Indigenizing Science Education Curriculum Content using Concept Cartoons in Nigeria

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Scientific knowledge is very important as it is a shield against poisonous hands of global competitive economy. There is no doubt about it; societies operating at lower digital divide are at the verge of contracting neo-modern enslavement. Information and Communication Technology (ICT) is dissolving both national and international geographical boundaries, revolutionizing the way information is sent, received, organized, analyzed and interpreted. This article highlights on the importance of considering the learners’ cultural environment when designing ICT teaching and learning resources to suit our indigenous setting. However, the success of Information and Communication Technology revolution will not be complete until developing countries generate their content and build their own tools. This paper highlights on the importance of harnessing ICT resources to suit learners’ cultural environment (Indigenized Concept Cartoons in Science Education) for intellectual restitution.

Key words: Indigenizing, Science Education Content, Concept Cartoons, ICT and Nigeria

INTRODUCTION

Modern education, science inclusive is operating in a world where students had easy access to information and connecting with other students from different geographical and cultural environment at wider distance, through virtual worlds. These suggest that the traditional science education could not produce the desired effect in such arrangement. Productive science education is one that prepares students to effectively and systematically track information on how to know the unknown. Therefore, it is important to prepare citizens that can proactively and logically face and tackle unfamiliar situation to make appropriate decisions in such situations.

This is due to the fact that much of the content knowledge is vulnerable to easy decay. In most cases hardly can someone apply what he learnt in school, particularly in long duration courses.
This will make students to become more functional citizens by having the ability to identify, analyze, interpret and critique information to know where to appropriately act rather than being able to provide evolutionary evidences proposed by Darwin theory. Science is an evolving discipline. Science education that is bound to succeed is one that engages students in a more 'humanistic' way to produce scientific ideas. It has been opined that the idea of including content only when it might make a difference to a decision or choice a student might make, or to their viewpoint, represents a substantial shift from our traditional curriculum (Tytler, 2007).

Scientific knowledge is very important, as it is a shield against poisonous hands of global competitive economy. Modern generation need to be well prepared against the world of too many ideas, that is why Devlin-Foltz (2008) Opined that, modern students need to be responsible citizens for effective participation in the global marketplace of the 21st century. Science is a systematic way of acquiring relevant information in the environment, and scientific knowledge is shared and reviewed to push back the frontiers of ignorance. Science and technological development is affecting the way information is sent and received. In fact, reality is almost becoming virtual in nature. This suffices the need to bridge the gap between our daily experience and the virtual world brought by advances in Information and Communication Technology. Alvin Toffler argued that “The illiterate of the 21st century, will not be those who cannot read and write, but those who cannot learn, unlearn and relearn” (Victoria, 2002).

In this information age science curriculum can easily become obsolete even in the event that it has local relevance. This paper felt that the focus of science education in Nigeria should be on engaging young learners in their education, not on training future scientists. The deficiency of the current practice was its focus on recruiting traditional Scientists rather than on providing all students with opportunities to engage themselves with Science.

Information age is evolving a boundless world; hence today’s students have a broad world view and are interested in social and global problems. Easy access to information is pushing the modern students towards a multiple intellectual rectitude but having an indigenous content can be the bridge to understanding and engaging the competitive world. Building a culture of interest in science will enable Nigerians to cope with a future that will be very much dependent on science and Technology. According to Isiaku (2003), for country to function in a globalised world it must be able to pass through the triplication process, for perfect competition. Modern resources which partially reside in the brain (Science and Technology) not absolutely in the environment and the economy are knowledge based. This succinctly suggests that societies with relevant and functional Science education have higher probability of survival.

Therefore, by implication individuals with competences, skills and sensibilities to proactively and critically engage with new situation will have a higher advantage over those without them. There is a global shift on how information is transmitted from teacher to learner; these curricular changes affect the role of both the teacher and learner. In learner centered curriculum, customization of learning by the learner is squarely emphasized. But major challenges in modern learning environment is that attention span of the new generation is so short and full of distraction by electronics tools, moreover the frequent use of electronic tools is changing the way they prefer to send, retrieve and organize information. Living in the world of fast information decay and easy access to information, schools cannot remain mere venues for the transmission of a prescribed set of information from teacher to student over a fixed period of time. This suggests that traditional classroom practice is a retarded and obsolete means of communicating ideas today.
Information and Communication Technology (ICT)

Information is an acquired data that can be used to create meaning, which could be accessed via audio, visual or kinesthetic means; while communication is a process by which meaning is assigned and conveyed in an attempt to create shared understanding. Communication can be Personal, or mass communication. A scholar proposes different theories which include; Mechanistic; sender-receiver perfect, Psychological; sending meaning making, interpretation, Social-constructionist; truth, ideas are constructed or invented through social process. Communication has also been modeled in different dimensions for example; Aristotle believed that receiver hold the key to success in communication; Lass Well opined that an effect must be achieved if communication take place; Shannon and Weaver argued that Semantic noise can be a major communication barrier; Schramm suggest that overlapping experience makes it easier to communicate successfully; Riley’s acknowledged that membership in primary groups affects how messages are sent and received; and Berlo argued that several important factors must be considered relating to source, message, channel, and receiver (Riley and John, 1959).

Why ICT in schools

Information and Communication Technology is becoming a necessity in work places and schools, vis-à-vis;

- Computers are fast, accurate, and stupid. Humans are slow, inaccurate and brilliant. Together they are powerful beyond belief (Albert Einstein, 1879-1955)
- Unprecedented growth of information and communication technology
- Transforming education in the industrial society to education in the information society.

Concept of ICT

ICT history is often used to an extended synonym for information technology (IT) but it is usually a mere general term that stresses the role of unified communication and the integration of telecommunication (Telephone lines and wireless signals). ICT consist of all technical means used to handle information and communication, middle wires as well as necessary software, in other words ICT consist of audio and video processing, transmission and network based control and monitoring functions. The expression was first used in 1997 in a report by Dennis Stevenson to the UK government, and promoted by the National curriculum document for the UK in 2000. ICT is often used in the context of ICT road map, to indicate path an organization will take with their ICT needs.

ICT in teaching and learning

ICT has now been integrated in to teaching and learning because of the following facts:
- The information revolution has changed the way knowledge is acquired and used.
- In this world the curriculum is less of a running track and more a series of pathways through a plurality of learning programmed.

Theories of learning consistent with ICT

The role of ICT in acquiring and developing knowledge might be considered from the perspective of various learning theories:
- **Behaviorism**: Reinforcement by positive feedback; simple testing programs, mainly suited to commercial training.
- **Constructivism**: Piaget emphasized the role of experience in allowing the mind to pass from one stage to another during its development.
- **Social Constructivism**: Social interactions are seen as the source of learning rather than individual experience.
- **Stativity**: This suggests that learning is valid in the context where the learning took place but not necessarily in others.
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**Social Constructivism**

Piaget schema theory suggests that cultural set up of a society typify cognitive demand required for existence, because schema influences attention and absorption of new information. Individuals are more likely to notice things that agree in to their schema while re-interpreting contradictions as exception or distorting them to fit their scheme. The substantial claim of integrating ICT in education is student active involvement in learning process using humor and simulated scene to stir excitement of learning, often the intended message smothered by emotional tunes in the background; moreover, the content seems boring due to its dissonance with learners' cultural history.

Focus of any functional Science education is conceptual change or intellectual and attitudinal rectification. Modern Scientific concepts appeared more conflicting in the mind of Nigerian child living deeper in wider breadth of cultural belief and lengthy track of religious inclination. Scholars such as Wasagu (1998), Shumba (1999) and Cobern (2000) independently criticize the claim of culture deficit theory by arguing that let alone Science, generally knowledge is socially constructed, and in the process of construction cultural history served as filtering mechanism. Therefore, modern scientific ideas cannot supplant other ideas in the interpretation of facts and events in nature universally. Moreover, as argued by Goldhaber and Nieto (2010), scientific investigation is not an effort in search of absolute truth, rather an effort to moderate the inhibitory irritating doubt to determine where to act. He argued that there is no absolute reality. This reinforces the Piaget theory of constructivism or construction of reality.

Since cultural schemata influence interpretation in the process of reality construction, then facts and events that are similar may be given different meaning in different environment. Deducing from earlier mentioned schema theory, scientific content with foreign context would be difficult to comprehend by African learner due to lack of social support to hold the new conflicting belief in his local environment. It is the view of the authors that African learners have not embraced scientific belief because it is lacking cognitive concordance. This suggest that living in a modern scientific view makes an average African an insane in his local community hence no one is ready to be perceived as psychologically unstable. These views suggest also that the question of sanity depend on both perceivably correct belief (intellectual rectitude) and cognitive concordance. Therefore, in attempt to train students in Science education, a wider opportunity has to be developed for the learner to enjoy cognitive concordance so that his immense attention could be sustained for possible intellectual rectification. The major challenge in Science education in Nigeria today is not only the integration of ICT for Science Technology and Mathematics Education (STME), but equally to find knowledge and practices in family and community life that have common orientation with what Science education intend to teach the learners, this is how productive education would be developed in the mind of students.

**Culture and Cognition Debate**

According to Vygotskys’ (1987) theory of social constructivism, adults are conduits of knowledge while culture provides tools. Among the emerging recent tools surfaced Information and Communication Technology. ICT has exposed a lot of differences among the societies. One, among the recently debated difference is cognitive universalism.

The debates which almost sway against identity, is the collective memory and authenticity of universal mind which Science earlier claimed. The new understanding indicated that individuals experience their way of living as discrete
information and as schematic structures that organize such information. According to DiMaggio, in attempt to construct reality individual culture eliminate inconsistent element in the data. (Grosser and Bombard, 2008) This indicated that people differ in meaning making process.

Different scholars reported that there is difference between the ways Westerners and East Asians view the world. They argued that East Asians, whose more collectivist culture promotes group harmony and contextual understanding of situation, think in more holistic way, they pay attention to all the elements of a scene, to content and to the relationship between items. Western cultures in contrast, emphasize personal autonomy and formal logic, and so are more analytic and pay attention to particular objects and categories. Therefore, the assumption that culture can shape the way people think at these deep levels is a departure from psychology, which as a field, with a traditional belief that basic cognitive processes are universal (Varnum, Grossmann, Kitayama and Nisbett; 2010).

Indigenizing ICT Content

There is no doubt about it that societies operating at lower digital divide are at the verge of contracting neo-modern enslavement. Information and Communication Technology is dissolving both national and international geographical boundaries revolutionizing the way information is sent, received, organized, analyzed and interpreted. However, it has been observed that like any other revolution, its success will not be complete until developing countries generate their content and build their own tools (Mushava, 2016). Therefore, indigenizing ICT at home is supposed to be the topical agenda of Nigerian Science educators in order to function effectively in digital Sabbath. ICT Policy in educational sector has been established for almost two decades in Nigeria. ICT is an indispensable tool in the 21st century and critical element in Science Technology and Mathematics Education (STEM). However, there is a gap to be bridged if at all the ICT could thrive as functional element, that is taking charge of that revolution by indigenizing content. Foreign content is discriminatingly corrosive to our indigenous values. Therefore, harnessing ICT to suit our local content would not only preserve the cultural values of Nigeria but would also help the citizens to effectively customize their own learning in their cultural environment. Some people may argue about back sliding; however, it has been argued that building on what is already in place is a natural step before leapfrogging to better products, a process which can be sped up by democratizing education and incentivizing innovation (Mushava, 2016).

The main focus of social constructivism is learning through social interaction, and the value placed on cultural background. The theory suggests that child need cognitive tools in order to develop. One of the tools more recently affecting learning is electronic form of information access. It has been observed that, ICT has dramatically changed the processes of data capture, logging, modeling, and interpreting. Virtual experiments, virtual experiences, and social robots changed the psychological–socio-cultural learning environment (Stamoulis and Plakitsi, 2013). Benefit that can be derived from use of ICT includes: engagement of learners, interpretation in school science classrooms, easy upgrade of schools with contemporary Science, effective learning of virtually simulated scientific processes and skills, in addition to a simulated experimentation that provides visual feedback in a short time.

Use of Concept Cartoons as ICT Product in the Science Education Class room

Use of ICT in instruction has received wider consideration among educators in recent times most especially in developed parts of the world. Use of media for learning is almost becoming a
necessity in modern times. Educators use different forms of ICT in the educational activities. However, what enjoys wider application, abundance and easily found according to Hamidon, Subahan and Lilia (2010), is cartoon or humour CARTOON. Among the advantages of using cartoon is that it attracts students’ attention, boost interest, motivate learners and activate creativity. Based on the outlined advantages and role of cartoons in promoting science learning, this article aims at stressing the importance of indigenizing concept cartoons to promote learning of concepts, processes and skills.

CONCLUSION

Knowledge acquisition has been totally changed by ICT applications, because it has changed the way scientists act and do their research. In fact, ICTs are part of modern learner’s everyday life experience. Therefore, this article concluded that use of ICT as tool in Science education is necessity in the modern day setting; however, its adoption without indigenizing its content is corrosive to our National development. This can be achieved with Concept cartoon technology of ICT.

SUGGESTION

In attempt to train students in science education in developing countries like Nigeria, a wider opportunity should be provided for the learner to enjoy cognitive concordance so that his immense attention could be sustained for possible intellectual rectification. This can be through Indigenized Concept cartoons.

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