Content development approaches in e-learning lessons

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ABSTRACT

Developments in the IT field have led to the development and variety of e-learning objects so that video or gaming lessons are found in most online courses and are developed in order to maintain the student’s interest. The current Learning Management Systems challenges refer to how to generate a dynamic content that automatically adapts to the a priori level of a student’s knowledge and behavior during lessons. Starting from the model student, the component of adaptive learning, the aim of this paper is to keep student motivation by designing a course with content related to the level of knowledge of the students. At the same time, lessons combine elements of gamification with quizzes, textual contexts and infographics in order to make the content more varied, and in order for the student to be more engaged, to assimilate, to understand or to recall the concepts presented in the course.

Keywords: gamification, adaptive learning, blending learning

1. INTRODUCTION

Developing technologies and users’ availability in the virtual space has led to the merging of techniques that correspond to reality and in the process of training or learning. If we discuss in terms of on-line training, learning or testing, for higher education, specific options refer to „traditional” e-learning, blended learning, or virtual learning (Kindi, 2014). Whatever form of training, students can choose between synchronous or asynchronous on-line learning models, according to their interests and needs, and the teacher’s choices (Wang, Shen, Novak, Pan, 2009). Trends in learning have led the mentor to adapt the traditional teaching strategies of the traditional space and the online environment (Jones, 2017), and the need to adapt contents, both in terms of availability and content integration, is evident (Sharples, Arnedillo-Sánchez, Milrad & Vavoula, 2009).

1.1. Learning strategies

Availability of learning contents refers to device options. In other words, accessing content on any type of device without time, space, or technology constraints requires primarily a responsive design - the text or images are displayed relative to the screen’s size and then successive small lessons are designed for a single objective, which is equivalent to short, clear and concise content. This approach is met by micro-learning or mobile learning, and studies show that information retention, self-determination and student interest have increased (Giurgiu, 2017; Al-Fahad, 2009; Fozdar & Kumar, 2007). An example of how a micro-learning unit can be designed is video eLearning - which allows you to achieve the goal associated with the task through a short presentation of up to 5 minutes. The effect can be improved if gaming elements, serious games and simulation, or real-life examples in bite-sized format, for the connection between the topic and the practical part are added to the micro small piece of learning. Moreover, transmitting information as graphics (infographics) is a characteristic feature of micro learning (Pappas, 2017).
In addition to responsive content, color psychology is another important aspect. Cold colors help improve concentration, while warm colors are suited to make a boring subject attractive. Additionally, a suitable background, which does not affect the legibility of the message, adds personality to the content. The description of complex phenomena or procedures can be successfully replaced by video, animated sequences, or screenshots - any activity that can be solved. In micro or mobile learning, lessons are short, mostly done in video sequences, and are more suited for deepening knowledge or in combination with other eLearning strategies. Education is more than knowledge transfer; it involves the combination of theoretical and practical knowledge and the adoption of the strategy according to the didactic objectives, the characteristics of the student class and the availability of the content according to the device are permanent concerns in the design of the teaching act.

1.2. E-learning concepts

Elements that can be integrated into contents, regardless of the adopted eLearning strategy, refer to concepts such as gamification/serious game, personalized learning, adaptive learning, video-based learning, bite-sized learning, or peer to peer assessment (Livia M, 2016). The use of current trends in content has the same purpose - to awaken the interest of the student and his need for self-improvement, on the one hand, but also to facilitate the level of understanding by explaining or simulating phenomena which, in a form of face-to-face training needs financial resources or special materials.

Gamification is defined as the process of applying the rules and techniques specific to the game in a non-game environment in order to motivate and encourage the student in the learning activity (Kapp, 2012). It has been found that, regardless of age, the student is happy to learn from mistakes, but also to receive rewards in the case of correct answers, elements that can lead to positive learning outcomes. A practice often used to embed gamification into contents is for courses in medicine (Choules, 2007; Elsaid & Abbadi, 2013), technical sciences (Virca et al. 2017; Bârsan et al., 2017; Bârsan et al., 2009) or in other fields in order to improve the students’ understanding (Dinicu, 2017; Dinicu 2014). Laboratories associated with medical courses are commonly developed on LMS platforms and include simulation and gamification elements, as they enable students to develop skills in the field, understand the succession of the various operations or the instrumentation used. Moreover, the development of classes in dedicated laboratories requires extraordinary financial resources; virtual classes can ensure familiarity with new products or equipment in the field, while dedicated classes in traditional space can be used for more demanding activities.

Personalized learning refers to adapting curriculum, pedagogical strategies and learning environments to student needs (Epignosis, 2014). In other words, an environment learning can be determined for each student (combination of colors, themes, ...), learning content or the form of content representation (text, audio, video; while some students can find multimedia content attractive, others can remember more if the explanations are presented in text), but also the form of interaction - quizzes, gaming (Klašnja-Miličević et al. 2016). If, in “traditional” e-learning it is started from the idea of designing a course according to objectives, and that course is covered by all learners at their own pace, adaptive learning involves designing the course that meets the same teaching objectives, but according to the student’s model. The model can be determined on the basis of an a priori knowledge (low, intermediate, high) and on the basis of intermediate evaluations, so that the course is adjusted or not at all times.

Personalized learning, also contains adaptive learning - each course can be seen differently, depending on the performance and progress of the student, and this adaptation can be obtained for example depending on the answers from the initial test or the answers given by the student during the course – you can come around some of the contents or skip some lessons if the teaching objectives have been reached. Another indicator of adaptive learning may be the time spent by a student to answer certain questions, so that a re-ordering of learning units can be made permanently, during the study, not only at the end. In other words, adaptive learning modifies the sequence of lessons, the degree of difficulty of test questions based on student performance and involvement (EdSurge, 2016). If personalized learning is the method or process based on observation, adaptive
learning refers to adapting the content so that the student achieves the proposed goals and meets the needs, preferences and abilities in a particular subject (Heera, 2016).

High rates of Internet connections allow the development of steps to solve or explain processes in the video. Thus, video-based learning has brought a new dimension in e-learning and allows both the development of practical skills as well as the demonstration or presentation of various phenomena.

Bite-sized learning is an e-Learning paradigm that allows building a lesson from modules that do not exceed 5-10 minutes. The need to adopt this trend refers to both the student’s ability to concentrate and the need to provide just-in-time support (Omer, 2015). Short learning modules support independence from the device, but also enable personalized or adaptable e-learning strategies.

Another way to keep the student’s interest during a course is also peer-to-peer assessment. For example, at the end of the lesson, in quiz sections, the student can become motivated if he finds out the number of students who answered the same or incorrectly to the same question. Moreover, peer review processes allow the student access to colleagues’ work. As any evaluation activity needs to be followed by feedback, the student improves his or her oral or written communication, but also identifies the most appropriate justifications (Kahiigi., Vesisenaho, Hansson, Denielson, Tusubira, 2012).

All the strategies and trends adopted in eLearning aim to engage the student, maintain his / her interest so that he / she achieves the established goals, develop the skills and qualification required by the teaching objectives.

The paper proposes a combination of new concepts in the field of e-learning with the aim of designing and presenting a differentiated content by groups of students, depending on students’ a priori level of knowledge and attitude along the way in order to maintain the student’s interest, but also to help the student achieve the course’s objectives.

2. MATERIALS AND METHODS

The Dynamic Web Development Course combines advanced HTML5 elements with PHP and MySQL programming language. As an adopted form of learning, a blending learning approach was used - the courses are conducted on-line on the eFront platform of the university and the laboratories in the specialized rooms, by groups of students divided according to the level of knowledge. There are several approaches to how to classify the student class (Yang & Dong 2016), but this approach was chosen because it seems best suited to higher education where interest on certain topics may decrease if the level of the course does not coincide with the level of knowledge of the student.

Students are required to go through the course on three platforms (beginner, intermediate and advanced) each week until the day before the lab. Students who have no knowledge in the field will go through more detailed materials, with more examples and demonstrations, so that the objective of each course is achieved regardless of the level of a priori knowledge. The course was divided into 3 lessons and each lesson consists of bit-sized objects modules that do not exceed 5 minutes, making it possible to use common modules between different levels of difficulty. In other words, there are common units that are identical in all courses, and the distinction between the levels of knowledge is done by adding explanations or demonstrations.
Lessons contain both gamification, interaction, text, and video, and are made with Storyline Authoring tools and then imported to the eFront platform. All objects follow the SCORM standard. Each course finishes with a series of questions to which students must answer correctly. An incorrect answer will display additional explanations or allow the student to review the associated modules.
Adaptive learning involves the construction of 3 models: domain model, student model and adaptive model (Esichaikul, Lamnoi & Bechter, 2011; Mustafa & Sharif, 2011). The Domain model contains curricular structure data, content type, and important is how to navigate between elements so as to get adaptive content. The student model is a representation of the information that characterizes each individual learner. It is based on pretest and behavior during the study of the information. The adaptive model specifies how to modify content presentation by combining domain model modules and student model so that the results are as good as possible for each individual student.

Starting from the need to build a model student, the entire series of students gave a LMS pretest, and based on the results obtained, each student was assigned to a study group, both at the laboratory and at the course. The pretest was composed of 30 questions, with equal weight, designed in accordance with the objectives of the course. If the result obtained by a student was below 40%, then the student was assigned to the beginner’s level course. For a score of 40% and 70%, the intermediate level was allocated and for a score of over 70% - the students was assigned to the advanced level.

After the results of the pretest, the students were assigned to the corresponding groups and completed the first e-learning lesson according to the level obtained, and in the laboratory they were able to clarify their misunderstandings.

Along the way, complex tests were created after each lesson for student model, which allowed the reorganization of student groups according to the results obtained. If, initially, after the pretest, the advanced group contained the fewest members, after the first lesson, the number of students in the beginner’s course became the smallest. Although there was no real adaptive learning, the use of e-learning elements and the division into 3 clusters, depending on the level of knowledge, both for the platform activities and for the
laboratories carried out in the traditional space, kept the students’ interest and attractiveness for the course was measured by the small number of users in the group of beginners.

3. CONCLUSIONS
Combining the concepts of gamification with classical methods used in e-learning has increased student self-determination. The adopted blending learning has maintained the interest of the student but has also stimulated most students to reach the upper level.
The differentiated approach to student groups presented in the paper is not a new concept and can be successfully applied to maintain the interest of the class. Thus, students with in-depth knowledge in the field will not get bored during classes, and students with a relatively low level of knowledge can reach the experienced level by a greater effort. Initially, the student model was built on a priori knowledge with the help of the pretest containing questions in accordance with the course’s objectives, and the level of knowledge gained during the course was determined by the tests at the end of the lesson. As a further development, it is intended to develop an adaptive course in the true sense by developing student model, model domain and adaptive model in accordance with the requirements of a differentiated course.

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