Analysis of user needs to create specific learning environments

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Abstract. *By having different e-learning systems within education systems and knowing that they are geographically dislocated, it is important to examine different aspects while creating those kinds of systems. The purpose of our research study was to observe how different users of e-learning systems perceive different aspects of their LMS systems, in order to facilitate design driven LMS system design. It is important to note, that our research is not focused on LMS course design, but how to design better LMS systems. In order to execute a research, a questionnaire was designed and filled by respondents from Croatia and United States of America from different universities. We have showed differences between respondents attitudes towards system features and system interface. Results that are shown in this paper can be used in the development of a new e-learning system as well as for further research on the subject matter.*

Keywords. e-learning, LMS, customized learning environments, web 2.0, LMS development

1 Introduction

Today the process of higher education around the World is almost impossible without some kind of course management systems (CMS) [3], which we mostly recognize as e-learning systems. E-learning systems are integrated in many university programs [13] and with their help we generally improve quality of teaching and learning [2]. While we can have great benefits out of e-learning systems [2] , according to [10] learners must use the system correctly and the system must be designed correctly or else those benefits will not be maximized.

There are a lot of advantages that e-learning systems can produce. Some of these advantages are improvement of the systems quality, accessibility to education and training, reduction of the education costs and improvement of the cost- effectiveness education [5]. Despite of all the advantages and improvements that e-learning system can provide us, there are also some ever present problems with those kind of systems. Most of the systems were developed at a time when Internet was primarily seen as a mechanism for information delivery. Because of that, course management systems were developed to make it easier for a faculty member to deliver the materials, not to enhance learning. Even though most of the systems now include basic tools that allow students to turn in assignments, take exams and surveys, communicate with each other through discussion boards and chat programs, those tools tend to be limited in functionality, generic in form, and based on relatively old technology [8]. Because of these problems, constant research need to be conducted [9], so we can always obtain new information about learners needs. [4]

While designing those kind of systems, we must be aware that, even though e-learning is very helpful in studying [2], different problems in written communication can be identified from users [7], especially problems that refer to communication between users [11]. We also must be careful while designing system for different kind of study fields [12] and users. According to [13] every course management system developer must obey certain standards while developing that kind of systems [12], but he/she must also have in mind the differences in systems, such as software engineering or vocal training applications. According to [12], the published e-learning critical success factors, that we also must consider while developing course management systems, were surveyed and grouped into 4 categories namely, instructor, student, information technology and university support. According to [13], the first step in designing e-learning is to define what learning means in the context of an e-learning environment. A popular approach in the modern software design paradigm requires asking users what they want [4].

In order to develop a new system (knowledge hub) that can both be used as an e-learning system and a system for a distance education, which are generally not the same [6], we conducted a study which results and comments are shown in this paper. The study served as a basis for affirmation or disproved of certain ideas related to the features of the system

during its development. Since the appearance of e-learning systems, enormous efforts have been dedicated to the development of learning systems [1]. So in order to build a quality learning system we need to constantly conduct other researches and obtain as much of new information as we can [9].

2 Objectives

This study held three objectives. We conducted our study on two kinds of respondents in order to determine the differences in their attitudes. The first objective was to determine professors and teaching assistants attitudes and to find out their experiences with current course management systems and to determine what exactly are their problems, if there are any, with those systems. The second objective was to determine the same information from students perspective. The specific objective was to compare the obtained results between professors/experts and students.

3 Methodology

3.1 Measurement

A secured online questionnaire was designed for the purpose of this study and was sent to professors and education experts and students from different universities from Croatia and United States. The questionnaire grouped the respondents in two categories: teachers/experts and students. Besides the questions that determined which group the respondent belongs to, there was a total of 46 items grouped into four categories. The first category consisted of three items that determine the respondent's previous experience in using the e-learning systems, while the second category focused on the system's user interface and the help (6 items).The purpose of the third and the most important category was, according to the respondents' opinions, to determine which system features, tools and options need to be integrated into the unique system. This category consists of 32 Likert-scale type items (a scale from 'not important' to 'very important'). The last category consisted of four items that gathered demographic data, the main purpose of which is to determine the respondents' field of study, thus pointing to certain differences in the needs of respondents, based on their field of study. The alpha coefficient of reliability (α) is 0,909 for 39 Likert-type items of the questionnaire.

3.2 Respondents

University students, professors/ teaching assistants and education experts were the target population for our study. 250 questionnaires were administered, out of which 161 responded all together (64,4%). Out of 161 questionnaires 118 respondents were students (73,3%), while 43 were professors / teaching assistants / education experts (26,7%) which gave us a ratio of approximately 1:3. The sampling method used was snowball sampling. Average age of all the respondents was ≈ 24, while the average age of student respondents was ≈ 21 and other ≈ 31. According to gender 55,3% of respondents were male (N=89) and 44,7% were female (N=72). Based on the field of study, 9,3% (N=15) respondents were affiliated with Humanities (History, Languages and linguistics, Literature, Performing arts, Philosophy, Religion, Visual arts), 24,2% (N=39) with Social sciences (Information sciences, Anthropology, Archaeology, Area studies, Cultural and ethnic studies, Economics, Gender and sexuality studies, Geography, Political science, Psychology, Sociology), 5,0% (N=8) with Natural sciences (Space sciences, Earth sciences, Life sciences, Chemistry, Physics), 47,2% (N=76) with Formal sciences (Computer sciences, Logic, Mathematics, Statistics, Systems science) and 14,3% (N=23) with Professions and Applied sciences (Agriculture, Architecture and design, Business, Divinity, Education, Engineering, Environmental studies and Forestry, Family and consumer science, Health sciences, Human physical performance and recreation, Journalism, Media studies and communication, Law, Library and museum studies, Military sciences, Public administration, Social work, Transportation).

4 Results and interpretation

4.1 Attitudes towards system interface

Likert-scale type question was used for 4 items in order to examine the level of importance of system interface. Table 1 shows the list of system interface based on mean values in the descending order.

	Mean	Std. Deviation
Usability	4,6603	,57358
Intuitive to use	4,3077	,74154
Interactivity	4,0833	,89413
Interface personalization	3,3269	1,04828

Table 1. List of system interface

ANOVA test was used in order to find out if any differences exist between the attitudes of students and others. Statistically significant difference was found for one item (usability). The values for ANOVA analyses of variance are F=8,320, df=2, p<0,001. Students (M=4,188, sd=0,706) consider the aspect of system usability to be less important than other respondents (M=4,666, sd=0,721) do, which might be because of fewer options they usually use in e-learning systems.

4.2 Attitudes towards system features

In order to examine the level of importance of the integration of certain features in the system, Likert-scale type question was used for 32 items. Table 2 shows the list of system features based on mean values in the descending order.

	Mean	Std. Deviation
File upload	4,4454	,82027
Presentation upload	4,3782	,84364
Exams	4,2605	,78613
Schedule	4,1092	,96366
Tools for question asking	4,1008	,81714
E-mail integration	4,0924	,97417
Forum	4,0672	,89945
Private message	4,0588	,99400
Text editor	3,8992	1,00334
Calendar	3,8824	1,11368
Poll/Question tool	3,8487	,87951
User to user file sharing	3,7647	1,10243
Simultaneous text editor	3,7227	1,02448
Learning conferences	3,5882	1,14545
Embedding Youtube videos	3,5042	1,03231
Wiki	3,4538	1,03127
Video upload	3,4202	1,05361
Chat	3,3529	1,21144
Mind Map creator	3,2857	1,14346
Presentation editor	3,2857	1,09809
Concept map creator	3,2689	1,11003
User information page	3,2269	1,08485
Flow Chart creator	3,2017	1,02989
Learning games	3,1345	1,18554
Picture Editor	3,1176	1,09835
Integrated map creator	2,9580	1,07668
Video formating tool	2,8487	,98840
Voice call option	2,5966	1,19547
Cam to cam calls between users	2,5462	1,14794
Facebook account integration	2,3193	1,20685
Other social media integration	2,1176	1,16573
Twitter account integration	2,0504	1,14868

Table 2. List of system features

Statistically significant differences between the attitudes of students and others were found while using the ANOVA analyses in only two items out of 32. The first item refers to poll questionnaire tool for which students (M=3,632, sd=0,854) consider to be less important than other respondents (M=4,139, sd= 0,861) considers it to be. The values for ANOVA analyses of variance are F=5,349 , df=2, p<0,010. The second item refers to user to user file sharing for which students (M=3,909, sd=1,071) consider to be more important than other respondents (M=3,463, sd= 1,247) considers it to be. The values for this ANOVA analyses are F=3,380 , df=2, p<0,05.

Figure 1 presents results from all Likert-type items that were used in the questionnaire. X-Axis presents ordinal numbers of items from the questionnaire, while Y-Axis presents arithmetic means (Likert type scale, 1 to 5). Black line presents students' responses, while the gray one presents professors/TAs' responses. It can be seen from the given figure that the mentioned groups usually share similar attitudes/opinions towards our proposed statements. However, some differences do exist between those groups, which can be seen from the figure, while statistically significant differences were mentioned before.

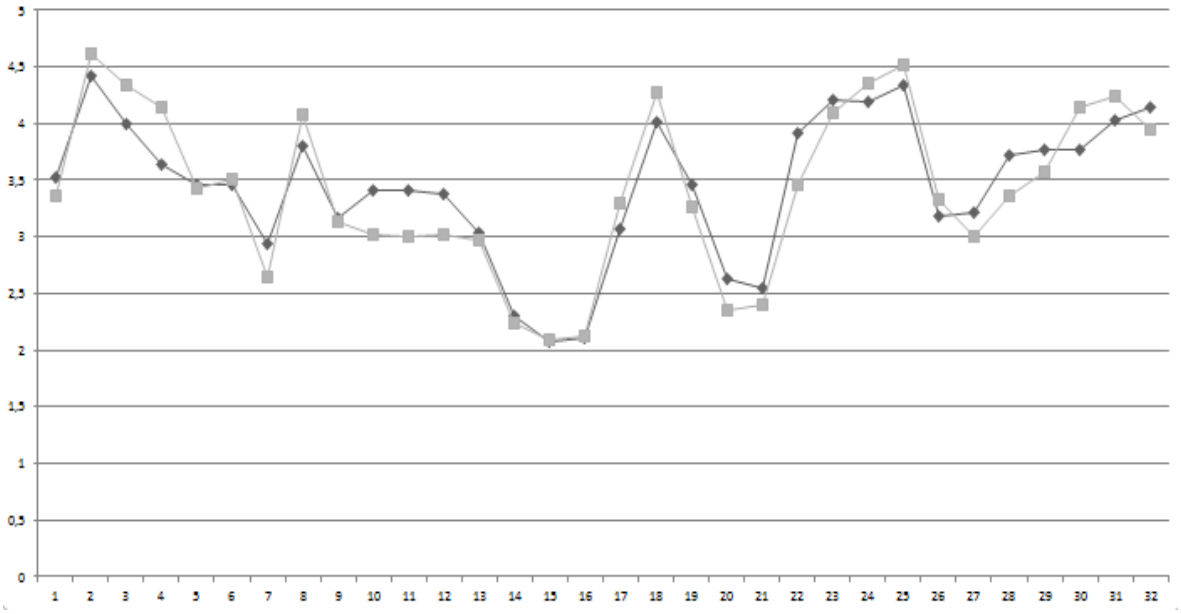

Figure 1. Comparison between students' and professor/TAs' responses

4.3 Comparison of attitudes towards system features based on gender

By using the T-test method, comparison of attitudes towards system features based on gender was made. 8 statistically significant differences were found, out of which 5 are connected with video and/or voice integration tools. In all five of those, female respondents consider the given statements to be more important than male respondents consider it to be. For the video upload feature in the e-learning system results are the following: (M(female)=71, sd=0,968, M(male)=86, sd=1,129, t=-2,474, p<0,05, df=155). For the second feature, the video formatting tool, results are the following: (M(female)=65, sd=0,936, M(male)=86, sd=0,952, t=-4,354, p<0,001, df=149). Thirdly, for cam to cam calls between users feature results are: (M(female)=67, sd=1,126, M(male)=87, sd=1,038, t=-2,661, p<0,01, df=152). For the presentation editor feature where the example of the online voice integration was given, the results are: (M(female)=64, sd=1,052, M(male)=87, sd=1,065, t=-2,112, p<0,05, df=149). The last given feature was learning conferences with the inclusion of live presentations with video and voice for which the results are: (M(female)=68, sd=0,907, M(male)=85, sd=1,256, t=-2,595, p<0,05, df=151).

4.4 Respondents comments and suggestions

Many respondents used the comment section in the questionnaire for explaining their current experiences and suggestions for future development of e-learning systems. One comment about system that respondent currently uses was: "The system I currently use has a large delay in delivering news messages posted on different courses. It has absolutely no useful (or used, anyway) integration with very popular web 2.0 tools, nor any other tools. The system itself is outdated, even though new versions add interesting new features. The current system serves its most basic purpose, yet something more advanced would increase interest in e-learning, and probably aid the learning process altogether." An example of a comment about additional features that respondent would like to have was: "I would like to see an e-learning system as a somewhat open system, implementing everything a 1 (or a teacher) might use or consider useful, along with social, educational, organizational and entertainment parts. Such a system could perhaps be used for holding conferences, without having to look for a hosting service. Such a system would allow ones to immerse themselves into the system, creating an environment both friendly and educational. In the end, such a system could change the way we study."

5 Conclusions

The reason for conducting this study was to search about attitudes of those people that are using e-learning systems in higher education (i.e. professors, teaching assistants and students). Three objectives connected to e-learning systems users attitudes were set prior the study and all three of them were carried out. Not many statistically significant differences were found between responses from professors/teaching assistants and students, which shows their similar thinking of what e-learning systems should be and what features should be integrated in systems that are currently being

developed or will be developed in the future. Finally, this study was a base for our current development of a so called, knowledge hub, which gave us an additional view of what features we should integrate in the system and what kind of interface we should develop.

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