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Procedia - Social and Behavioral Sciences 206 (2015) 262 – 266

Procedia
Social and Behavioral Sciences

XV International Conference "Linguistic and Cultural Studies: Traditions and Innovations", LKTI 2015, 9-11 November 2015, Tomsk, Russia

Using Electronic Courses in Teaching Master's Degree Students

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Abstract

The paper discusses the structure, design peculiarities and usage methodology of an electronic course in learning management system Moodle. Blended learning combines the technologies of traditional classroom-based and web-based learning, which complement each other. The blended learning model implies replacing a part of traditional classes with different types of educational interaction in a virtual learning environment. The Department of Power Grids and Electrical Engineering of Tomsk Polytechnic University is developing electronic training complexes for master's degree disciplines, such as Operational Management in Power Engineering and Methods of Stability Calculation. The paper shows the applicability of electronic courses as a tool for developing professional competencies in students.

Peer-review under responsibility of the Scientific Committee of LKTI 2015.

Keywords: Moodle; electronic training complex; electronic course; blended learning.

1. Introduction

The modern professional environment is constantly changing for the graduates of power engineering specialties. This calls for the need in updating the requirements to their professional competencies, which affects the choice of educational technologies (Fix, 2015).

There is an abundance of electronic courses in various disciplines created in different virtual learning environments (Brinson & James, 2015; Broadbent & Poon, 2015), but we did not manage to find any analogs for master's degree disciplines associated with operational dispatch management in power systems. Therefore, it is of

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Peer-review under responsibility of the Scientific Committee of LKTI 2015.
doi:10.1016/j.sbspro.2015.10.021

great current interest to describe the principles of design, structure, functional purpose, and usage methodology of an electronic course in the teaching process with modern simulators used for professional training of operating personnel.

2. Tool Kit for Electronic Courses

For developing electronic courses, we chose learning management system (LMS) Moodle as a virtual learning environment, which allows us to create editable and manageable electronic training materials (Caputi & Garrido, 2015; Gogan, et al., 2015).

Moodle is a learning management system that makes it possible for a teacher to create their own website filled with dynamic courses, which allow students to learn at any time and any place convenient for them. Moodle includes the following features:

- uploading files of various formats created in external software
- developing training materials within the environment with the help of an embedded HTML editor
- monitoring the learning process by means of tests, tasks, seminars, wiki, forums and other tools
- communication within the course by means of forums, chats, and webinars; feedback through surveys and questionnaires (Tunda, 2014).

We use Fenix and Finist operator training simulators as tools for designing and implementing business games devoted to power system state management and Modus switching training simulators for the games involving switching operations.

3. Methodological Support and Implementation

The training philosophy can be viewed as recommendations on how to choose ways of achieving teaching goals with due consideration of regularities and conditions of the educational process, which can be made effective through optimal combinations and interaction of its elements. Therefore, when designing electronic courses, one should take into account a system of requirements to them as teaching tools and software products.

The Department of Power Grids and Electrical Engineering of Tomsk Polytechnic University is developing electronic courses for a professional set of master's degree disciplines. The main goal of creating and using an electronic course is to develop professional competencies in a virtual learning environment. An electronic course must take into account didactic, psychological, methodological and ergonomic requirements to e-learning resources. (Fix & Troschinskiy, 2015a).

When using an e-learning system, we deal with the following main tasks:

- developing the structure of an electronic course in accordance with the syllabus of the discipline
- adapting the theoretical materials, practical and laboratory courseware as well as business games to the virtual environment
- arranging the classroom and independent work for students by means of Moodle

Due to a dramatic upsurge in the intensity and consciousness of learning, it is becoming ever more important to manage the learning process so that we could help a student, who is free to choose a training sequence and learning organization methods, select rational trajectories of mastering a discipline in the constructivism-based environment of Moodle (Tunda, 2014). We can adjust the duration and number of repetitions of the instructional impacts in an electronic course to fit the individual learning style of a student, thus providing intelligibility and individualization of learning.

At the same time, in order to prevent education from becoming fragmentary, we need to provide learning consistency by developing the expertise, knowledge and skills in the correct order, as part of a system where all the elements of a training course are logically related to each other (Babanskiy, 1989).