Constraints in Course Design Using Web 2.0 Tools: A Croatian Case

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***Abstract*— Even though Internet and Web have always supported some form of social interaction, Web 2.0 shifts this paradigm to a new level. As social networking that rises from Web 2.0 applications, gains acceptance within the Internet community and the general public, a concept of enabling e-learning using Web 2.0 tools and services becomes more and more recognized. Goal of this paper is to evaluate empirically some of the constraints that are crucial for course design using social networking tools. A survey was carried out among current students at the Faculty of Economics and Business in Zagreb in order to evaluate issues connected with student constraints on course design. A cluster analysis was used in order to identify different student groups and their expectations from Web 2.0 tools that would be used to support e-learning. The results show that there are four typical groups of student attitudes towards implementation of Web 2.0 in e-learning. A successful course design should take into account expectations and demands for each of these groups. According to these results comparison of identified needs and currently available practices was conducted showing the advantages Web 2.0 contributes to e-learning while also uncovering weak points that can be further improved.**

Keywords- e-learning, Web 2.0, social networking, Course design, cluster analysis, teaching

I. INTRODUCTION

Development of the Internet has influenced the way people communicate, work and learn, enabling new means and possibilities in distance learning. Distance learning implemented through the use of Internet services has evolved into e-learning paradigm. The possibilities of synchronous communication was introduced into learning processes, while the quality of asynchronous communication was improved using Internet services such as email, chat, forums and newsgroups. Also videoconferencing and teleconferencing made distance learning more accessible and cheaper for both the institutions but also for students. These services also allowed for new communication possibilities and new types of information exchange. Even though e-learning is seen as a tremendous enhancement of distance learning, there is still only passive approach to acquiring and using educational materials [1].

Web 2.0 paradigm has introduced further change in the way e-learning can be implemented. Web 2.0 is a platform that enables interaction, collaboration and information exchange between various users resulting in participative creation of rich new content [2]. In terms of e-learning interaction between teachers and students is improved by emphasizing the role of students. Also interaction of students with each other is introduced into the learning process as a new significant factor that improves the results of learning.

The goal of this paper is to examine the possibilities of employing Web 2.0 services and social networking services as an additional platform for design and creation of e-learning course content. Based on the current attitudes of students a number of constraints over course design can be identified in order to customize this learning platform to suite needs of students. In order to identify these requirements a survey was carried out among the students at the Faculty of Economics and Business. The results were used to estimate further steps in developing current e-learning practices and tools used, and also to develop an approach to the introduction of Web 2.0 as a platform for e-learning 2.0.

The rest of the paper is organized as follows: In Section 2, e-learning and Web 2.0 are defined and explained. In Section 3, issues in course design are presented as seen by the students, teacher and institutions. In Section 4, research methodology is described along with the questionnaire and basic statistics of the targeted student sample. Also, cluster analysis which was used for the analysis of student groups is described. Results are discussed in the following Section 5, along with a few guidelines for the introduction of the Web 2.0 platform. Finally, Section 6 contains conclusions and final remarks.

II. E-LEANING AND WEB 2.0

A. Development of e-learning

The term e-learning pertains on a very complex and dynamic process regarding and connecting learning processes and developments in digitalisation and ICT. There is a multitude of definitions of e-learning in literature. Most of these definitions refer to certain aspects of e-learning such as simple adoption of electronic media [17, 18], or possibility of achieving distance learning [20, 21] and so on. Each definition describes subtle differences that are associated with the term itself, but different authors emphasise different aspects of it depending on the context. A more general definition of the term can be found in [19] where Tavangarin et al. define e-learning as "*all forms of electronically supported learning and teaching, which are procedural in character and aim to effect the construction of knowledge with reference to individual experience, practice*

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and knowledge of the learner. Information and communication systems, whether networked or not, serve as specific media […] to implement the learning process". In other words e-learning is an umbrella concept, which comprises almost anything related to learning in combination with information and communication technology [4]. This definition includes a type of education where students work on their own at home and communicate with teachers and other students via e-mail, electronic forum, videoconferencing, chat rooms, bulletin boards … and other computer-based communication [3]. As Dichtanz [4] points out the time and space component of e-learning, the same definition recognizes e-learning as a collection of teaching and information packages in continuing education which is available at any time and any place and is delivered to learners electronically.

E-learning development is strongly associated with the organisation of the distance learning process. The process of this evolution from distance learning to e-learning in its present form was carried out in three different stages: (1) stage before digital era; (2) digital era of the Internet and World Wide Web; (3) Web 2.0 stage and E-learning 2.0.

At the very beginning of distance learning organisation, learning process was goal oriented, available to a particular audience, learning materials were in the form of print-outs, and the communication between students and teachers was based on traditional types of communication. This type of learning process was known as "correspondence study" or "correspondence education". In his way formal education was made available to working people who were able to complete courses with minimum time spent at the education institution. Next advancement in distance learning process organisation was the application of analogue technologies in the learning process (radio teaching, radio-television teaching). Even though this technology introduced additional benefits for overall learning process, learning still remained passive in its nature, limited to a particular audience and with limited communication possibilities. It allowed for introduction of learning in areas where learning process was undeliverable such as remote geographical locations (i.e., smaller islands of mainland, or scarcely populated mainland areas). More radical advancement of the learning process was introduced with the appearance of the Internet and World Wide Web. Information technology is still rapidly developing; teaching and learning materials are digitized, stored in databases. Due to the usage of modern ICT, collaboration of participants involved in learning process is highly facilitated. The progression of the Internet has set the ground for the rapid development of e-learning based on the Web [6]. E-learning was established as a new form of learning offering new possibilities. Some of these possibilities include: availability of a variety of learning materials in variety of presentation types, learning at one's own convenience – in terms of time and place of learning, unlimited possibility of repetitive learning (re-learning). Benefits from e-learning improve both distance learning implementations but, unlike earlier enhancements, they also significantly improve traditional learning processes. Implementation of e-learning is based on a learning management system (LMS) that is used to organize and deliver online courses [14]. Most important functions of an LMS include management of the course information, tacking of student progress and cataloguing of reusable learning objects. Learning process is enriched with simplified, user-friendly communication possibilities, sharing of information and opinions among students and teachers through e-mail, chat, instant messaging, file sharing, etc., but still it is a type of passive learning. Internet was a rich source of information, but it didn't allow its users to participate in the creation process, it didn't allow interactivity [7]. The most recent enhancement of the e-learning process is achieved through Web 2.0. Web 2.0 refers to a change in the way the Internet is used, representing its innovative collaborative nature. Flexibility, pervasive access, user-friendliness, interactivity, social interaction and collaboration and information sharing are just some of the advantages Web 2.0 brings to E-learning. All of these increase student motivation and foster student reflection [8] giving the students better control over their learning results.

B. Web 2.0 paradigme and its influence on social networking

Web 2.0 has made a shift in the way Internets users perceive and use Web content. Most of the developments of Internet and Web services have been technical in nature until Web 2.0. Most of the Web 1.0 content was published and edited by information owners and professionals. Even content that originated from the common users was first screened and approved or edited by web site editors or at least Internet service providers before it was made available online. Web 2.0 introduced a sociological change of the paradigm by excluding the middleman between Internet users. In this new paradigm users share their information directly. Internet service providers only provide the appropriate platform but do not interfere with the content that is published by the users for other users on a peer basis. This change enabled Internet users to become active users of the Web and realize potentials that were otherwise hardly achievable or ineffective, like collective intelligence, massive collaborative efforts, non-mainstream news content and niches, folksonomies, etc.

Possible disadvantage or threats Web 2.0 may lead up to is the creation of the digital narcissism and amateurism which can undermine expertise and safety of available information. Some of the critics already warn that the Web is filled with mistakes, half-truths and misunderstandings that make navigating and using Web difficult and exhaustive.

Nevertheless, applying Web 2.0 into the learning process can result in more positive change of the learning results than generating negative outcomes. For example, using online social networking service can be a good supplement to existing e-learning platform as it enables additional possibilities Web 2.0 generally provides. This is because all of the efforts of the students and teachers are readily publicly available to the whole learning group, which motivates students to be original. Being aware that all of the work they dedicate to mastering a course can be seen and appreciated by whole group, which can additionally stimulate students to

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make their best effort. Along with the increase of student interaction this is one of the most important advantage e-learning 2.0 can provide.

III. COURSE DESIGN INCORPORATING WEB 2.0 TOOLS

Some of the most significant potentials of using Web 2.0 tools in learning are: (1) ability to provide anytime, anywhere learning, (2) give access to vast amounts of content, (3) increase students' opportunities to interact with other students, teachers and experts, (4) extend learning to the traditionally excluded, to the disabled and to the global community [9]. The actualization of these potentials, though, can be questionable since it largely depends on the properties of the course design. There is a number of issues during the course design using Web 2.0 services that need to be taken into consideration. We can divide these issues into three groups: issues for students, issues for teachers, and issues for Institutions.

Some of the most important issues for the students include (1) the inadequate online access, (2) the need to provide training for those not skilled in the use of a range of software used (3) tendency to become uncritical about the material they get from using Web 2.0 tools and (4) the blurring of the distinction between full-time and part-time study. In the first two cases course design can be adjusted so that the final implementation is not overdependent upon the ICT [10]. The problem of underdeveloped criticism and assessment of obtained materials is connected with the students' inability to reflect on their learning. This is a skill students should acquire during their earlier education as a permanent process that is developed continually throughout their study period. In order to support these processes course design should include additional tools to allow for formal reflection on lessons learned. In this way e-learning 2.0 can promote student self-awareness and self-criticism. Finally, in order to cancel the effect of blurring the distinction of full-time and part-time study course design should be able to incorporate flexible study patterns so that part-time study can be achieved as a lifelong learning opportunity [16].

Most important issues for the teachers are (1) the increase of the workload, (2) requirement of acquiring new technical skills, (3) prejudice towards e-learning 2.0 and (4) unclear intellectual property rights. In the first two issues teachers need to dedicate more of their time in order to establish a course and invest even some additional time into acquiring new skills to be able to design a course. In order to minimize additional workload the course design should be implemented so that is requires minimum of maintenance during the running of a course. In this way teachers can manage their time better and successfully balance between gaining new skills and maintaining content of the course. The last two issues can be resolved by informing the staff about the advantages of e-learning that can promote teachers' roles in the learning process and not demote them as they might fear. Intellectual property rights should be backed up by the educational institution and the LMS should allow for some mechanism of authentication of the users before they can download the learning materials [13].

The educational institutions should concentrate on resolving the following issues in order to facilitate the learning environment for both students and teachers: (1) establishing a customizable LMS of the institution [15], (2) support and encourage staff development and (3) define policies and practices in assessment processes [12].

IV. RESEARCH METHODOLOGY AND RESULTS

For the purpose of this research a survey was carried out among the students of the first year of undergraduate study in Business Economics at the University of Zagreb.

The goal of the survey was twofold. First goal was to investigate student attitude towards social networking services and their involvement and habits in using some of these services. Within this part of the survey students were asked weather they use some of the social networking services, and if they do why did they join and what do they use these services for. Additionally students were asked if they can see social networks as relevant tool for e-learning. Second part of the survey contained questions about their concerns about using social networks. They were asked to rank dangers from using social networks and more generally the Internet and in the same context to asses on average how much time they spend using Internet. Using results from the first part of the survey it is possible to deduce the advantages from using social networks in e-learning courses, while from results of the second part of the survey it is possible to assess threats and challenges in implementation of social networks as e-learning tool.

Collected data sample contains 184 answers to survey questions. Majority of students were female, while only 26% were male students, which reflects the structure of the whole population of students at the Faculty of Business and Economics (Fig. 1).

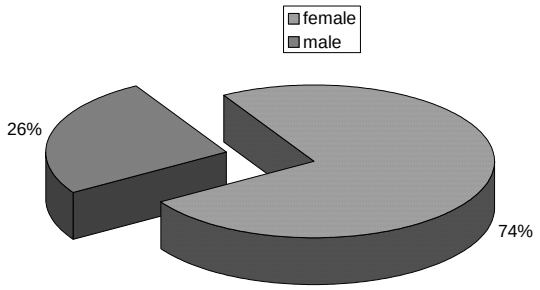

Figure 1. Surveyed students by sex.

When it comes to using particular Web 2.0 services Facebook is the most popular since 98% of students have an open profile. Other Web 2.0 services are barely represented since only 11% of students have an open profile with the second most popular service MySpace (Fig. 2).

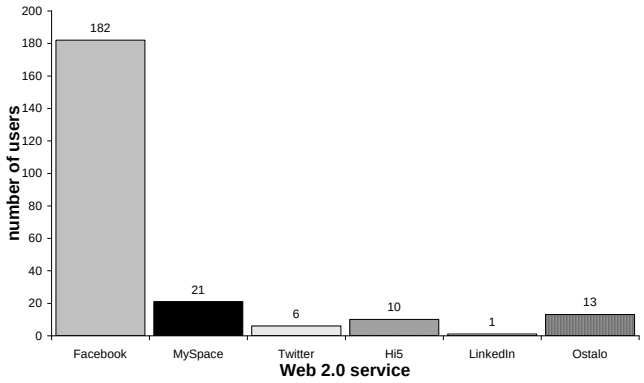

Figure 2. Number of students with open profiles of most common Web 2.0 services.

Finally, 61% of students believe that the usage of Web 2.0 services would be useful to them as an e-learning tool (Fig. 3).

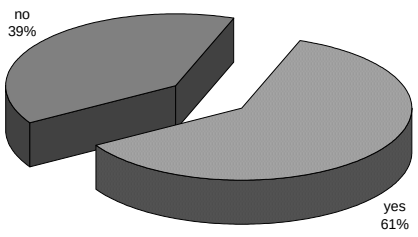

Figure 3. Number of students that believe Web 2.0 services can be used in e-learning successfully.

According to these data an in-depth analysis was carried out using undirected data mining methodology. The goal of the analysis was to identify typical behaviours of students in terms of their usage of Web 2.0 services and attitudes towards e-learning and the possible combination of the two. Cluster analysis was applied because it can provide basis for generating stereotypical properties that final implementation of course should contain in order to appeal and become useful to majority of the student population.

Cluster analysis, also called segmentation analysis or taxonomy analysis, is used to identify homogeneous subgroups of cases in data set. These groups, also known as clusters, are formed so that they both minimize within-group variation and maximize between-group variation. For each cluster a typical value across predictor variables is identified called centroid. Centroid is the value that has the minimal average distance for all members of each cluster, but that has maximum distance to centorids of other clusters [11]. By comparing centroids and statistics of different clusters differences can be determined between clusters and stereotypes can be created. For each stereotype a number of measures can be taken into account in order to customize final course design to targeted students.

The analysis showed that four distinctive student groups can be described. All of the student groups have some attitudes in common. ID theft is the biggest concern for all of the students, while disinformation on the Web or becoming addicted to Web is not perceived as a threat.

In Table 1, we can see typical values for some of the most important questions from the survey that make distinctive differences between groups.

First cluster consists of students that spend more time online where they participate in forum discussions (4-e) communicating with their "real world" friends (3-3), but also meeting new people (4-b). Due to intensive online communication these students see the main threat for online security in ID theft and possibility of false introductions from other Internet users. This group of students has good experience with the online world and they are willing to use Web. 2.0 services in education promptly. This is why this cluster can be called the cluster of "skilled active online users" which generally represent early adopters of technology.

Second cluster contains students that also spend more time online, but they do not actively participate in content creation in terms of posting on forums and discussion groups. They usually open profiles with online services under influence of their friends who have profiles already opened. They are more concerned with becoming addicted to Web then the other groups, but they do see a possibility of using Web 2.0 in the learning process but they need a bit more encouragement since they have a more passive approach. This is why we can call this group a cluster of

TABLE I. SUMMARY OF DETECTED CLUSTERS

	Sex	3-1*	3-3*	4-b*	4-e*	6*	8-1*	8-2*	8-3*	8-4*	8-5*	9 hour per week online	n	%
1	male	n	y	y	y	y	1	4	2	3	5	7hpw to 14hpw	42	23
2	female	y	n	n	n	y	1	5	4	2	3	7hpw to 14hpw	62	33
3	female	y	n	n	n	y	1	5	3	4	4	less than 7hwp	36	20
4	female	n	n	n	n	n	2	4	3	1	5	less than 7hpw	44	24

3-1 – Reason for opening a social network profile: friends' suggestion
3-3 – Reason for opening a social network profile: reconnect with old friends
4-b – Using social network for meeting new people
4-e – Using social network for discussions of leisure and private topics
6 – Do you think Web 2.0 can be used in learning process?
8-1 ID theft as a threat on soc. networks (1-high concern; 5-least concern)
8-2 false information on soc. networks (1-high concern; 5-least concern)
8-3 false representation of other users (1-high concern; 5-least concern)
8-4 lack of privacy on soc. networks (1-high concern; 5-least concern)
8-5 addiction to soc. network and Internet (1-high concern; 5-least concern)

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"cautious passive online users" which can also be treated as trend followers in terms of technology adoption.

Third cluster can be viewed as a subgroup of the second cluster since students from this group also tend to use online services on recommendation of their friends, but are rather cautious when using interactive tools these services provide. These users on the other hand spend less time online and have much less interest of online communication and Internet. This is why they are the group least concerned with online security issues. This cluster can be also referred to as the cluster of "online beginners" or late adopters.

Finally, the fourth cluster contains students that are highly concerned with privacy on the Internet (8-4 in Table 1), and this is why they are highly sceptical and unwilling about using Web 2.0 services as e-learning tool (6 in Table 1). This is why this cluster can be referred to as the cluster of "sceptical non-users" or refusers.

V. DISCUSSION

As we have shown earlier there are four distinctive groups of students that have different habits and attitudes towards the Internet, but also the possibilities in employing Internet services in the learning process. These results correspond with the expectations based on the theory of diffusion of innovation. What is crucial though is that during course design considerations of specific needs that can encourage each of these groups has to be taken into the account. The choice of Web 2.0 service is important in order to motivate students for the innovative approach to the learning process. Service that is already most popular should be chosen, because there is a number of users that will actively engage in this new form of learning (first cluster), and there is a number of students that can be easily motivated to become users of this facility (second cluster). While students that are skilled active online users may have high expectations from advanced functionalities of the e-learning service, cautious passive online users may need more reassurance in the security properties of the service, even if the functionality of the web 2.0 service is more modest. These users will also benefit from well developed online help for Web 2.0 services, which is especially important for students "online beginners". Beginners will be more willing to participate if they can see additional benefits in comparison to traditional learning that can justify time invested in training and learning how to use a new tool. The most challenging student group is the group of non-users that lack not only the skill for using the Internet but also motivation. It seems that the most motivating property of the Web 2.0 services seems to be the possibility of collaborative learning. In this way each student within the learning group makes higher impact on other classmates than in traditional learning by publishing and making available all of the works, research and tasks they make for the course. Every student can see other students' work, which can be motivating since each opinion over a particular subject is expressed and made available. Also, the fact that all of the work is available online motivates students to be original and in great measure prevents cheating in terms of copying other students work. The possibilities of influencing their classmates should be seen as the most important factor for the students that are unwilling to participate in online learning activities.

Being able to satisfy all of these needs can pose a great challenge and additional effort for the teachers in the starting phase of the course design. This can greatly discourage teachers in employing Web 2.0 services in the learning process, even though after implementation the role of the teacher is drastically changed and less emphasised than in traditional learning process.

In order to alleviate this workload for teachers the institution should establish policies and practices that can motivate teachers effectively. These may include introduction of LMS or virtual learning environments, staff development possibilities and assessment frameworks.

VI. CONCLUSION

E-learning 2.0 is a new paradigm of distance learning facilitated through the use of Web 2.0 Internet services. The main characteristic of this approach is the shift of the roles of teacher and students within the learning process. Teachers' influence is diminishing while the interaction between students gains more importance on the realization of the learning process though the collaborative learning.

In this paper, we examined what are the requirements of students that can successfully achieve these goals. In order to identify student attitudes and their preferences and habits in using Internet services a survey was conducted among students at the University of Zagreb. A cluster analysis was employed on the gathered data. Four distinctive groups of typical student attitudes were identified. Groups that have most positive attitude to using Web 2.0 services in learning process are the "skilled active online users" and "cautious passive online users". Survey results strongly indicated that adequate course design must take into consideration the theory of diffusion of innovation, and cover particular needs of all distinctive groups of users. Groups of students which are less inclined to using Web 2.0 services as a platform for e-learning are "online beginners" and "sceptical non-users" that require special attention during the course design.

Currently available practices for supporting e-learning at the Faculty of Economics have provided a good starting platform for development of e-learning courses but additional effort is required to customize final courses for the identified students groups according to the survey results. Crucial role in achieving the goal of implementing e-learning 2.0 is the support of the institution towards the teaching staff but also in the implementation and maintenance of the adopted learning management system.

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