

## PROPOSING A MODEL FOR DEVELOPMENT OF COMPUTER BASED TUTORIALS

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**Abstract:** The aim of this study is to propose a model for development of computer based tutorials. Analysis of various systems is presented. Most of the models developed so far were taken from the field of software engineering. These models are not able to be used for production of multimedia tutorial on large scale. They were not using the concept of reusable learning objects. Authors of this paper have proposed a new model for the development of multimedia tutorials. The proposed model suggests utilization of pre-existing learning objects from the repository in developing multimedia tutorials. This model provides an action plan, and can effectively be utilized for development of large-scale multimedia tutorials in addition to small-scale tutorials.

**Keywords:** Computer-based, multimedia tutorial, model, learning objects, CD- tutorial, e-contents.

### Introduction

The twenty first century generation has some distinctive features which were not there in previous generations. These features might be because of advent and access to technology. New technology and its usage has changed the lives. Majority have access to computer, internet, android phones, tablets, video games, digital devices including music players, video cameras and games devices. The access and usage of these devices has changed the interests of people. This digital age has changed the way the students learn and have interaction with their teachers and peers (Bennet, Maton & Kervin, 2008). Now students have access to laptops, tablets and android/windows phones with internet connections and they have access to a lot of information all the time. They can have networking with other devices and make connections in all parts of the world regarding their studies. With the advent of technologies these devices have become affordable for students as well (Cope & Kalantzis, 2009).

The use of computers and the Internet in education at all the levels all over the world, including many developing countries has become common now days. Use of new technologies in the field of education has led to the formation and usage of many new terms like E-Learning, Mobile Learning, Online Learning and Ubiquitous Learning etc. Distance and online learning is being spread more and more and it is possible through computer based tutorials which can cater a large number of learners at a time (Gene & Judith, 1997). The computer can be used to gain access to many online resources for teachers.

Individual researchers, as well as major institutions all over the world are investigating the role of information and communication technology in education. A variety of techniques that rely on the computer are being used including lesson sample distribution plan on CD-ROM, and the establishment of exchanges between different educational institutions through video conferencing and by using interactive learning materials based on computers, encouraging the use of material on the Internet, thus encouraging debate among students (UNESCO, 2002).

Computer Based Education/Instruction provides programs of high interest to support the learning practice. The feedback from students depict that the email, new media, websites and many more electronic resources of libraries and internet have improved their learning. An annual survey of Thrope, UNESCO, COL (2005) indicated that the student use electronic media in their studies more as

compared to print media and visiting libraries. The students rated CDs and DVDs helpful in their learning especially in science courses. But video Cd are more valuable than audio CDs. Most of the language learners have also rated CDs as important tools for learning. Same is the case with language teachers as they considered CDs helpful for promoting learning. Instructors and learners in Health and Social Care also give importance to using media for learning.

Computer Based Instruction/Education is one of the gifts of digital age. It provides more opportunities for learning. Research shows that that through using it retention rate can be increased up to 50%, which is a very significant improvement in the field of education. It also helps in reducing the cost of education and improving the quality of education , depicted through Cost Benefit Analysis (Iskander, 2010).

According to Susan (2001) Computer Based Learning may take help of Internet, CD-ROM, DVD and the use of resources on the basis of the computer in learning and learning process, at any place, and various forms of e-learning. Virtual learning materials are mainly composed of objects and entity offering digital learning to learn. Learning objects are designed and built in the development of curricula that focus on learning and learners.

The creation of a piece of high-quality learning may be integrated in different courses and their relevant activities, experiences and evaluations to meet students' learning needs. Instructional developers use different learning objects according to changing needs and demands of learners and subjects (Adams and Williams, 2006). The learning objects in short can have the following characteristics:

1. Learning objects are self contained and these can be taken independently by learners along with supporting guidelines.

2. Learning objects are reusable. Any learning object may be used for many times in different contexts as specified with it.
3. Learning objects can be aggregated and these may be classified according to their specifications. The guidelines or descriptive information helps in carrying out different functions and usage.

Learning objects are designed to strengthen learning through an interactive virtual learning environment. Objects can be used over again and again in a variety of contexts to make different learning courses according to the needs of a learner. Learning objects are stored in searchable repositories to serve the purpose of reuse.

The development of CBT consists of many interlinked steps. A model will make the task easier and systematic. However courseware development and general software development are not similar. While in past most of the models, adopted for courseware development, are from the discipline of software engineering (Pressman, 2005). According to Homeed and Mahmood (2006), none of these models has been widely applied and evaluated to give a degree of confidence in using them. Therefore ad hoc and informal methods used for the development of computer based tutorial are successful only for simple and small size courseware development.

Barrett (2000) has described five phase cycle of multimedia development including the following steps/phases:

1. Decide/Assess
2. Design /plan
3. Develop
4. Implement
5. Evaluate

The Barrett model is too general and covers all types of content development. However it does not possess specific details related to multimedia tutorials. Forte (2010) has given

a more specific model for the development of the tutorial. His model consists of 5 steps.

This is the process of creation of writing, creating visual media and creating audio media, synchronizing material, and disseminating the tutorial, and evaluating tutorial. The process is continuous and goes in a cycle which could be repeated in light of evaluation for improvement. The developmental process for multimedia module components include the development of content, and the development

of multimedia assets, and convert the file format, and the integration of building systems, and the preparation of CD-ROM, CD-ROM, and packaging CD-ROM (Iskandar, 2010). The terms used in this model shows that it more specifically describes a process of development of computer based tutorial. However, development of computer based tutorial has many other issues like structuring of contents, interface designing, and graphics and animations, which are not addressed in this model. The next model presented here is more specific and describes more steps involved in the process.

Sidhu, Singh and Narainsamy (2004) have proposed a detailed model for Multimedia instructional Material but it has ignored the Learning Objects. A multimedia tutorial can be developed using existing learning objects, which economize development labor. Figure 1 shows the processes involved in the model suggested by Sidhu, Singh and Narainsamy (2004).

- i.
- ii.
- iii.
- iv.
- v.
- vi.
- vii.
- viii.
- ix.

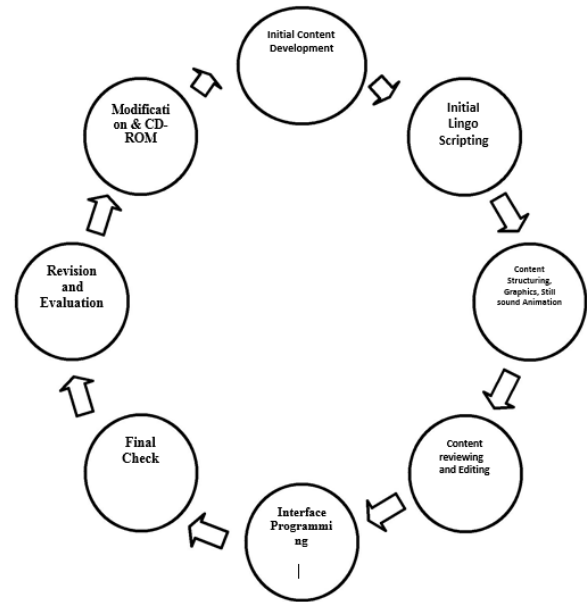


Figure 1: The design process adopted to develop the multimedia tool (Sidhu, Singh & Narainasamy, 2004).

Process Model for MIOs (Multimedia Instructional Objects) was proposed by Khattak (2010): the process model for Multimedia Instructional Objects includes three phases which are as follows:

**First Stage/Phase I:** Conceptualization of Multimedia Instructional Objects

**Second Stage/Phase II:** The essence of all development including:

- i. W-Content Production
- ii. Instructional Design
- iii. Digital Audio/Video Production
- iv. Multimedia Production
- v. Testing
- vi. Repository of MIOs
- vii. Quality assurance and
- viii. Local parameters

**Third Stage/Phase III:** Content Delivery (Khattak, 2010).

This model has used the term MIOs for learning objects. Before delivery of the content, it suggests to suggest the content developed in the repository so that it may be used in any other course when needed.

However, this model has not shown use of the existing MIOs. The process model has been depicted in Figure 2.

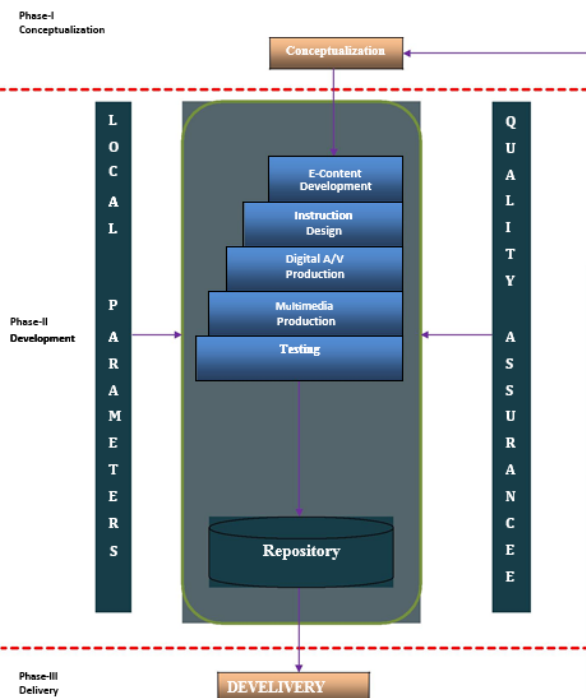


Figure 2: Process Model for MIO Development (Khattak, 2010)

The authors of this paper developed a tutorial for a graduate course *Educational Psychology* at Allama Iqbal Open University Pakistan, which proved to be very effective in promoting students' learning in distance education (Nasrullah, 2014). In this experiment a developmental process was proposed for multimedia courseware development. This model gives an action plan for development of E-contents, and a complete computer based tutorial. This model utilizes the existing repository of Learning Objects which was not present in any of the above models. Learning Objects available in the local repository or on the web are utilized in the process. This additional component ensures cost effectiveness in the development of multimedia tutorials especially in large-scale projects. This model also shows addition of

Learning Objects in the repository at 5 different levels and enhances the reusability of learning objects. Figure 3 depicts the proposed model for e-content and tutorial development.

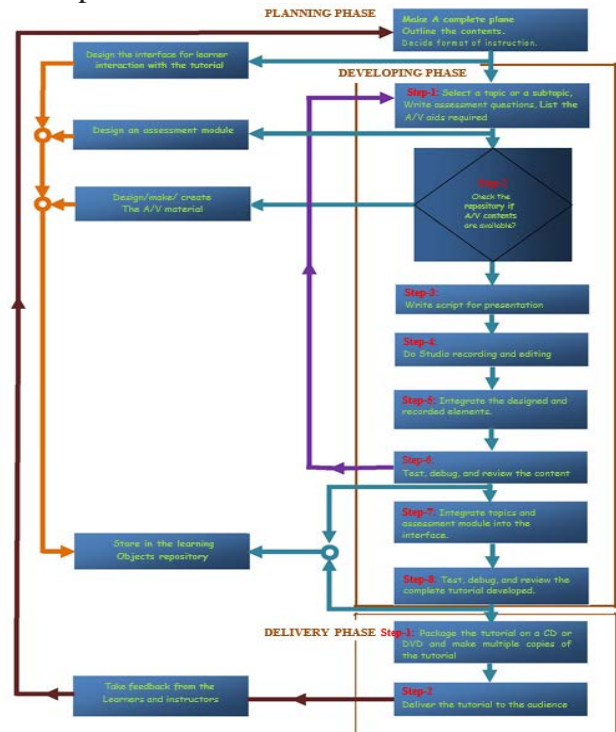


Figure 3: Proposed model for E-content and tutorial development.

This model consists of three phases, planning phase, development phase, and delivery phase. In the planning phase, outline of the contents is developed. The whole course is divided into units. A unit is further divided into topics and subtopics. Next is the selection of instructional format according to the nature of course and level of the learners. According to the instructional format interface programming is started in parallel. Development is the second phase. In the development phase from step 1 to step 6 a topic or a subtopic is prepared and sent to the learning objects repository for future use. This process is repeated till all the topics and subtopics of the whole course are developed. In step 7 of the development phase topics, subtopics,

and assessment modules are integrated into the interface. After testing and debugging the final product is sent to the repository. Delivery is the final phase in which the tutorial developed is delivered to the learners. Modifications may be done in the tutorial according to the feedback taken from the learners. In the following sections main activities indicated by the model are explained further

## DISCUSSION

The model proposed in this paper is a comprehensive and practical one. This model develops a repository of learning objects and final product, a tutorial as a whole simultaneously. The model also ensures granularity and reusability of learning objects. For larger organizations the model is cost effective as it is a continuous process and may be used to produce multimedia tutorials on large scale for various disciplines. Authors of the paper have practically used this model for development of multimedia tutorial for a graduate level course Educational Psychology, which provided very fruitful results (Nasrullah, 2014).

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