Eğitimde Kuram ve Uygulama
Journal of Theory and Practice in Education
ISSN: 1304-9496

Articles /Makaleler
2017, 13(1), 1-9

Geliş Tarihi *12/07/2016*
Kabul Tarihi: *06/01/2017*
Yayın Tarihi: *31/01/2017*

THE INVESTIGATION OF THE USABILITY OF WEB-BASED ASSIGNMENT SYSTEM[1]

(WEB TABANLI ÖDEV SİSTEMİNİN KULLANILABİLİRLİĞİNİN İNCELENMESİ)

Osman Gazi YILDIRIM[2]
Tolga ERDOGAN[3]
Harun CIGDEM[4]

ABSTRACT

Just as in all aspects of our lives, technological advancements have had an impact on traditional methods and techniques in education. The crucial reflections of this transformation in education have shown themselves in the increase of the use of distance education tools. In this process, online content sharing, testing and assignment taking traditional methods' place. The aim of this study was to investigate the usability of web-based assignment system implemented in a vocational college. In this mixed-design research, data were collected online from System Usability Scale and students' responses to open-ended questions. The participants were 204 post-secondary students enrolling at a vocational college during first semester of 2015-2016 Academic Year. Descriptive statistics, t test, correlation and regression analysis were used for data analyses. The average score of 67.14 from SUS application showed that usability of the system was acceptable. No significant difference was observed between first year and second year students. On the other hand, statistically significant linear correlation between SUS scores and students' course grades were found. The results of the qualitative analysis revealed that students enjoyed the system, instructor feedback had a motivating effect, but they had challenges owing to absence of enough time and difficulty at having access to computers and web-based assignment system.

Keywords: Web-based assignment system, usability, learning management system, MOODLE.

ÖZET

Teknolojik gelişmeler eğitimi de etkilemekte, eğitimde kullanılan geleneksel yöntem ve tekniklerin değişmesine neden olmaktadır. Eğitimdeki dönüşümün en önemli yansımalarından birisi de uzaktan eğitimin kullanımının artması; geleneksel eğitim yöntemlerinin yerini çevrimiçi içerik paylaşımı, sınavlar ve ödevler gibi uygulamaların almasıdır. Bu çalışmanın amacı, bir meslek yüksekokulunda uygulanan web tabanlı ödev sistemin kullanılabilirliğini incelemektir. Bu amaçla sistemi kullanan öğrencilerin Sistem Kullanılabilirlik Ölçeği (SKÖ) ile elde edilen puanları incelenmiştir. Buna ek olarak öğrencilerin web tabanlı ödev sistem hakkında görüşleri alınarak kullanılabilirlik ile hususlar ortaya çıkarılmıştır. Bu çalışmada yöntem olarak karma araştırma desenine yer verilmiştir. Veriler, Sistem Kullanılabilirlik Ölçeği (SKÖ) ve öğrencilerin görüşlerini bildirdiği açık uçlu sorular ile çevrim içi olarak toplanmıştır. Çalışmanın katılımcıları bir meslek yüksekokulunda 2015-2016 sonbahar döneminde sistemi kullanmakta olan 204 önlisans öğrencidir. Verilerin analizinde tanımlayıcı istatistikler, t testi, korelasyon ve regresyon analizleri kullanılmıştır. Çalışmada elde eilen sonuçlara gore SKÖ'den elde edilen ortalama puan 67,14 olup sistemin genel olarak kullanılabilir olduğu söylenebilir. Birinci sınıf ve ikinci sınıf öğrencileri arasında anlamlı bir ortalama farkı bulunamamıştır. Bununla birlikte, öğrencilerin SKÖ puanları ile ders başarısı arasında istatistiksel olarak anlamlı bir korelasyon bulunmuştur. Nitel verilerin analizi sonucunda öğrencilerin sistemi beğendikleri, ödevlere verilen geribildirimlerin öğrencilerin motivasyonları üzerinde olumlu etkisi olduğu ancak

[1] An earlier version of this article was presented at the conference International Conference on Education in Mathematics, Science & Technology (ICEMST) held in Bodrum, Turkey, 19-22 May, 2016.

[2] Turkish Land Forces Non-Commissioned Officer Vocational College. ogyildirim32@gmail.com
[3] Turkish Land Forces Non-Commissioned Officer Vocational College. tolgasensei@gmail.com
[4] Turkish Land Forces Non-Commissioned Officer Vocational College. hcigdem@gmail.com

öğrencilerin zaman yetersizliği, bilgisayara ve web tabanlı ödev sistemine erişim sıkıntısı yaşadıklarından dolayı zorluklar yaşadıkları belirlenmiştir.
Anahtar Kelimeler: Web tabanlı ödev sistemi, kullanılabilirlik, öğrenme yönetim sistemi, MOODLE.

INTRODUCTION

Assignments have always been an important part of an education system. Teachers use assignments to enhance learning, motivate students and keep track of their progress. In addition, assignments are valuable tools for evaluating level of understanding among students on the course subjects (Grieve, Padgett, & Moffitt, 2016). Conventionally, submissions of assignments, grading and providing feedback for them have been in hard copy format (Grieve et al., 2016). Due to emerging web technologies and online learning tools, today more faculties use online tools in their courses to facilitate their teaching capabilities. Especially learning management systems (LMSs) that affect many sides of the teaching/learning process, provide web-based forums, content resources, questionnaires, assignment and so on. Assignment submission and providing feedback also move online in this progress (Palmer, 2005-2006). One of the main reasons for adoption of online assignment system is the time and place flexibility in the assignment submission process and decreased turnaround time (Thomas, Carswell, Price, & Petre, 1998).

Online Assignment Systems

Assigning, collecting, grading the homework and providing feedback to students manually by the teacher for sure takes time and increases workload on the side of the teacher. Online assignment system is a web-based education tool that enables students to upload their assignments and receive feedback from their instructors with an assignment grade. In this process, feedback also plays a vital role because effective feedback helps students develop better understanding and knowledge, as well as increases students' confidence and encourages reflective thinking (McKimm, 2009; Clynes & Raftery, 2008). Online assignment systems are identified with some advantages like effectiveness of administration, its cost effectiveness, issues of security and accountability, improved turnaround time, ease of grading, availability of private feedback, reduction in paper use and creation of an electronic archive of submitted assignments (Collis, Boer, & Slotman, 2001; Palmer, 2005-2006; Thomas et al., 1998; Barker, Kortum, & Miller, 2008). On the contrary, Jones (2008) describes some of the disadvantages of using online assignment systems as feedback might not be as detailed as in paper based assignments and students might not use this sort of systems effectively due to their discomfort with working with computers.

Several research studies have been conducted addressing student preferences of online assignment systems. Many studies have showed that students prefer online submission of assignments due to flexibility in timing and scope and the enjoyment of checking grades and feedback online owing to increased privacy (Bridge & Appleyard, 2008; Buzzetto-More, 2008; Chu & Man, 2010; Hepplestone et al.,

2011; Palmer, 2005-2006; Parkin et al., 2012). Additionally, students reported that online assignments increased their understanding of the subject and students significantly devoted more time to online homework (Dufresne, Mestre, Hart, & Rath, 2002; Chu & Man, 2010).

Usability

Nielsen describes a usable system as user friendly, easy to use, learn, and remember (as cited in Battal & Cagiltay, 2015) and the usability concept comprises elements as learnability, efficiency, memorability, error handling, and user satisfaction (as cited in Storey, Philips, Maczewski, & Wang, 2002). According to its definition, usability issues affect users while they perform specific goals and task in a computer system. In an online learning environment, it can be deduced that usability plays a critical role because the negative experiences of students decrease their motivation and satisfaction level (Muilenburg & Berge, 2005) which also affect student achievement (Delice & Odabaşı, 2014). Some studies also confirm that implementation of usability principles can help teachers enhance student learning experience and it can improve student learning process eventually (Koohang, 2004; Heizer, Render, & Watson, 2009; Jones, 2008; Collins, Deck, & McCrickard, 2008).

Considering the aforementioned discussion and research, there is a need to elaborate more on the usability of online assignment systems to better understand how usability factors affect student satisfaction, motivation and preferences as well as students' achievement. The purpose of this research is to investigate the usability of a web-based assignment system, to analyze relationship between students' course grades and usability scores of the web-based assignment system and to identify student opinions on web-based assignment system.

Within this scope, the research was guided by the following research questions:

1. What is SUS score of MOODLE's web-based assignment system?
2. Is there a statistically significant difference between first year and second year students' SUS scores?
3. Is there a statistically significant correlation between web-based assignment system SUS score and students' course grades?
4. What are opinions of students related to web-based assignment system usability?

METHOD

In the current study, mixed-method research design was used for search purposes. Proper data collection procedures were applied for both qualitative and quantitative data.

Participants

The participants of the study comprised 204 vocational college students, of whom 130 were first year Computer Literacy course students and 74 were second year Computer Programming course students during the fall semester of the 2015-2016 Academic Year. All the participants are military college students (cadets), hence they are boarding students living on a military campus.

Context

The Computer Literacy course was offered 15 weeks in a blended format which covered topics like introduction to computers, introduction to operating system use, concepts of word processor software such as file creation, printing operations, text edition, image and table insertion, and document edition. In addition, the Computer Literacy course also covered topics like spreadsheet document creation, formulas, sorting and filtering data etc. The Computer Programming course was also offered 15 weeks in a blended format and covered topics such as introduction to algorithms, introduction to flow charts, variables, decision mechanisms (i.e. if-else statements) and loops in C#.

MOODLE (named as Portal here), as a Learning Management System (LMS), was used to provide lecture notes, presentations, instructional videos, and projects related to course topics. In addition, student assignment administrative issues like explanations, final submission dates, feedback and grade announcements were provided using the LMS. The Portal is open to intranet access, but is closed to access outside college campus. The participants have easy access to web-based assignment system through the computers connected to intranet within the boundaries of college campus.

Data Collection

As data collection tool, the System Usability Scale (SUS), which was developed by Bangor et al. (2008) and adapted to Turkish by Çağıltay (2011), was used for quantitative data. This scale involves five positive and five negative statements on a 5-point Likert type scale and possible scores range from 0 to 100 where higher scores indicate better usability. According to Bangor et al. (2008), SUS scores higher than 90 are superior products while scores in the 70s and 80s are also good products, but this score range does not guarantee high acceptability in the sector. Besides, with SUS scores below 50 will have certainly usability difficulties. In present research, the scale was administered during the last week of the course after the students had sufficient experience with the LMS and web-based assignment submission process. Descriptive statistics, t-test, correlation and regression statistics were used to analyze quantitative data. The significance level was set at .05 in all analyses.

A semi-structured interview was used for collecting qualitative data. The interview form consisted of several open-ended questions. Following procedure was

applied for preparation of interview form. Initially, the researchers prepared several questions related to web-based assignment system usability, and then they were checked by field experts as well as other researchers edited the form in terms of grammar, word preferences and comprehensibility.

A semi-structured interview was used for collecting qualitative data. The interview form consisted of several open-ended questions. Initially, the researchers prepared several questions related to web-based assignment system usability, and then those questions were checked by field experts, and in light of critical advice received the items were edited in terms of grammar, word preferences and comprehensibility.

RESULTS

Pertaining to first research question, which is "What is SUS score of MOODLE's web-based assignment system?", descriptive statistics analysis were conducted. According to results, the mean of SUS score of all participants were 67.14 with a standard deviation of 17.95. The minimum SUS score was 15 while the maximum score was 100. Bargor et al. (2008) states that any kind of product with a SUS score less than 50 is judged to be unacceptable, products with SUS score between 50 and 70 are marginally acceptable, and products with SUS score above 70 are passable. In current study, the mean SUS score of 67.14 reveals that online assignment system is generally perceived acceptable. On the other hand, this SUS score does not guarantee MOODLE's web-based assignment system's success in the field.

An independent-samples t-test was conducted to compare SUS scores of first year and second year students as presented in Table 1. According to test results, there was no significant difference between SUS scores of first year students (M=68.32, SD=16.33) and second year students (M=65.06, SD=20.43); t(202)= 1.249, p=0.213.

Table 1. Results of t-test and Descriptive Statistics for SUS Scores by Student School Year

	School Year						95% CI for Mean Difference	t	df	p
	First Year			Second Year						
	M	SD	n	M	SD	n				
SUS Scores	68.32	16.33	130	65.06	20.43	74	-1.88, 8.40	1.249	202	0.213

p<.05

Related to the third research question, linear correlation analysis was conducted to find out if there was a significant relationship between web-based assignment system usability score and student course grades. A relationship

between web-based assignment system usability score and student course grades would suggest that when usability increases, students' course achievements also increase or vice versa. Results of the correlation analysis were presented in Table 2. Simple correlations of student course grade and SUS scores showed that students' course grades were significantly correlated with SUS scores ($p<.01$). According to the correlations, as students' SUS scores increase, their course grades also increase.

Table 2. Correlations between course grades and SUS scores

	SUS Score
Course Grade	.244*

*Correlation is significant at the 0.01 level (2-tailed).

In addition to correlation analysis, linear regression analysis was applied to test SUS scores as the predictors of students' course grade. As presented in Table 3, linear regression analysis indicated significant results, $R2 = .060$, $F(1, 200)=12.709$, $p<.001$.

Table 3. Regression Results Predicting Course Grade from SUS Scores

Variable	B	SE	β	t stat
SUS Scores	.163	.046	.244	3.565

The results of the qualitative analysis showed that majority of the students reported positive attitudes towards web-based assignment system, especially due to time and place flexibility provided for assignment submission. In addition, students considered the personal feedback provided for their assignments as valuable and students stated that there was increased privacy when viewing grades online. On the contrary, students expressed concerns over the system due to absence of enough time and difficulty at having access to computers.

DISCUSSION AND CONCLUSION

The purpose of this study was to investigate usability of web-based assignment system implemented in a vocational college for a Computer Literacy Course and Computer Programming Course. In addition, SUS scores of first year and second year students were compared as well as the relationship between SUS scores and student grades was investigated. According to the results, web-based assignment system was found to be useful in terms of usability criteria presented by Bargor et al. (2008). However, no significant mean difference was detected between the SUS scores of first and second year students, which meant that the subject in which web-based assignment system was used did not affect overall SUS score of web-based assignment system. With regard to analysis of relationship between SUS scores and students grades, a linear correlation was found. This finding supported existing literature (Koohang, 2004; Heizer,Render & Watson, 2009; Jones, 2008; Collins, Deck & McCrickard, 2008), stating that applying usability principles for online learning tools influence student academic performance and attitudes towards

the tools. In general, it can be asserted that instructors should consider usability issues when choosing an online learning tool and easy to use, clear and simple, functional tools should be selected for improved learning experience for students.

The results of the qualitative analysis of those responses given to open-ended questions revealed that students enjoyed the system and the instructor feedback had a motivating effect on their learning. This finding is consistent with other studies in literature which also indicated that students enjoy using online assignment system, prefer submitting assignments , receiving feedback and viewing grades online (Bridge & Appleyard, 2008; Chu & Man, 2010;Ferguson, 2011;Parkin et al., 2012). Even though it will cost some extra time to the instructors using the web-based systems, we suggest them to give some encouraging and supporting messages in their feedback, like "Your assignment is good, but you could also improve it by ..." or "Congratulations! Your work is exemplary."

On the other hand, students also had some difficulties due to absence of enough time and access to computers. The results also showed that web-based assignments could be effectively used, but the ease of students' access to computers and the internet should be taken into account before utilization.

The findings in the present study have limitations though. First, the participating students were all male boarding cadets in a military college. Second, the treatment was implemented in Computer Literacy and Computer Programming Course. Hence, other factors like gender could also be examined in subsequent research or opinions of students taking differing courses could be analyzed to see the usage of web-based assignment system.

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