

## Chapter 23

# Development of the System for Authoring Three-Dimensional Learning Applications for Use in E-Learning Environment

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### ABSTRACT

*The problem of automated development of learning applications based on the three-dimensional graphics and having the property of adaptability is important when addressing a number of issues related to e-learning. Effective solution of this problem will provide some benefits to organizations that use in their work or provide e-learning technologies. This article describes the main benefits of using a common approach and tools to design learning applications for use in e-learning and based on the three-dimensional graphics and properties of adaptability. The existing software systems and technologies, which can be used for these purposes, are considered; their shortcomings are revealed. Methods for authoring three-dimensional adaptive applications that do not have the disadvantages of existing systems are suggested. The technology of modeling variability underlying the most important component functionality is proposed. The structure of the proposed system is considered.*

DOI: 10.4018/978-1-5225-5643-5.ch023

## **INTRODUCTION**

Toward the end, specifically state the objectives of the chapter. The use of automation technology in the development of adaptive learning software for use in e-learning has certain advantages. So, having a uniform relatively simple way to produce a wide class of learning software (for example, virtual simulators), a developer of e-learning course does not spend a lot of time and effort to create the necessary software simulator. Also, the developer of the course does not need to employ outside programmers. The design of the learning applications should take into account the rapid variability of both a learner (continuous improvement of knowledge and skills) and the environment (changes in educational standards, requirements, technical capabilities). In this case, the learning process should not be interrupted because of updating the software. The learning applications should be based on such models that would allow them to monitor the processes of variation and adapt to them without having to recompile the source code. The main objectives of the work are:

1. To consider the most important issues related to the construction of a universal system for authoring three-dimensional adaptive learning applications. The greatest attention should be paid To the implementation of the methods of adaptation. It is necessary to evaluate the possibility of using these methods in the e-learning;
2. To review existing systems for authoring learning applications and to evaluate the possibility of their use in the e-learning;
3. To offer the technology of modeling variability to design adaptive learning applications with support of 3D-graphics;
4. To consider and offer other ways to improve the process of computer-aided design of learning applications (including visual programming language used in the authoring system);
5. To examine the structure of the automated system for authoring three-dimensional adaptive learning applications that is offered as an alternative to existing systems.

## **BACKGROUND**

Rapid advances in the information technologies largely determine the functional characteristics and patterns of evolution of learning applications. Growing market of mobile devices, advances in ICT area, the popularity of game forms of social communication, trend to visually, virtual worlds and augmented reality, lean software development, the continuity of the software life cycle, the progress in client-server and service-oriented technologies, artificial intelligence – all these trends should be taken into account in e-learning.

It should be noted that the market of learning software is very sensitive to many of these factors. Thus, the expanding mobile market contributes to the appearance of learning systems oriented to mobile platforms (m-learning); wireless communications are widely used in distance learning and e-learning; many online learning games and intelligent tutoring systems use experience of social networks; visual representation of the educational content is often based on best practices in computer graphics and virtual reality systems; many applications have service-oriented architecture. And finally, the most general trend in the evolution of learning applications is their intellectualization.

The current state of researches in this area can be estimated by examples of recent works.

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