly (2002) proposed that the use of Technology-Assisted Instruction (TAI) 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 the classroom. Osland (2001) stressed the importance

of learning through experience; in such a case Technology- Assisted Instruction (TAI) may be more effective. This is to say an effective learning would begin from reflection and conceptualization to action followed by methods .The adoption of Technology-Assisted Instruction (TAI) has numerous advantages in the teaching and learning process as it offers exciting approaches not only in the area of teaching and learning but in everyday life. McFarlane and Sakellariou (2002) reported that simulation varieties provide an excellent means of developing science process skills and higher order thinking skills as a part of students' interaction with soft ware and can be extended beyond the classroom. Hence this paper tried to explain how the use of TAI in science learning can aid students in entrepreneurship, thereby assist in the area of National development.

Nigeria like other countries have identified the benefits of technology assisted instruction in the acquisition of science process skills, because the use of TAI in the teaching of sciences as explained by Inyang (2009) can provide the students with the opportunity of gaining all the benefits engrossed in acquiring the basic scientific processes. Suwaid (2013) cited that the use of various technological devices has become a salient feature of most houses and social environments which can assist children to learn a lot of concepts and skills that are needed for the understanding of modern science concepts and which are related to the use of complex technology devices. Technology assisted learning can as well serve as an informal way of intimating learners with the programs and features of computers.

Science Process Skills

Science being the study of nature can be considered as the search for facts and beliefs in rational answers to questions about the nature of life and the universe. In pursuing those answers, scientists try to adhere to particular rules and habits of thoughts that have proved reliable in the painstaking process of building up increasingly dependable pictures of the world. The method of science, therefore, is a process or procedure of arriving at scientific facts. Their (1973) explained that the most distinguishing features of science is the method it uses for exploring about the universe. It is an activity that takes place in the mind as a result of certain intellectual processes, which are means by which one can examine the unknown, explore, and investigate through experimentation and analysis of the environment. There is no one scientific method but there are certain general principles that govern scientific processes. For example, process skills are means of learning that are peculiar and essential to the conduct of science and they can be termed as tools that are used to investigate the world around us and construct science concepts. Mifflin (2002) outlined process skills as the art of reasoning, cognitive development, critical and logical thinking, which generally includes observation, communication, measurement, comparison, contrasting, organizing, classifying, analyzing, inferring, hypothesizing, and predicting among others. He went further to say that the development of concepts depends on process skills because concepts and process skills are interrelated. Some studies by Miller and Wayne (1988), Suwaid (2013) revealed that process skills are means that help the child to understand school subjects as well as assist in the approach to everyday life. The

science process skills are regarded as general cognitive skills that man routinely employs. Example of the basic science process skills include, Observation, measurement, classification, communication, prediction and inferring.

The United Nations Educational, Scientific and Cultural Organization UNESCO (1992) in its own attempt summarized process skills as a series of activities that attempts to explain and re-define an existing situation, namely observation, questions, hypothesis, prediction, finding patterns and relationships, communicating effectively, designing and making, devising and planning, investigations, manipulation of materials and equipments effectively, measuring and calculating, then finally computing results in an effective way. The components of science education consist of science concepts and processes in intricate relations to how they can be conveyed to learners for the attainment of higher socio-economic status. Adequate delivery of these components have been the basis for the development of manpower in sciences and science allied fields and also the advancement of technology which has direct effect on the transformation of socio-economic status in a society. The following are some of the important functions of science process skills:-

- Helps the child in understanding the school subjects
- Helps the child in his approach to everyday life in all formal, informal, and common sense reasoning.
- Helps a child to understand scientific concepts
- Helps a child to reason well in his approach to everyday life
- Helps to improve a child's problem solving phase
- Serve as a science learning tools.

Impact of TAI in Science Classrooms

Generally technology denotes the application of tools and machines in solving a problem. In an educational setting it can be referred to the use or application of simple tools or machines in solving an educational problem or simply in facilitating the process of teaching and learning. These machines and tools ranges from simple machines like calculators, magnifying glasses, thermometers, barometers, saw, hammers, simple toys and so on; while the complex machines includes computers, projectors, television, DVDs, VCDs to mention but a few. Ideally the use of tools or machines is to conduct learning in a demonstrable way, in such a way that students will be involved. For an effective teaching of science concepts the teacher needs to collect all the resources and make use of all the necessary inclinations that can make learning interesting and real, for example charts, equipments, specimens, etc. most of the time these resources are often not available in Nigerian schools due to one reason or another e.g. lack of fund, lack of trained teachers or lack of adequate supervision by the school authorities. In view of these cumulative problems Ranade (2001) posited that computers can not only help them overcome these problems but will cause a great leap in the quality of science teaching and learning. Furthermore Renade (2001) went further to say that in the past the use of technology in teaching and learning did not proved to be effective, as most of the soft ware's were not fully understood in Africa. However with the advent of new technologies that are easy to use, for example micro

soft, power point, excel and so on, teachers can easily modify or produce their own technology assisted instruction soft wares, based on the educational level, the course content, as well as the age of the students, in order to achieve the desired educational objectives that can be used both in school and out of school situation.

The visual impact and interactive nature associated with the use of Technology-Assisted Instruction (TAI) can help to minimize the abstractions that are associated with the teaching and learning of science concepts and make the learning of science concrete and familiar. The employment of TAI in the teaching of science concepts can help to improve the flow of applicable knowledge, skills, capability, and expertise. Other benefits of the use of Technology- Assisted Instruction (TAI) in the teaching and learning of science is that it can help to engage students fully, thereby making them respond well in ways that can engage them adequately both within and beyond the classroom practice, and can help to foster greater skills, enthusiasm in learning, increase motivation, participation, collaboration, as a result of clearer, and more efficient dynamic presentations. Consequently the impact will make students to acquire the necessary skills needed for entrepreneurship.

Science Process Skills and Entrepreneurship for National Development

As earlier mentioned process skills are tools that students use to investigate science concepts and the world around them in general. While entrepreneurship denotes the creation of a business or any business enterprise for the purpose of providing goods or services that will consequently leads to profit making. Generally an entrepreneur needs to possess a business capital, which can be either in the form of fund or skills. Funds are use in financing the business or organization, while skills are always in the form of human capital and can be described as the ability of a person or personnel to create, maintain, modify or produce a product or service. Development literally denotes to an increase. The increase may be in terms of skills, capacity, ability, creativity, responsibility and well being (Ogundele, 2005). In view of the above interpretation it can be deduced that the creation of an entrepreneurship or business cannot be possible without the acquisition of skills. The combination of both in an individual will lead to an individual development in particular and National development in a general. Therefore the government should include the entrepreneurial education in all levels of education ie primary, secondary and tertiary education level. For example (Ogundele 2015) stated that at the primary school level the concept of reading and writing is not enough for the students, they must be taught how to develop the vision for a better future thus making them to be visionary and conscious. If this foundation is being laid in the primary school level there will be little or no problem in the secondary school level as the 6-3-3-4 system of education is equipped with the strategy of sorting, classifying, and building the students according to the area where they have exhibited their best competences. In a nut shell if development is to be achieved, then functional education must be encouraged in all sectors of education, in order for the students to acquire the necessary skills that are required for entrepreneurship that will build individuals who are capable of providing National growth and development.

Conclusion

The paper has explained that Technology Assisted Instruction (TAI) can serve as a very good teaching resource that can be employed in the teaching and learning of sciences in Nigerian schools, as it will help the students to acquire the science process skills, which have the tendency to bring up citizens with entrepreneurship qualities. The adoption of which will bring about National development.

Suggestions

- The use of TAI must be encouraged by teachers and various government agencies.
- Teaching and learning materials like computers must be provided by government and private school owners.
- Non Governmental Organizations (NGOs) and Parent Teachers Associations (PTA) and other stake holders in education should provide adequate funding for the purchase of teaching resources like computers and the like.
- The use of TAI in learning helps to visualize scientific facts.
- Professional associations like Science Teachers Association (STAN), Mathematics Association of Nigeria (MAN), and research centers like Nigerian Educational Research Centers (NERDC) should try to organize seminars and workshops on the use of TAI in science teaching and learning.
- On individual basis science teachers should try to be computer literate.

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