Chapter 14

Engaging Engineering Students in the Educational Process Using Moodle Learning Environment

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ABSTRACT

Modern pedagogical practice emphasizes the use of technology as an opportunity to personalize the learning process and the need to take into account students’ new needs. The purpose of this chapter is to offer a model of presenting online learning materials in mathematics that involves students in a continuous learning process. This model consists of textual materials, video materials, and tests in Moodle virtual learning environment (VLE). Textual materials include short theoretical materials with examples, self-control exercises, and worksheets with step-by-step solutions. The model includes five different types of videos: mini-lectures, problem solving walkthroughs, instructional videos, interactive videos, and individual videos. The testing system includes training, control, and bonus tests. Creating all parts of the model requires the use of specific didactical techniques. The students’ feedback to this model has been highly positive.

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INTRODUCTION

The need for the use of technology in education is emphasized throughout the European Union’s education policy guidelines. The advantage of using technology in education is primarily the possibility to personalize the learning process (Cheung & Hew 2009; Maseleno et al., 2018; Rossing, Miller, Cecil, & Samper, 2012). We are in the situation where students are more and more diverse, for example their preliminary knowledge, participating in working life, age and nationality vary. This was one of the starting points that prompted the authors to reorganize the mathematics courses. It was also important for the authors to consider the students’ learning preferences. Today’s students learning process is moreover characterized by the preference of images, sound, colours and videos for text, changing reading patterns, “just-in-time” learning, identifying the real and virtual worlds, immediate feedback, and the preference for active, playful learning (Jukes, Schaaf, & Mohan, 2015).

The internationalisation of higher education has also led to a blend of learning and teaching cultures, and it has become increasingly important to emphasize the active participation of students. Activation of students, well-structured courses as well as independent learning supports deep and discouraging superficial learning (Valk, Marandi, Pilt, Villems, & Ruul, 2005). According to Lakovets, Kusnetsova and Zainutdinov (2018) and Moalosi, Uziak and Oladiran (2016) to achieve the shift to student-centred methodology, universities have adopted the blended learning approach. The use of online tools helps to improve the quality of student preparation and gives students the opportunity to be the leader of their own learning process.

When studying mathematics, first-year students face a variety of circumstances that reduce motivation and hinder successful learning. These are gaps in education, accumulated in school; overload and lack of time for structural thinking; low self-esteem; poorly formed own goals; emotional immaturity and, which is of great importance, the underestimation of the academic discipline in terms of importance for further professional training (Masouros & Alpay, 2009).

In order to find the solution the indicated problems, the existing method of organising the educational process was redefined. The purpose of this chapter is to introduce a model of presenting online learning materials in mathematics that has engaged and involved our students in a continuous learning process. The model consists of different types of materials which are interrelated based on certain principles.

According to Töytäri et al. (2016) designing courses is important how teachers view their tasks, what personal development they have had and what their perceptions of learning are. According to their study, the courses could to be designed more and more in cooperation of several teachers. The model has been developed by the authors based on their experience over several years. The model is based on teaching experience from various engineering disciplines in Moodle VLE at TTK University of Applied Sciences (TTK UAS).

The following is a discussion of the reorganization of the course content in the online environment and does not concern the educational processes in the classroom. This is because students with different needs need support primarily outside of classroom (Bayne, Gallagher, & Lamb, 2014).

This chapter consists of two main parts. The first part focuses on the process of reorganizing the mathematics course content, the model for presenting course materials, and the principles for designing and presenting model elements. The second one consists of the results of a research conducted among students to measure students’ engagement related to the new model.