

## Chapter 8

# Ontology-Based Multimedia Authoring Tool for Adaptive E-Learning

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### **ABSTRACT**

*More video streaming technologies supporting distance learning systems are becoming popular among distributed network environments. In this paper, the authors develop a multimedia authoring tool for adaptive e-learning by using characterization of extended media streaming technologies. The distributed approach is based on an ontology-based model. Suppose a well-known teacher is giving a lecture/presentation to his student. Because of time constraints and other commitments, many students cannot attend. The main goal of the authors' system is to provide a feasible method to record and represent a lecture/presentation using a browser with the windows media services. This system requires flexible support for the modeling of multimedia content models and supports possible interactivity, transfer of streams multimedia data such as audio, video, text, and annotations using network facilities. The authors propose a new approach for the modeling of reusable and adaptable multimedia content. A comprehensive system for advanced multimedia content production is also developed. This approach significantly impacts and supports the multimedia presentation authoring processes in terms of methodology and commercial aspects.*

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## INTRODUCTION

### 1.1. Authoring Tool

The distributed computing technologies have been improved and have become more and more efficient and effective in the past decade. More and more web-based application systems consider the user's various demands, such as the different cultural context, the learning environment as well as the professional field; the video-based multimedia authoring tool for e-learning must also consider them. Bhowmicka, Khasawnehb, Bowlinge, Gramopadhyea, and Melloy (2007) proposed that the following guidelines can be recommended for designing web-based asynchronous learning systems for procedural tasks. (1) When a learning system was designed for simple procedural tasks, then use of a particular multimedia combination should not affect learning performance. (2) For complex procedural tasks when learning performance was the criterion, then a combination of both audio and synchronized text or audio, video and synchronized text was the best alternative. (3) When resource utilization was the issue for a learning system for complex procedural tasks, a combination of audio, video and synchronized text was the best alternative in terms of the time spent on the learning modules and the frequency of access of the modules. (4) For simple procedural tasks, the choice of multimedia combination should not affect the system resource in terms of the amount of time spent viewing the modules or the module accessing frequency. Therefore, multimedia authoring tool should not be irrevocable, and should defer to each user's special characteristic conditions and special demands. For example, the different knowledge degrees, the different network facilities as well as the time demand should give different personalization multimedia with different content that explores the effect of using different adaptive presentation strategies and the impact on learning performance when material is matched and

mismatched with learning preferences (Kelly & Tangney, 2006). These different user's demands can be seen as adaptability for the multimedia authoring tool.

In other words, the multimedia authoring tool should give the appropriate content for learner's preferences especially for video-based e-learning applications, and then penetrate learner's demands to make the essential adjustment. Therefore, seeking multimedia information for learning is sufficient when need is well defined in the learner's mind. The multimedia contents characteristics contain the media itself, is multi-dimensional, interactive and integrated. For the past few years, we also aimed at the multimedia's main characteristics and the adaptive operations to develop video-based multimedia authoring tool for distance learning (Deng, Chen, Liu, & Chang, 2009). There were three main characteristics as follows:

**User Interactive Model:** Some VCR-like user interactions were discussed in Liao and Li (1998), Prabhakaran and Raghavan (1994). With user interactions, he or she can (a) reverse the flow of the presentation; (b) skip forward or backward to a specified presentation segment; (c) freeze and then restart the presentation, and (d) scale the speed up or down. It provides such user interactions are issued dynamically and unpredictably during the presentation.

**Usability:** Reuse capability is necessary and has the flexibility to incorporate instructional components in multiple applications and contexts in a multimedia supported system. There are some different levels of reusability: reuse of complete multimedia authoring tool document, reuse of segments of multimedia as single scenes or a lectured chapter/unit, and reuse of individual atomic media elements such as a video, audio, slides or text and parts of those media elements such as a scene of a video clip. Wang and Hsu (2006) proposal for reusing e-material from different

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