Component Based Approach for Technically Feasible and Economically Viable E-Content Design and Development

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Abstract -The world has undergone a transition from the Industrial Age to the Information Age and to the present Knowledge Age in a rapid way. In this era, wherein the economy is knowledge-based; continuous learning will decide the success or failure of every organization and individual. E-learning, it is believed, would mark the zenith of the evolution of learning. Socio-economic changes in the world have been causing drastic changes in the way people look at education and training as we have progressed from agriculturist mode of economy to the information age.

E-learning has had a broadly positive pedagogic impact. The "learning object" model is perhaps the most prominent "revolutionary" approach. This paper aims to address the issues associated with different types of pedagogical approaches and the key benefits of content development using learning object.

Index-Terms: E-learning, learning object, pedagogic,ict.

I. INTRODUCTION

Significant works on Information and Communication Technology (ICT) based instructional material design, development and their issues have been reported in many published literature. The areas range from e-learning technologies, pedagogical aspects, perception studies, and issues. The issues are related to specific instructional strategies for ICT based instruction, learner characteristics and causes of failures in e-learningPedagogical elements are an attempt to define structures or units of educational material. For example, this could be a lesson, an assignment, a multiple choice question.

When beginning to create eLearning content, the pedagogical approaches need to be evaluated. Simple Pedagogical approaches make it easy to create content, but lacks flexibility, richness and downstream functionality. On the other hand, complex pedagogical approaches can be difficult to setup and slow to develop, though they have the potential to provide more engaging learning experiences for students. Somewhere between these extremes is an ideal pedagogy that allows a particular educator to effectively create educational materials while simultaneously providing the most engaging educational experiences for students.

II. DIFFERENT TYPES OF PEDAGOGICAL APPROACHES FOR ECONTENT DEVELOPMENT [2]

2.1Instructional design – The traditional pedagogy of instruction which is curriculum focused, and is developed by a centralized educating group or a single teacher.

2.2 Social-constructivists - This pedagogy is particularly well afforded by the use of discussion forums, blogs, wiki and on-line collaborative activities. It is a collaborative approach that opens educational content creation to a wider group including the students themselves. The One Laptop per Child Foundation attempted to use a constructivist approach in its project [1]

2.3 Laurillard's Conversational Model [2] is also particularly relevant to eLearning, and Gilly Salmon's
Five-Stage Model is a pedagogical approach to the use of discussion boards [3].

2.4 Cognitive perspective focuses on the cognitive processes involved in learning as well as how the brain works.[4]

2.5 Emotional perspective focuses on the emotional aspects of learning, like motivation, engagement, fun, etc. [5]

2.6 Behavioural perspective focuses on the skills and behavioural outcomes of the learning process. Role-playing and application to on-the-job settings. [6]

2.7 Contextual perspective focuses on the environmental and social aspects which can stimulate learning. Interaction with other people, collaborative discovery and the importance of peer support as well as pressure. [7]

III. COMPONENT BASED APPROACH E-CONTENT DESIGN

Before the industrial revolution, a craft based approach to product manufacture was prevalent, where one or two individuals create a completed product form the raw material available to them.

After the industrial revelation there were many chances in product manufacturing. The major developments were the division of labour, increased automation and to development of the component based approach to manufacturing.

The main benefit of a component based approach is reusability is a component used on product can be used to provide the same function for another product.

Parallel to the industrial revolution has occurred within a shorter time frame in the software industry. It is only since the development of the idea of software engineering in the 1970's that software development has begun to move from a craft to an industry.

The Idea of moving to a component model for development of courses and content has gained prominence move recently and been driven by the interest in the educational potential of the internetThere are number of initiatives which transfer the ideas and benefits of the component approach to developments and delivery of educational systems[2,3,4,5].

Manuscript Received on November, 2012.

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IV. REUSABLE E-CONTEN DEVELOPMENT USING LEARNING OBJECTS

Reusable learning object is an emerging paradigm shift in instructional system that promises to bring to education, the same improvements in productivity that it has in software development. There are number of problems to be resolved before component manufactures becomes an established approach in educational system design. These include the issues of standards for learning objects and support for those educators making the transition to object based design.

Reusable learning objects can provide for better management of learning content by:

- minimizing redundancy
- allowing updates to be centralized
- allowing for immediately updateable learning materials
- allowing searches for learning objects

Reusable learning objectsprovide for increased learning opportunities. They may allow for:

- customized, non-linear paths through materials; and
- Further levels of instruction in greater depth.
- Learning objects may result in savings of time, work and money

Learning objects can be reused in different training programmes, thus a learning object on open or closed questions can be used in an interviewing course and also in an appraisal course. This creates the potential for more cost-effective e-learning through the reuse of learning objects within an e-learning library

Trainers can quickly construct e-learning courses, for individuals or groups, by selecting learning objects from an existing library and reusing appropriately.

Learning objects can be used to create time specific learning programmes. For example, if a learner wants a twenty or thirty minute refresher, the programme can automatically assemble the key points for the time specified.

V. COST WISE BENEFITS OF LEARNING OBJECTS

In the field of software engineering, reuse is considered as a very important factor for productivity and quality of software systems. As a result, a number of methods have been developed to measure the cost effectiveness of software code reuse [12]. Component-based Software Development (CBSD) is commonly accepted as a cost effective approach, as it emphasizes on the creation of software systems using reusable components [13]. However, although software components reuse promises reduction in the development cost and time, as well as benefits in productivity and quality, its application in practice does not necessary ensure that these benefits can be achieved. Therefore, appropriate metrics and models have been proposed as tools to measure and assess the impact of reuse [14]. Within this context, Poulin et al. [15] described a set of cost metrics for software components re-use used by the IBM company (http://www.ibm.com) that are the most commonly used mainly because they are simple to understand and easy to calculate during the software development process. The is main cost metrics are:

- Relative Cost of Reuse (RCR), which is defined as the cost for reusing a software component divided by the cost normally incurred to develop it for one-time use,
- Relative Cost of Writing Reusable Software (RCWR), which is defined as the cost for developing a reusable software component divided bythe cost of developing it for one-time use. These metrics can be used as input in a return on investment model (ROI), upon which managers may rely their business decisions.

VI. REUSABLE AND PORTABLE E- CONTENT

Learning objects are Transportable among applications and environments, Re-purposable to different delivery structures. LO's are designed and developed by following some standard specification.

Many groups are working together to define common international standards that the world can adopt for describing learning objects that can be interoperable, reusable, repurposable, and effectively managed and presented. Their common interest is to find a minimum set of metadata standards that will support the worldwide deployment of learning objects for multiple purposes. Just a few of the groups participating in these worldwide standards-making efforts through the IEEE Learning Technology Standards Committee [16] are:

- Alliance of Remote Instructional Authoring and Distribution Networks for Europe(ARIADNE, 2000)
- Instructional Management Systems(IMS,2000a) Project
- Dublin Core Education Working Group(DC-Ed, 2000)
- Advanced Distributed Learning Initiative (ADL, 2000)

VII. CONCLUSION

The technical advantage of Learning Objects in Technology-enhanced Learning has been claimed to be their potential for component-based reuse in different learning settings. As the content design and development is adopting the component based approach the content can be reused in same context and also the components are highly portable.

The economical benefits can also be achieved by reusing the existing component. As a result, a number of methods have been developed to measure the cost effectiveness of software code reuse as well for productivity and quality of software systems.Component-based Software Development is commonly accepted as a cost effective approach, as it emphasizes on the creation of software systems using reusable components

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