Development of an Online Multimedia Course

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Abstract – At the University of Rijeka the theoretical knowledge is mainly transferred by the traditional model consisting of professor explaining material to a group of students in front of a blackboard. We believe that this model dates from the period of the industrial revolution when it was necessary to educate large number of people to work on new machines, but there was no technology for more efficient knowledge transfer. Nowadays, such a model cannot keep up with the speed of generating new knowledge and technology. A larger number of participants cannot be educated due to time and space constraints, and the knowledge usually becomes obsolete by the end of studies. The result of this model are students with skills unadapted to the labor market requirements. We believe this is an extremely important issue for our university. One of the possible solutions might be digitizing theoretical parts of courses. Using web technologies, theoretical lectures can be held online and in that way more efficient methods of teaching on campus can be used. In this paper, the process of digitizing the university course Introduction to Psychology is presented, as well as the benefits that can be achieved by creating and using multimedia online courses.

I. PROBLEM DESCRIPTION

A. Outdated model of knowledge transfer in Croatia

At the University of Rijeka the theoretical knowledge is mainly transferred by the traditional model consisting of professor explaining material to a group of students in front of a blackboard or using power point slides. We believe this model is outmoded and dates from the time when there was no technology for more efficient knowledge transfer. Nowadays, such a model cannot keep up with the speed of generating new knowledge and technology. A larger number of participants cannot be educated due to time and space constraints, and the knowledge usually becomes obsolete by the end of studies. The result of this model are students with skills unadapted to the labor market requirements. We believe this is an extremely important issue for our university.

B. Practical problems

Students are faced with a number of problems in mastering course content. Inadequate, outdated and sometimes raw literature, the lack of literature, badly maintained course websites, no playback of lectures, and the lack of interaction during the class are some of these problems. Students who wish to choose and design their own curriculum, by attending only those courses that interest them, are forced to make compromises in their work week, due to the spatial and temporal limitations such as overlapping classes. Hence, the maximum capacity of their learning is not utilized [1]. Teachers, on the other hand, are overloaded by teaching and by bureaucratic obligations, which greatly inhibits their scientific productivity.

C. Saving resources

The University of Rijeka organizes a large number of courses each academic year - about half of the teaching workload comprises theoretical lectures. For example, the Department of Informatics offers 41 course at the undergraduate level, which is approximately 1125 hours of theoretical lectures [2]. When these theoretical parts of the courses could be mastered over the Internet by watching multimedia video lessons, the University could redirect significant resources in research and scientific projects. By using computer technology, universities can reduce the number of classrooms, staff and hard copies of teaching materials which are required if the number of students is to be increased [3]. Payne and Stergioulas argue that technology enhanced learning could be a significant driver for progressive change and economic growth, which can assist in the economic recovery, as well as in the democratization of education [4]. Teachers would not need to spend time in teaching and preparing the content year in year out, and students would be able to adapt the learning process to themselves so that they learn where and when they want and at a pace that suits them [3]. Moreover, such an approach would evidently solve the problem of overlapping courses.

II. TECHNOLOGY AND EDUCATION

Using technology in education can enhance the process of learning; therefore it is called Technology Enhanced Learning (TEL). It can make the process of learning more effective, efficient and flexible for students and it can improve teaching quality and add more value [3, 5, 6]. Technology evolved to the level that it can support individualized and collaborative learning [7, 8, 9]. There are even reports that students prefer TEL to the traditional face-to-face learning methods [1]. Some people in academia fear that TEL can never be as effective as face-to-face teaching, but one might argue
that this held true in the past, due to the negative experience with poorly designed content or inappropriate use of technology [4]. With education becoming more and more personalized, and enriched with multimedia and social media, that should not be the case anymore.

A. Democratization of knowledge

Until recently, access to the most advanced knowledge, created by leading experts, has been reserved for a small number of students who passed a rigorous and financially very demanding process of enrolling in one of the prestigious universities. All that changed with the open curriculum initiatives, which began to spread across prestigious universities. Since 2012, many online platforms have emerged with the goal of providing top quality education for free. Some of them are Coursera, edX, Udacity, Venture Lab, Udemy in USA or OpenupEd and Iversity in Europe. Since the courses are open to the general mass, they are called Massive open online courses or abbreviated MOOC. One might ask why institutions and educators would give their knowledge for free. Bonk argues that by doing it they promote their talent and enhance their reputation, they potentially help faculties with recruitment and retention, and they create connections with life long learners [10]. They can also build business models around this free content, like charging for knowledge certification or charging other institutions for material usage.

B. MOOCs

MOOCs are online courses with no formal entry requirements, and usually no participation limit. They can be enrolled free of charge and they do not earn credits. [11]. According to Siemens, there are 2 different categories of MOOCs [3, 12]. By adopting a connectivist philosophy, cMOOC, where c stands for connectivity, emphasizes creation, creativity, autonomy, and social networking learning. xMOOC is based on the traditional learning approach, and comprises of lecture recordings and short quizzes and tests. Lisa Lane suggests that MOOCs can be grouped into three types: network-, task-, and content-based [17].

C. Big data in education

More and more activities are carried out via the Internet. This results in an increasing amount of data to be analyzed in order to develop intelligent tools for improving the decision-making process. The same applies to the process of learning. With the development of MOOCs, the educational process began blending with the Internet in much higher rate. Users interact with LMS systems (Learning Management System) in different ways, and thus generate enormous amounts of data. These data should be analyzed to better understand the process of learning over the Internet and thus improve the LMS systems and the design of the courses themselves.

Learning analytics “is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs” [13]. By building predictive models based on learning data, researchers can answer questions like: “What sequence of topics is most effective for a specific student? What student actions are associated with more learning (e.g., higher course grades)? What student actions indicate satisfaction, engagement, learning progress? What features of an online learning environment lead to better learning? What will predict student success [14]?” Long and Siemens argue that by using learning analytics we can innovate and transform university systems and pedagogical approaches, so its biggest value is in reforming activities in higher education and assisting educators in improving teaching [15].

III. COURSE DEVELOPMENT

The course Introduction to Psychology from the Faculty of Humanities and Social Sciences at the University of Rijeka is digitized for the purpose of this paper. The course is offered at the undergraduate level and intended as an elective course for the students of the entire university.

By enrolling in a course at the university, a student is expected to adopt certain theoretical concepts and develop specific skills. Since the purpose of this course is to provide a basic overview of the entire scientific field of psychology, most of the course loads are theoretical lectures and it is, therefore, not possible to go into the depths of matter or to develop certain skills. The course is digitized with the aim of making students learn theoretical concepts before coming to class, and thus a content-based xMOOC is created.

To create this online course, a web application for distributing the content needed to be developed, and the course content needed to be digitized.

A. Web application development

For the development of the web application, the “Lean Startup” philosophy is used [18]. Since this approach is based on fast and agile development, technology which enables developing a fast, dynamic and flexible application needed to be chosen. The back end part of the application is developed in Python programming language and Django web development framework driven by MySQL database. The front end is developed using HTML language and jQuery Javascript library. An important criterion for choosing these technologies was the fact that they are free and available to everyone.

B. Course digitization

The course is divided into 12 thematic sections, each divided into concepts that are shown in the form of video lessons with the average duration of two minutes. Recent research suggests that the format of short videos provides learning outcomes comparable to the traditional on-campus lectures [19]. To keep the users engaged, a fast exchange of short videos and short single choice questions with immediate feedback is employed. The
The purpose of the questions is not evaluating users’ knowledge, but rather pointing out key points and helping with memorizing them.

The course is available to the general public since one of the goals is the popularization of psychology. To make the course materials interesting and fun to watch, video lectures are made in the form of comics and drawings in the making. In order to improve users’ memory, mnemonics is used, a strategy that helps in storing information in long term memory and recalling it when needed [20]. Fig. 1 shows an example of mnemonics which describes the role of glial cells inside our brain.

The whole digitization process, as shown in Fig 2, is conducted in 5 steps. The first step consists of preparing the course content in the form of narrative, and the questions that go with video lectures. Thereafter, two processes take place in parallel. While the illustrator creates graphics using the drawing tablet, the lecturer is recorded in a specially prepared studio. These steps are then followed by the assembly of video in a video editing software. The final step is the publication of the content on the web platform.

![Mnemonic Example](image1)

**Figure 1.** Using mnemonics in describing function of glial cells

![Digitization Process Diagram](image2)

**Figure 2.** Course digitization process

### IV. PRACTICAL RESULTS

Following the example of developing platforms for MOOCs mentioned in this paper, we opt for a similar approach. A standardized platform is made, enabling all courses to have the same structure. User interface currently consists of two main parts: a promotional page and a virtual classroom.

The main element of the promotional page is a motivational video, in which the course instructor is trying to motivate visitors to enroll in the course. This page also provides information about the course instructor, description, thematic segments and literature. Once participants enroll in the course, they get access to the classroom where they can watch video lectures and answer lecture questions, as shown in Fig 3 and Fig 4.
The course, which can be found on web address http://www.buraznanja.uniri.hr/courses/uvod-u-psihologiju, consists of a total of 12 thematic sections and 223 lessons, which makes 347 minutes of video material. By the 15th of January 2014, when the data were analyzed, the course was enrolled by 849 participants. Fig. 5 shows a huge drop in the number of video lessons watched after the first thematic section. The reason probably lies in the fact that a large number of people enrolled this course out of curiosity rather than interest in the material.

Fig. 6 shows times at which the participants were watching video lessons. This supports the idea that people need flexibility in organizing their learning, and if the flexibility is given, they use it.
V. CONCLUSION

The growth of popularity of MOOC courses in the world opens door to new research in various domains of science, from pedagogy and education to computer science, and based on the data created within a variety of learning systems. With new technologies evolving every day, teachers are faced with new challenges. For students, the biggest contribution of this type of courses is the possibility to watch lectures all over again whenever they want. The biggest benefit for teachers is that they can spend more time on practical work and research with their students. They can focus more on directing social communication, identifying students capable of mentoring, and identifying and selecting the most successful method of learning.

Using online multimedia learning and developing analytical tools, we are able to personalize and customize learning for each student individually. We can raise student motivation and student achievements by providing immediate feedback while learning (lecture questions) and by visualizing complex information. Our future work will focus on identifying the impact of combining multimedia courses with on campus teaching, and developing tools for estimating student motivation in an online environment.

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REFERENCES


[21] Online multimedia course Introduction to psychology, http://www.baranzanja.uniri.hr/courses/uvod-u-psihologiju