TRENDS IN INSTRUCTIONAL DESIGN: A QUEST FOR AN INDIGENOUS COMPUTER-AIDED LEARNING MODEL FOR NIGERIA

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Abstract

This article examines the state of children's edutainment software generally and their potential dynamics that have today transformed educational development in the west. It has been established that early child development (ECD) program poses positive long-time benefits on future learning potentials, educational attainment and productivity, a major goal of every school curriculum being to-form character, gaining understanding and skill acquisition. It is against this bearing that the Interactive Child Learning Aid Project (i-CLAP) is initiated, as a local instructional resource, towards enhancing academic achievement (assimilation, retention, recall, flexibility and motivation) in Pre-primary education in Nigeria. The project is aimed at determining the effectiveness of culturally sensitive instructional components and to possibly adapt Computer-Generated Animation with a view to fostering an African idea in digital imaging.
Keynotes: ICT in Education, Culturally Inclusive Design, Computer-Aided Learning, UBE.

Introduction

According to the Bureau of Labor Statistics, U.S. Department of Labor (2006), teachers act as facilitators or coaches, using interactive discussions and "hands-on" approaches to help students learn and apply concepts in subjects such as science, mathematics, or English. They utilize "props" or "manipulatives" to help children understand abstract concepts, solve problems and develop critical thought processes. For example, they teach the concepts of numbers or of addition and subtraction by playing board games. As the children get older, the teachers use more sophisticated materials, such as laboratory equipment. Lally et al (2005), affirm that infants build information not by subject, but; physical, emotional, social, simultaneously through their actions, interactions and observations; that is, the holistic nature of learning. Ebanks and Griffin (2005), in Azi (2006d), opine therefore, that preschool programs need to enhance instructional contents, in order to ensure that children, especially those most at risk for later school failure, start school with the skills that will lead to later academic success.

Educational software is a computer software whose primary purpose is teaching or self-learning, they are designed for use in school classrooms. Typically, they may be projected onto a large whiteboard at the front of the class and/or run simultaneously on a network of desktop computers in a classroom. This type of software is often called "classroom management software" (Wikipedia, the free encyclopedia.htm). While teachers often choose to use educational software from other categories in their IT suites (e.g. reference works, children's software), a whole category of educational software has grown up, specifically, intended to integrate learning with fun. In a broader sense, the term "edutainment" describes these packages; they are an intentional merger of computer games and educational software into a single product.

Thousands of Computer-Assisted Instructional software packages are used today in enhancing early educational development in America, Canada, UK, Australia and elsewhere (Azi, 2006c). Increasing development and use of technology allows for the design of specialized courseware that provides educational opportunities to learners, including adults with or without access to face-to-face teaching. Examples of which include production packages by: Disney World, Sesame Street Workshop, Kidspiration & Inspiration, ABC Kid's Workshop, Scholastic (in America), Mixy's Toybox (in Australia), Meena (Asia), etc. They offer instructional enrichments in Mathematics, English, Science, Arts, Music, Religion and lots of special interest areas across the curriculum. On the contrary in Africa however, not much has been achieved in this direction.

Effectiveness of Computer Aided Learning

Some current researchers have investigated the effects of Computer Aided Learning resources on early cognitive development and have shown that CAL has a measurable positive effect on student performance in knowledge tests. According to McNutt (1994), Computer Based Learning enhances student performance, in that:

- Instructional time is reduced;
- With the computer as a learning tool Students have a more positive attitude towards the learning process; and
- It can in some circumstances be more cost effective.

Other advantages include the:

- The support for self-paced individual learning;
- The variety of presentation options available to developers;
- The interactive nature of the courseware; and
- Facilities for student's intellectual management.

As a result, the attitude of the students towards subject area is seen to increase; other studies have carried out cost comparisons, which have shown that CAL is a very economic form of instruction. The US military reported in 1988, a general saving in cost per unit of effectiveness in the order of 30%. According to McNutt, similar findings have been reported in earlier studies regarding flight and maintenance training simulators. In Ireland, the Irish Technology Based Training newsletter (issue 2, 1992), reported that the Ulster Bank has delivered 974 days of training with an estimated saving of £100,000. Seventy five hours of training material have been produced at a cost of £25,000. Feedback from staff showed that, 96% were positive about Computer Based Training. Similarly, the Centre for Accounting Studies of the Institute of Chartered Accountants in Ireland developed the PEER accounting courseware suite - with student preferring CBT to lectures. Overall, there would appear to be considerable evidence both from empirical studies and anecdotal reports regarding the effectiveness of CBT (McNutt et al., 1994).

Furthermore, some of the results of developments by the "National Curriculum" introduced into England, Wales and Northern Ireland, as a nationwide curriculum for primary and secondary state schools following the Education Reform Act 1988. The Act ensured that state schools of all Local Education Authorities had a common curriculum (http://en.wikipedia.org/wiki/National Curriculum). The two principal aims to the curriculum were: (i) to provide opportunities for all pupils to learning and to achieve and (ii) to promote pupils' spiritual, moral, social and cultural development and prepare all pupils for the opportunities, responsibilities and experiences of life. All of which efforts gave birth to software packages for specific educational purposes that cover a diverse range of highly specific markets for educational software include:

- Language learning software.
- Typing tutorials (Mario Teaches Typing or Mavis Beacon, for example.
- Driving test software.
- Software for enabling simulated dissection of human and animal bodies (used in medical and veterinary college courses).

In Australia, on the other hand, is an example of the efforts of the National Indigenous English Literacy and Numeracy Strategy (NIELNS), which was launched in 2000. Its objective was to ensure that Indigenous students reach levels of literacy and numeracy comparable with other Australians through methods such as raising school attendance rates, addressing health problems that undermine learning, attracting and retaining good teachers and using the most effective teaching methods. The taskforce was an effort to make achievement of educational equality for Australia's Indigenous peoples an urgent national priority in the early childhood, vocational education and training and higher education sectors. Hence, the model was responsible for designing culturally inclusive and educationally effective schools, towards creating a climate of sustainable change and encouraging successful outcomes of Indigenous programs for absorption into mainstream practice (hUp://www.dpst.goY,au / schog.Is/iiK.figenous/nieins.htm). The results of which were varieties of TV

programs, Indigenous Multimedia and Web Projects.

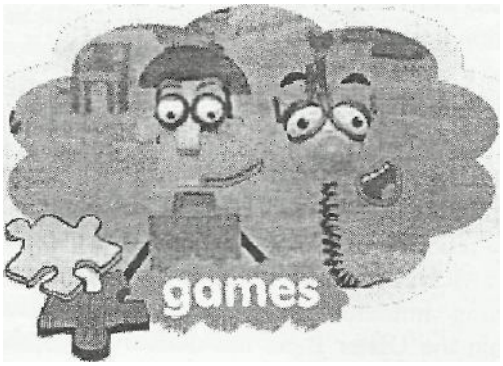

Plate 1. The Playground - ABC Children's Games Australia

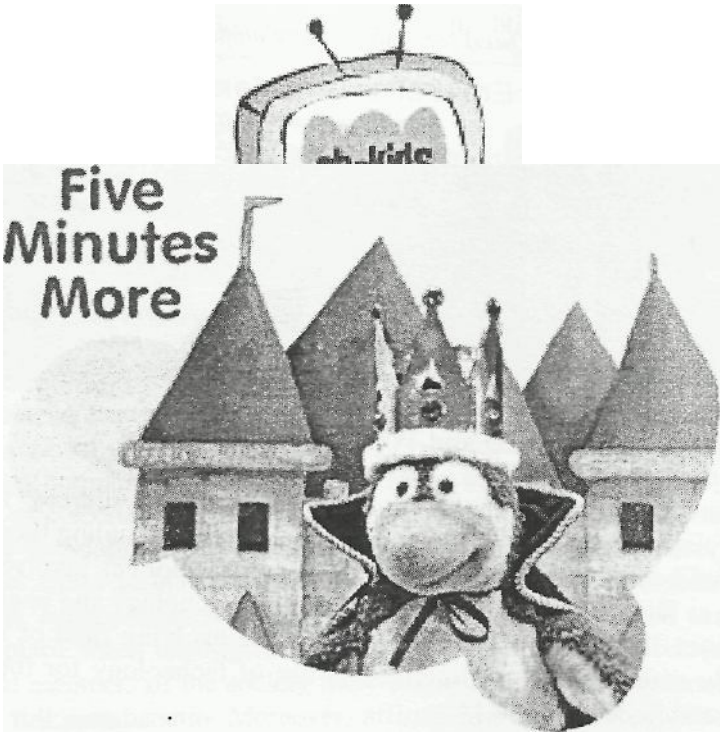

Plate 2: The Playground - ABC Children's TV Australia

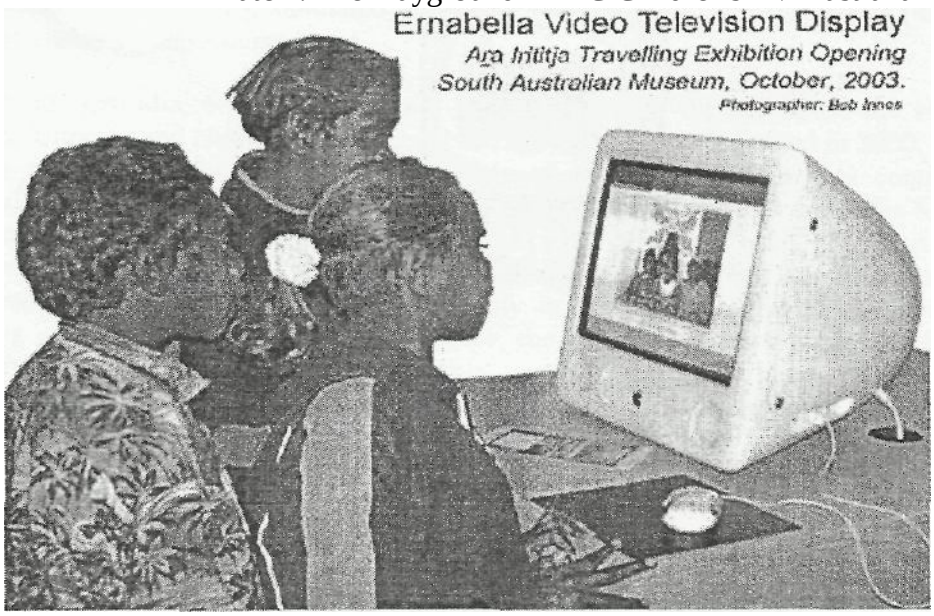

Plate 3: Indigenous Multimedia and Web Projects Australia

Current trends in Technology Based Teaching resources have included research on instructional systems involving artificial intelligence. Understanding these new learning tools involve a range of considerations associated with the various disciplines involved in the production of these resources. These include researchers in the fields of psychology and cognitive science, education and educational psychology, instructional design and the evolving field of human-computer interaction. There are several terms used to describe the use of technology for the purpose of instruction and learning. These include: (i) Technology Based Training (TBT). (ii) Computer Aided Learning (CAL). (iii) Computer Assisted Instruction (CAI), (iv) Computer Based Learning (CBL). (v) Computer Based Instruction (CBI).

Like every other technologies that preceded it, IT is changing the way people not only exchange information but process it in all segments of human endeavor. Despite the enormous advantages of IT tools, a. number of factors have attributed to the failure to realize the potentials in Africa generally and Nigeria particularly. Especially, as a complementary resource to educational development, these include:

- Cost associated with:
  - (i) Relevant courseware design development.
  - (ii) Courseware delivery.
  - (iii) Implementation and evaluation.
- Lack of specialized technical know-how for indigenous content development.
- School-age population explosion without commensurate infrastructural facilities.

- Lack of up-dated curriculums in areas relevant to the Nigeria's socio-eco-cultural needs and style.

- **Transforming** AV **to CAL in Nigeria**

- According to Anglin (1991), Thomas Edison proclaimed in 1913, that books will soon be obsolete in schools, that it was possible to teach every branch of human knowledge with the motion picture. The Bureau of Audio-Visual Aids at the Indiana University (IU) America (established in 1940) introduced the concept of Instructional Technology into Nigeria. Under the leadership of Ole Larson, visual films were produced for training troops at the World War II, which became classroom educational resources (Campbell, 2003). Interestingly, IU in 1956 was awarded a $1.5 million grant to set up AV programs in Nigeria, the project spanned a period of seven years and ran out of funding, hence was phased out. Local efforts to consolidate the IU initiatives by establishing Instructional Technology development centers could not be sustained, making the use of teaching equipment in Nigeria to remain to date at the Audio-Visual stage. Even at that level, C. A. Ogunmilade the author of *"Media in Education"* affirms, Nigeria has not been making effective and efficient use of the opportunities provided by the introduction of the technology into the teaching and learning processes (Azi, 2006b).

- **The Need for Culturally Sensitive Design**
- McLoughlin and Oliver (1999), argue that one of the limitations in current instructional design models is that they do not fully contextualized the learning experience and are themselves the products of particular cultures. The "i-CLAP" initiative therefore, is aimed at developing a contextualized instructional resource that integrates two features to education, that is: culture and multimedia technology components. Culture simply refers to the behavioral customs, the manners, the interests and values of a society. Moreover, since children all over the world are born into a culture not with one, a solid foundation to their education cannot be laid outside their culture. According to Azi (2006a), Michael Howe in his book *"Learning in Infants and Young Children"* states that, the term "experience" is synonymous with exposure to the environment. It is usually inferred that learning has taken place when changes in behavior occur as a result of experience, practical and training. As potential members of the society therefore, it is one of the tasks of education to prepare its children for that full members-hip. Moreover, affirms Marito (2000), it has been established that early child development (ECD) program possess positive long-time benefits on future learning potentials, educational attainment and productivity.
- Dickinson (2002) postulates that through Artistic experience, perception of the environment is required in clarifying, intensifying and enlarging knowledge. Also, that practicing the creation of visual images develops mental and physical skills, throughout the organization of thoughts and manipulation of materials and tools. McLoughlin and Oliver (1999), affirm that recent theories argue for the need to provide a culturally sensitive learning environment. The "Vygotsky and Social Cognition" and "Communities of Practice" models postulate that culture is a prime determinant of individual's development. In addition to culture however, McLoughlin (1999), declares, designers should know that 90% of communication is non-verbal, conveyed through visual means such as gestures and images especially in the early stage of mental growth. The British Film Institute (1999) also adds that critical and creative moving image skills will be a key element of literacy development in the 21st century. Today's advances in technology avails digital applications for designing, producing and delivering visual images through interactivity allowing for the selection, controlling and self-pacing of learning.
- The "Learning Style Theory" emphasizes the introduction of a wide variety of experiential elements to the educational process such as plays, rhymes, arts/crafts, games and storytelling activities, interestingly such elements have been a heritage of the Africa society. The "i-CLAP" therefore, proposes an all-inclusive educational resource that harmonizes these artistic and cultural experiences to contemporary multimedia technology devices. That is aimed at appealing to all the intelligences towards enriching learning, as stipulated by Gardner's "Multiple Intelligences Theory" (Chapman 2005). The "i-CLAP" initiative postulates that learning should not only be a means to a vocation, but a medium for the articulation of socio-cultural values.
- While it is true that action is required on many fronts, cutting across all these challenges and central to the achievement of the MDGs is the monumental task of achieving "Education for All" (EFA). By estimates of the Nigerian government itself, over 7 million children remain out of school, when examining the scale and nature of the problem, what we must always ask of every initiative is how it contributes to the overall reduction of those numbers in a sustained manner (Albani, 2004).
- The "Education For AH" Agenda
- Nigeria presents a complex political, economic and social environment due to its political history, demography, size, inequality levels and socio-cultural diversity. Its strategic importance within the Sub-Saharan African region and the wider Africa places huge expectations on it. This is in terms of its development performance, viewed, from a political and economic perspective (Albani, 2004). According to Nicholas Negroponte, every single problem you can think of: poverty, peace, the environment, is solved with education or including education. Hence, the Interactive Child Learning Aid Project (i-CLAP) was initiated in 2002, in search for a "techno-cultural approach" to consolidating the "Education for All" agenda, which has the onerous challenge of catering for 13 million Pre-school children in Nigeria. Key issues of concern to this research include an appraisal of the following questions: (i) Does adapting culturally sensitive instructional components enhance assimilation, retention and recall in Pre-primary school learning delivery? (ii) Does the use of Computer-Assisted Instruction reinforce flexibility, motivation and engagement in learning 'ABC' among Pre-primary school children in Nigeria? (iii) Is the "i-CLAP" model capable of enhancing cognitive maturation towards supporting school-readiness among Pre-primary school children in Nigeria?

- The "i-CLAP" Model
- Guided by relevant models, learning theories and locally set goals, the "i-CLAP" model is proposed as an indigenous Computer Aided Instructional resource for Nigeria. Significantly, the resource is geared enhancing cognitive maturation among early learners, towards alleviating the escalating rate of failure, dropout and to also accommodate the explosion in school age population. Hence, "i-CLAP" is a model proposed to teaching basic skills in:
- (i) Alphabets; and
- (ii) Object/Color Recognition.

The design is targeted at enhancing early cognitive development among children within the age range of 0-6. They are meant to engage in 'ABC' learning tasks: the English language alphabets, word pronunciation and picture recognition activities using colorfully rendered digital objects, realistic speech, self-testing and dynamic feedback devices. To complement these activities, the "i-CLAP" modules also enable artistic activities in "object coloring" tasks using the "creative tools" with range of colored brushes to pick from and paint with. Amory (2001), ascertain that play associated with games, especially during early childhood, performs important roles in psychological, social and intellectual development. He claims further that it could be defined as a voluntary activity that is intrinsically motivating and involving some level of activity. Skills required for playing the computer-generated games includes logic, memory, visualization and problem solving and it promotes goal formation and competition. The major desire is to bring the application of information technology (IT) closer to the grassroots, an essential resource for mass-literacy development in the 21st century, especially, as Nigeria unfolds its new educational agenda in accordance with the Millennium Development Goals.

Thus, in developing the model the researcher has adapted a new art technique called "Afrimation" (African animation), composing of African art and design, child-art and caricature, Computer Graphics and Animation, to make for easy recognition, assimilation and recall among children. The linear animation clip called "The Yellow Butterfly" features "Wazobia" (a unity word among the 'Yoruba', 'Hausa' and 'Ibo' tribes of Nigeria) as the main character and other supporting actors include a boy and two girls. In opening, "Wazobia" is seen going to school as he walks through an African village scene and then into a class filled with other children where they would learn the ABC. This is to serve as a stimulant onto the interactive aspects, which involves games designed with African textures and sounds. "Adobe Illustrator", is used for the vector-based drawings while the animation is made using "Macromedia Flash". The rationale is to develop a local resource that is capable of expanding "word vocabulary" and "visual literacy" skills among Pre-primary school children, as a springboard for early cognitive development. The world Education Ministers declared that "Quality Education" should embrace certain basic knowledge, values, competence and behavior specifically attuned to globalization but reflect the beauty and riches of our diversity expressed in different forms of belief, culture and language (UNESCO, 2003).

Recommendations

The following recommendations have been proffered with a view towards improving upon the "i-CLAP" prototype design and evaluation, which include:

- The need to adapt current trends in Instructional Multimedia Design and Development towards creating contextualized edutainment resources that integrates African concepts for enhancing education cannot be overemphasized;
- Government and other stakeholders in early child development (BCD) in Nigeria should encourage local product design and development initiatives, through the offering of sponsorships and other incentives.

Conclusion

In addressing a crucial issue like the need to adapt culturally sensitive Computer-Assisted Instructional components towards enhancing motivation, engagement, assimilation and recall in learning among Pre-primary school children in Nigeria, the "i-CLAP" model has been proposed. Its goal is to support school-readiness and life-long learning achievements among the target group. Moreover, it has been established that early child development (BCD) program possess positive longtime benefits on future learning potentials, educational attainment and productivity. The "i-CLAP" is taking advantage of current trends in educational technology, which avails digital applications for designing, producing and delivering visual images through interactivity allowing the selection, controlling and self-pacing of learning. This is an

attempt to develop an all-inclusive educational model that harmonizes African artistic and cultural experiences to contemporary multimedia technology devices.

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