THE BLENDED LEARNING DELIVERY DESIGN MODEL

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Abstract. This paper presents the model of information system for blended learning delivery. ADDIE model has been used for instructional design these information system. Instructional design is the systematic approach to the Analysis, Design, Development, Implementation, and Evaluation of learning materials and activities. ADDIE model helps to estimate learning processes and project tasks. It causes better design distance education information system (DEIS). This system is presenting and describing in this paper and has been realised in Vilnius Gediminas technical university (VGTU). DEIS is based on IBM Lotus technologies and is adapting and using for Master studies.

Keywords: ADDIE model blended learning, distance education information system.

1.   Introduction

Modern universities and education institutions dealing with current circumstances should fully approach students and assure the potential for them to study, contribute up-to-date knowledge for everyone by all available means. In distance learning, much emphasis has been given to the pedagogical concepts of student-centered learning and student motivation, resulting in the design and delivery of high quality courses in higher education as well as more generally in resource-based education [5]. E-learning can help to prepare school-leavers for studies in university [2,3]. McVay Lynch [10] offers a systematic approach to the development of distance education based on online courses using the Web and refers to specific areas of student need for support and of faculty skills needed to develop course designs and curriculum.

The term **blended learning** is used to describe a solution that combines several different delivery methods, such as collaboration software, Web-based courses, and knowledge management practices [8]. Blended learning is also used to describe learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning. In courses that are using a virtual learning environment (VLE), some students like to work together, and some do not. The instructional design of collaborative learning in combination with ICT (Information Communication Technologies) proved to be more than feasible, and produced good learning results [4]. Under this system, the teacher could effectively evaluate student progress and also provide direct individual advice [11]. The opportunity given to the students in this course to choose between working collaboratively and working individually, in combination with face-to-face instruction, virtual instruction, and studying from written materials provided is highly appreciated by students [1,4]. Participatory e-learning can be defined as learning with systems that enable learners to produce part of the learning materials themselves [5,7].

The most widely used methodology for developing new training programs is called Instructional Systems Design (ISD). It is also known as Instructional Systems Design & Development (ISDD), the Systems Approach to Training (SAT), or just Instructional Design (ID). This approach provides a step-by-step system for the evaluation of students' needs, the design and development of training materials, and the evaluation of the effectiveness of the training intervention.

Instructional design (ID) is a conceptual model for developing instruction and typically includes analysis, design, development, implementation, and evaluation, i.e. ADDIE model [9].

The ADDIE model is an interactive instructional design process, where the results of the formative evaluation of each phase may lead the instructional designer back to any previous phase (Fig. 1). The end product of one phase is the starting product of the next phase.
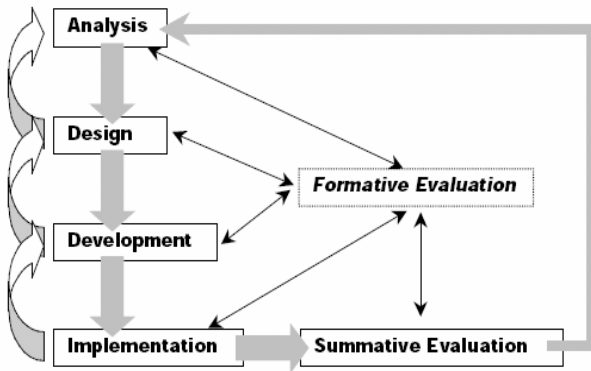
Fig. 1. Scheme of ADDIE model [9]

The paper presents information system that is able to realise the blended learning method and learning management processes. The system has been designed and implemented using ADDIE model at the Information Technologies Department of VGTU.

2. Instructional System Design using the ADDIE Model

Instructional design is the systematic approach to the Analysis, Design, Development, Implementation, and Evaluation of learning materials and activities.

Instructional design aims for a learner-centred rather than the traditional teacher-centred approach to instruction, so that effective learning can take place. This means that every component of the instruction is governed by the learning outcomes, which have been determined after a thorough analysis of the learners' needs.

These phases sometimes overlap and can be interrelated; however, they provide a dynamic, flexible guideline for developing effective and efficient instruction, given in the Table 1.

ADDIE model has been used for project of e-learning information system at the Information Technologies Department of VGTU.

Table 1. Stages of ADDIE Model

Stages	Sample Tasks	Sample Output
Analysis: the process of defining what is to be learned.	o Needs assessment o Problem identification o Task analysis	o Learner profile o Description of constraints o Needs, Problem Statement o Task analysis
Design: the process of specifying how it is to be learned.	o Write objectives o Develop test items o Plan instruction o Identify resources	o Measurable objectives o Instructional strategy o Prototype specifications
Development: the process of authoring and producing the materials.	o Work with producers o Develop workbook, flowchart, program	o Storyboard o Script o Exercises o Computer assisted instruction
Implementation: the process of installing the project in the real world context.	o Teacher training o Tryout	o Student comments, data
Evaluation: the process of determining the adequacy of the instruction.	o Record time data o Interpret test results o Survey graduates o Revise activities	o Recommendations o Project report o Revised prototype

3. Blended learning

E-learning is technology-enabled learning. There are many types of e-Learning technology, including the live virtual classroom. Once the different approaches to e-Learning and the various underlying technologies required to deliver are discussed, blended learning could be defined as:

- a combination of various networked technologies in a single learning package;

- a synthesis of various pedagogic methods that enables to achieve an optimal quality of learning process;

- a combination of various lecturing technologies (video cassettes, compact discs, internet material, etc.) together with direct lecturing by an instructor.

The integration of a virtual classroom into LMS has many advantages:

- opportunity is presented for provided blended learning;

- learning activities including both virtual classroom sessions and learning in a virtual classroom can be managed from a single location;

- learning activities includes virtual classroom sessions could be performed in a single location;

- information about learning activities is stored in a single location.

The blended learning method is valid by realising the coupling between virtual classroom and LMS technologies together with course management systems (CMS) Authoring Tool, LearningSpace, WebCT and others conforming to the SCORM standard. The layout of such architecture from a functional standpoint is presented in Fig. 2.

Blended learning has been chosen for design of the distance education information system because of its effectivness [11].
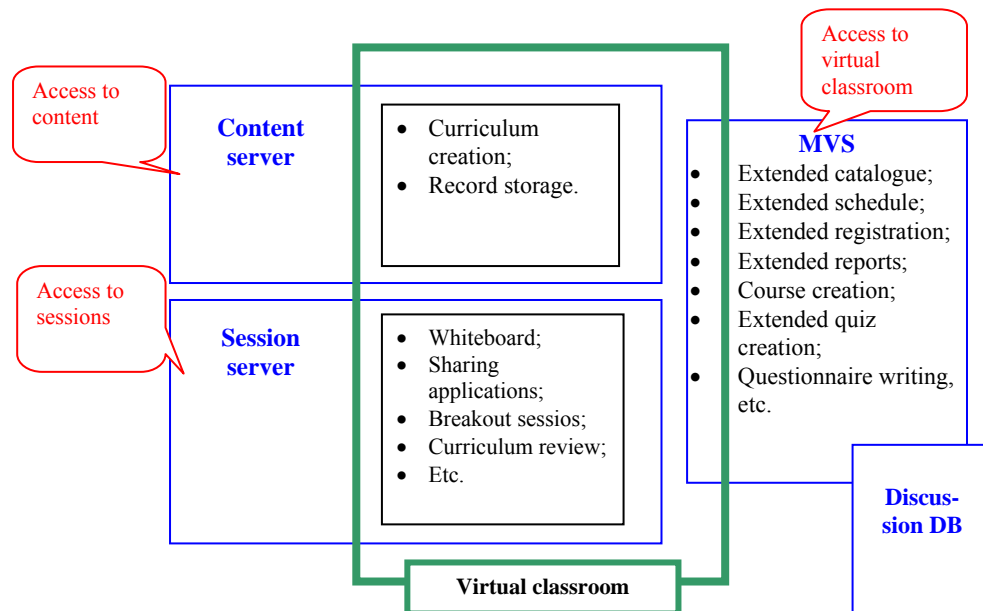

Fig. 2. The architecture of blended delivery model

4.   The Blended Delivery Model of the Distance Education

The project of distance education information system (DEIS) on the basis of blended architecture is based on the completed instructional system design using the ADDIE model. Such a system has been implemented and tested for the distance education system at the Information Technologies Department of VGTU.

DEIS conform these requirements:

- the system must realise the blended learning form,

- the system must be flexible i.e. independent on component architecture, the number of users, and changeable or scaleable number of servers, platform and software,

- the system must conform to HTML, LDAP to SCORM 1.2 standards,

- the system should be able integrate into other higher-level information systems.

A simplified conceptual structure of a blended distance education information system has been designed; it is presented in Fig. 3. Any VLE can serve as a course delivery server as long as it conforms to the SCORM 1.2 e-learning standard. Moreover, it is also planned to implement a knowledge management and search system (Lotus Discovery Server), which would enable users to find required information more quickly and precisely.

The designed system has been implemented and tested in the departmental information system. Its structure is presented in Fig. 4. This system realises the blended e-learning model.
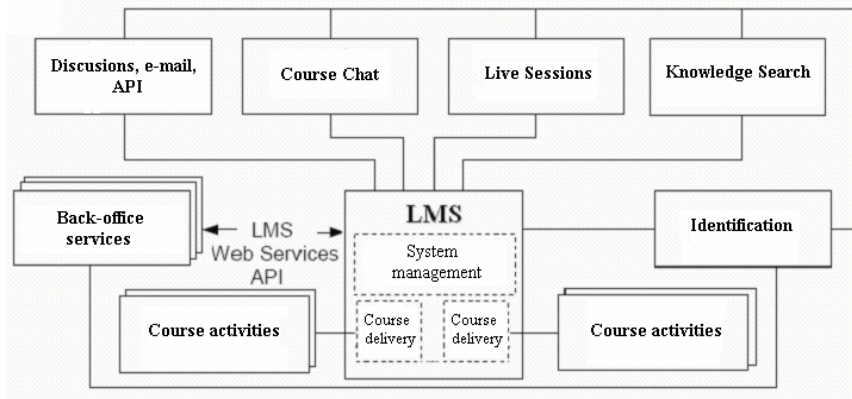

Fig. 3. The conceptual structure of a blended learning IS
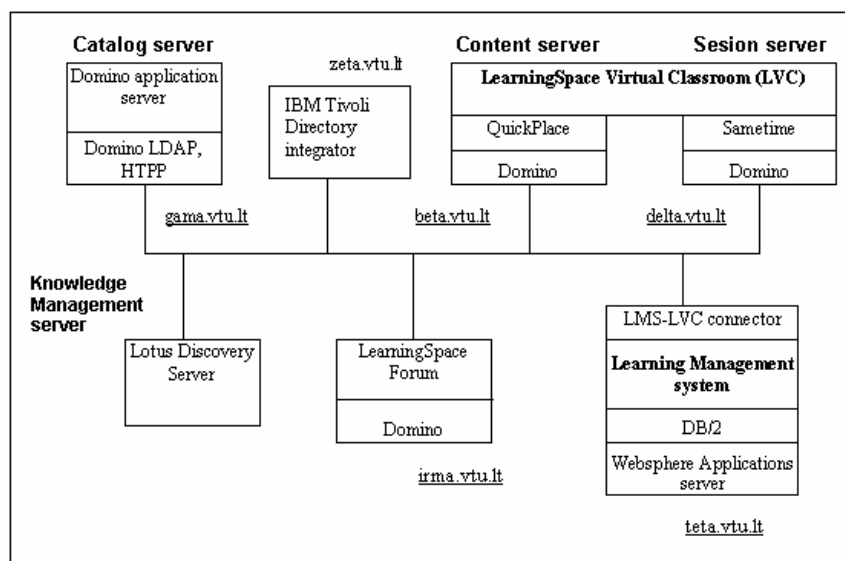

Fig. 4. The scheme of the blended learning information system at VGTU

This system is based on IBM Lotus technologies. Course authors can use the Authoring Tool (AT), LMS components, or LearningSpace and other course creation tools for creating course content. LMS guarantees the access to the courses created and imported into LMS, administers them, manages learning processes and stores all information related to learning processes. When instructors create course content with the AT, they are able connect course content to virtual classroom sessions as one of the activities. Thereby blended courses could be created that cover video lectures and asynchronous material.

Video lectures are created with the LearningSpace - Virtual Classroom server environment, course Internet interviews are based on the Sametime technology, and discussions are run on the basis of Domino technology.

Also, the Domino server stores various document libraries, such as various departmental organizational documents, theses and

organizational documents for bachelor and master students, e-book library, news, schedules, a virtual employment exchange, etc. Content servers store course content files used via the LMS. Course files are connected via URL. Instances of the WebSphere Application server on the basis of Java, XML, HTTP and other technologies are used. Thereby two different application servers that perform different functions are used in the distance education information system. This system could be used by students with mobile devices like PDA or smart phone [12].

Conclusions

The information system has been designed and realized for blended learning delivery model using ADDIE model that let exactly to estimate distance learning processes and all tasks of project.

DEIS is flexible, independent on component architecture, the number of users, the changeable or scaleable number of servers, platform and software because of it's conforming to the main standards of information technologies and e-learning. The presented model of distance education information system is based on IBM Lotus information technologies. Using of this system let to get information, earth up knowledge for Discovery Server and to provide future research on knowledge management.

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