E-University:
Critical success factors

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Abstract

In Turkey, e-learning used in university education, especially in diploma programs, is increasing day by day. In this research, a questionnaire has been submitted to students studying e-learning diploma programs in Turkish universities. Several dimensions are created for the questionnaire to widen the analysis. The dimensions are demographic characteristics, which state general features of students, and success factors, which measure the success of e-learning systems, namely usability, interaction, functionality, reusability, evaluation, appropriateness, design, interoperability, and accessibility. We focused on the current situation and success of e-learning systems in Turkey with respect to these factors.

1. Introduction

Many universities are using e-learning systems with or instead of traditional face to face education in the world. The world-wide-web is increasingly being used as a resource in education of students in universities. In Turkey, e-learning used in university education, especially in diploma programs, is increasing day by day. Now, there are many universities having e-learning systems in Turkey. The general situation of e-learning systems in Turkey with respect to the following criteria, and the success degrees given to these criteria form the problem statement (Kor & Tanrikulu, 2008).

Demographic characteristics of the sample are based on gender (male, female), education program type (associate degree, undergraduate, graduate), faculty name, department name, state of employment (employed, unemployed), occupational branch type (governmental institution, private sector, self-employment) and whether the student has the formal educational diploma or not. The "usability" factor denotes the ease of use for a particular tool or other human-made object in order to achieve a particular goal. It plays an important role toward the success of e-learning applications, tools, and systems (Ardito et al., 2006). The "interaction" factor is based on the fact that e-learning does not mean learning entirely in isolation, interacting only with a computer. Building forms of interaction into an

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e-learning tools, either with faculty members, other students or practical experiments that need to be completed before progressing, should not be viewed as a failure of the technology. The "functionality" factor is based on the fact that learning technologies can be expanded in functionality in order to serve broader populations and educational purposes (Kor & Tanrikulu, 2008). The success of e-learning systems can be increased if they can be leveraged beyond their original scope. The "reusability" factor refers to the ability of a component to function and integrate outside the environment for which it was primarily designed (Varlami & Apostolakis, 2006). The "evaluation" factor is systematic determination of significance of something using criteria against a set of standards. Evaluation is often used to determine subjects of interest in education as any other branches, so it is not questionable to use evaluation for e-learning systems as well. The "appropriateness" factor in e-learning systems can be taken into consideration from two different concepts. One side deals with the appropriateness level of the learning content while the other side deals with the appropriateness level of the student using the e-learning system (Blass & Davis, 2003). The "design" factor is based on the idea that it becomes a barrier to effective learning because a poorly designed interface makes students spend more time in learning it than in mastering the provided knowledge (Horton & Horton, 2003). The "interoperability" factor refers to the ability of different systems and organizations to work together. Systems, tools, or applications should operate together when needed. The "accessibility" factor refers to the ability to access the systems or products such as a service or environment. It describes the degree to which a system is accessible by as many people as possible (Kor & Tanrikulu, 2008).

1.1. Research Objectives

The main aim of the research related to the defined problem statement is to find out the general situation of e-learning systems in Turkey, and to measure the success of e-learning programs with respect to factors, which are already defined as success factors.

2. Methodology

This research study started in September of 2008 and lasted for approximately three months. An original questionnaire was prepared, a sample was formed, and data was collected and analyzed according to the success criteria.
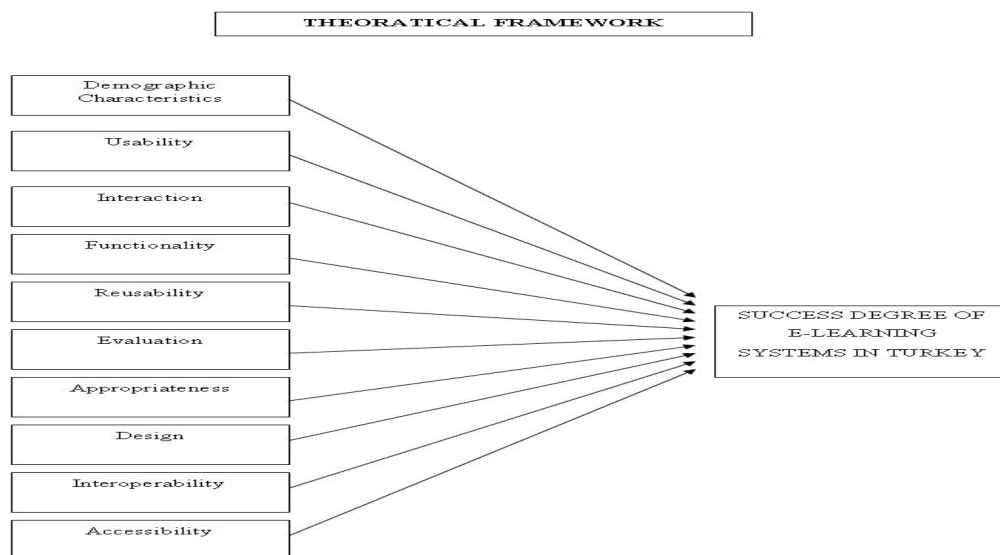

Figure 1. Research Model

Several factors were formed to be analyzed and each factor was examined through the questionnaire. Figure 1 shows the general framework of the research. There are ten main dimensions, namely demographic characteristics, usability, interaction, functionality, reusability, evaluation, appropriateness, design, interoperability, and accessibility.

It is important to emphasize that we determined our success ratio for each factor mentioned above as 80 %. Thus, after the questionnaire hypothesis is analyzed and tested, we will be able to comment on each factor based on the previously determined ratio. This ratio is called the "success ratio for factors".

2.1. Data collection

The questionnaires were sent to university students in Turkey who are studying in e-learning diploma programs, via e-mail, mail and by hand. The number of questionnaire sent to universities was 130. The overall return rate, which is 77 %, was slightly higher in some universities in contrast to others. Moreover, there was not any return from some universities. Although the return rate of survey was high, about 20 % of the questionnaires were returned with too many missing answers. Therefore, the total number of questionnaires that were accepted for our survey diminished a bit more. The number of questionnaires differs among universities with respect to their e-learning program numbers. Finally, the overall return rate of the questionnaires without missing answers to the survey is 61%.

The collected data was analyzed by using SPSS version 16.0 as a software tool.

2.2. Sample

The sample of the research is the students who are studying e-learning diploma programs in Turkey. The questionnaires were submitted to 80 students. While submitting questionnaires to them, we guaranteed to keep all the information that was gathered confidential. The gender distribution of the students answering the questionnaire is 32 female students and 48 male students. The working state distribution, which means that the distribution whether students are employed or not, is that 52 students are employed, meaning having a job, and 28 students are unemployed, meaning not having any job. The distribution is not highly homogenous, nor mildly homogenous. According to the test statistics, there is a significant difference between the number of employed students and the number of unemployed students, with a significant level of 0.007, which is less than 0.05 (Sig < 0.05).

The program type distribution is that 57 students are from associate degree, 21 students from undergraduate degree, and 2 students from graduate degree programs. The distribution is not very homogeneous.

In total, there are 10 different departments. According to the department type distribution, 18 students are from "Information Management", 7 students are from "English Language Teaching", 11 students are from "Preschool Teaching", 2 students are from "Teaching of Children with Growth Disability", 10 students are from "Computer Technologies and Programming", 5 students are from" Management", 3 students are from "Accounting", 9 students are from "Web Technologies and Programming", 10 students are from "Divinity Undergraduate Completion Program", and 5 students are from "Computer Programming" department.

2.3. Reliability and validity analysis

In order to measure the reliability of the survey, the Cronbach's Alfa Coefficient is determined. The value of Cronbach's Alpha Coefficient should be greater than or equal to 0.6 to trust the reliability of the survey. This measurement is done for all Likert scale questions from 37 items; the Cronbach's Alpha is 0.897. Therefore, there is a high internal consistency of reliability.

3. Results

Statements related to the "usability" factor: In the questionnaire, the students were asked whether or not the e-learning systems they are studying on, included specific criteria that we defined in order to measure the success degree of e-learning systems with respect to the "usability" factor. Table 1 includes the criteria and the statistical means of the criteria shows the statistical results of students' responses.

The statistical results of the responses indicate that e-learning systems in Turkey mostly contain instruction manuals about the system usage having the highest mean of 0.9250, and they have a deficiency in instruction manuals about education sources having the lowest mean of 0.2875. Most importantly, the overall "usability" mean was calculated to measure the current state of e-learning systems in Turkey by summing the mean values of the criteria shown in Table 1 and dividing the score to the number of criteria. The success degree was found as 0.74.

Table 1. Statistics of current state for usability factor

		Instruction manual about the system usage	Instruction manual about education sources	Section showing the aim of the subjects in course sources	Search engine	Frequency Asked Questions section	Technical service support	Program links	Site map
N	Valid	**80**	80	80	80	80	80	80	80
	Missing	0	0	0	0	0	0	0	0
	Mean	.9250	.2875	.8250	.6625	.9125	.7750	.8625	.7125
	Sum	74.00	23.00	66.00	53.00	73.00	62.00	69.00	57.00

Statements related to the "interaction" factor: Some criteria were defined in order to measure the success of the current state in e-learning systems with respect to the "interaction" factor. In the questionnaire, the students were asked which of the previously stated criteria, namely forum platform, chat/discussion boards, the homework module, web-mail, the suggestion module, web-questionnaire, videoconference, electronic letter (student letter, transcript, etc.), and online courses, are included in e-learning systems they are studying on. The existence of the defined criteria increases the success of the "interaction" factor for e-learning systems.

The statistical results indicate that the "forum platform" has the highest mean with a value of 0.9125 and the "web-questionnaire" has the lowest mean with a value of 0.1625 among all criteria, which means that most e-learning systems in Turkey have the "forum platform" but they do not apply the "web-questionnaire". In addition, "videoconference" and "online courses" have low mean values as 0.5000 and 0.6000 respectively. The "chat module/discussion board" has 0.6625, the "homework module" has 0.6375, "web-mail" has 0.7125, the "suggestion module" has 0.6125, and "electronic letters" has 0.715.

The result of the calculation indicates that e-learning systems in Turkey have 61% of the criteria, which represent the success for "interaction" factor. However, it is less than the success value we have already defined as 80 %.

Statements related to the "functionality" factor: Some criteria were defined in order to measure the success of the current state in e-learning systems with respect to the "functionality" factor. In the questionnaire, the students were asked which of the previously stated criteria, namely the announcement module, academic calendar, course presentation with animations, vocal presentations and videos, dictionary, games, help menu, and settings menu, are included in e-learning systems they are studying on. The existence of the defined criteria increases the success of the "functionality" factor for e-learning systems.

The statistical results indicate that the "announcement module" has the highest mean with a value of 0.9875 and the "games module" has the lowest mean with a value of 0.00 among all criteria, which means that most e-learning systems in Turkey have the "announcement module" but they do not have the "games module". The "academic calendar" has 0.9750, "course presentation with animations" has 0.8875, "vocal presentations and videos" has 0.8125, "dictionary" has 0.1125, "help menu" has 0.5625, and "setting menu" has 0.5125.

The result of the calculation for the overall mean indicates that e-learning systems in Turkey have 60 % of the criteria, which represent success for the "functionality" factor. However, it is less than the success value we have already defined as 80 %.

Statements related to the "reusability" factor: In the questionnaire, the students were asked which of the criteria in order to measure the success of the current state in e-learning systems with respect to the "reusability" factor, namely additional course sources, homework subject, exam questions, online courses, prepared homework,

answer key, uploaded homework, and uploaded exam answer, are archived in e-learning systems they are studying on. Archiving the defined criteria increases the success of the "reusability" factor for e-learning systems.

The statistical results indicate that "archived additional course sources" has the highest mean with a value of 0.9250 and "uploaded exam answer" has the lowest mean with a value of 0.4229 among all criteria, which means that most e-learning systems in Turkey have additional course sources but they do not have uploaded exam answer. The "archived homework subject" statement has the means of 0.6500, "archived exam questions" has 0.6375, "archived online courses" has 0.5000, "archived prepared homework" has 0.5375, "archived answer key" has 0.4375, and "uploaded homework format" has 0.4875.

The result of the calculation for the overall mean indicates that e-learning systems in Turkey have 57 % of the criteria, which represents the success for reusability factor. The overall success degree is 57 %, which is less than the success value we have already defined as 80 %.

Statements related to the "evaluation" factor: To measure the success degree of e-learning systems with respect to the "evaluation" factor, the students were asked to specify their participation frequency levels to the statements related to the tools and medium in the e-learning since the participation level will show the success of the system. Statements are as, "I read tutors' comments in every phase of my projects", "I read tutors' comments on my exam results, and homework", "I evaluate myself by using online and offline exams, tests, homework, and other measures", and "I check my current grade information in the system".

According to the statistical results of the responses indicate that "I check my current grade information in the system" statement has the most frequent participation level with the highest mean of 3.9, and "I read tutors' comments in every phase of my projects" statement has the least frequent participation level with the lowest mean of 2.7250. "I read tutors' comments on my exam results and homework" statement has the mean of 3.0375, and "I evaluate myself by using online and offline exams, tests, homework, and other measures" has the mean of 3.6625.

To be able to evaluate the overall success degree of the "evaluation" factor in e-learning systems, participation levels for all statement are taken into account as a whole. The results indicate that e-learning systems in Turkey are not successful because of the fact that the overall success degree for "evaluation" factor is 66 %, which is less than the success value we have already defined as 80 %.

Statements related to the "appropriateness" factor: To measure the success degree of e-learning systems with respect to the "appropriateness" factor, the students were asked to specify their participation levels to the statements related to the "appropriates".

According to statistics, "My department in e-learning system does not require any handcraft and practical application specialties" and "I have the necessary technical equipment to use the e-learning system" arguments are the most successful evaluation criteria with the mean of 4.2750. "Education quality of the e-learning system I study on is high" argument is the least successful evaluation criterion with the lowest mean as 2.8750. In addition, it is important to emphasize that "The contents of courses in the system are appropriate for e-learning applications" is another successful criterion, with the value of 4.0875, which increases the appropriateness of e-learning systems in Turkey. "The e-learning system I study on has a robust infrastructure" statement has the means of 3.0250. The overall success degree is 74 %, which is less than the success value we have already defined as 80 %.

Statements related to the "design" factor: The success degree of the e-learning systems is measured with respect to the "design" factor. To measure the success degree, the students were asked to weight the criteria, which e-learning systems they are studying on include, according to Likert scale.

The statements related to the "design" factor are as "The language in the system is clear and easy to understand", the "The format, size, color, and place of buttons in different pages of the system are consistent", "I can easily transit on pages by using menus in the system", "The text amount and quality enable me to read writings easily", and "Multimedia mediums such as audio, graphics, animations, and video direct me to learn without distracting my attention".

The statistical results of the responses that "The text amount and quality enable me to read writings easily" argument is found as the most successful evaluation criterion with the highest mean of 3.85 and "I can easily transit on pages by using menus in the system" argument is found as the least successful evaluation criterion with the lowest mean of 3.50. "The language in the system is clear and easy to understand" argument has 3.75, "The format, size, color, and place of buttons in different pages of the system are consistent" has 3.55, and "Multimedia mediums such as audio, graphics, animations, and video direct me to learn without distracting my attention" has 3.6250.

The overall success degree for design factor is 73 % that is very close to the success value we have already defined as 80 %.

Statements related to the "interoperability" factor: In the questionnaire, the students were asked whether or not the e-learning systems they are studying on, include specific statements which we defined in order to measure the current state of e-learning systems with respect to the "interoperability" factor. These statements are as "opening the system web pages from different browsers without any problem", "watching the videos which are in the system, on every medium (individual and other computers)", "watching the animations which are in the system, on every medium", "seeing the pictures which are in the system clearly, on every medium", and "running the audio files in the system without any problem, on every medium". The existence of these criteria provides the success of the "interoperability" factor in e-learning systems.

The statistical results of the responses indicate that e-learning systems in Turkey mostly have the opportunity to see the pictures which are in the system clearly, on every medium which has the highest mean of 0.6125, and they have a deficiency in watching video on every medium, which has the lowest mean of 0.4500. "Opening the system web pages from different browsers without any problem" has the means of 0.5625, "watching the animations which are in the system, on every medium" has 0.5875, and "running the audio files in the system without any problem, on every medium." has 0.5375. The overall "interoperability" mean is calculated as 0.55, which is less than the success value we have already defined as 80 %.

Statements related to the "accessibility" factor: Following criteria were defined in order to measure the success of the current state in e-learning systems with respect to the "accessibility" factor. In the questionnaire, the students were asked which of the previously stated criteria they could perform in e-learning systems. Performing the defined criteria increases the success of the "accessibility" factor for e-learning systems.

According to the statistical results of the responses indicate that the "opportunity to see the course plan and schedule" statement has 0.9625, "opportunity to see the definition of the courses" has 0.9125, "opportunity to access the content of the courses on a weekly basis" has 0.9625, "opportunity to reach the sources tutors uploaded into the system at anytime" has 0.9375, "opportunity to see the academic calendar information" has 0.7375, "opportunity to see the exam grades and school report" has 0.6750, "opportunity to see the final exam information" has 0.3000, "opportunity to read the tutors' comments about exam grades or homework" has 0.6000, "opportunity to read the tutors' comments at every phase of the project" has 0.5125, "opportunity to see my detailed personal information" has 0.8250, "opportunity to reach the archives in the system at anytime" has 0.7375, and "opportunity to read the e-mails" has 0.7625.

The statistical results indicate that "opportunity to see plan and schedule" and "opportunity to see weekly based content" have the highest mean with a value of 0.9625. "Opportunity to see final exam information" has the lowest mean with a value of 0.3000 among all criteria. This means that most e-learning systems in Turkey give the opportunity to see plan and schedule, and weekly-based content but they do give the opportunity to see final exam information. The overall success degree is 75 %, which is less than the success value of 80 %.

4. Conclusion

This study has provided a detailed overview of the key factors in evaluation of e-learning systems' success in Turkey. In accordance with the factors that we defined as usability, accessibility, reusability, functionality, design, interoperability, interaction, appropriateness, and evaluation, a questionnaire was conducted to determine the success ratio of universities' e-learning systems. Therefore, this article has presented the results of research aimed at defining a methodology for evaluating e-learning systems. This methodology combines a study of literature and user testing for the evaluation of software systems. As mentioned before according to the used methodology, which requires the definition of specific criteria, success factors that capture e-learning system features have also been proposed.

In this current phase of the reported research, attention was focused on evaluating the success of e-learning systems according to the students' standpoints. In order to perform a deeper evaluation, features concerning

effectiveness of the e-learning systems with respect to tutors and administrators' standpoints should be considered. The next phase of the research will be conducted to understand tutors and administrators' standpoints.

Acknowledgement

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