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Volume 17, Number 3, April 2016

URI: <https://id.erudit.org/iderudit/1066236ar>
DOI: <https://doi.org/10.19173/irrodl.v17i3.2253>

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Publisher(s)

Athabasca University Press (AU Press)

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Cite this article

Cigdem, H. & Ozturk, M. (2016). Factors Affecting Students' Behavioral Intention to Use LMS at a Turkish Post-Secondary Vocational School. *International Review of Research in Open and Distributed Learning*, 17 (3), 276–295. <https://doi.org/10.19173/irrodl.v17i3.2253>

Article abstract

There is a substantial increase in the use of learning management systems (LMSs) to support teaching and learning activities in higher education institutions. Despite their benefits, students use them to a limited extent due to a number of factors influencing behaviors. This study executed a three-tier use model to examine the predictors of students' behavioral intention to use LMSs at a two-year post-secondary military school in Turkey, and the participants consisted of 155 students. The data were collected through an online questionnaire and analyzed through Pearson correlation coefficients and linear regression analyses. Results showed that multimedia instruction had a direct influence on perceived usefulness and perceived ease of use, while interactivity had a direct influence only on perceived satisfaction. Perceived satisfaction was also affected by perceived usefulness and perceived ease of use. Perceived ease of use exerted a direct influence on perceived usefulness, as well. Moreover, perceived usefulness had a great influence on behavioral intention to use LMSs. As a final point, self-efficacy did not take a position in the model due to its insignificant relationships with the other constructs. It is suggested that an increase in the multimedia features and interactivity of the system could lead to higher perceived usefulness and ease of use among learners, and both factors add to learners' perceived satisfaction which in turn increases their engagement.

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April – 2016

Factors Affecting Students' Behavioral Intention to Use LMS at a Turkish Post-Secondary Vocational School



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Abstract

There is a substantial increase in the use of learning management systems (LMSs) to support teaching and learning activities in higher education institutions. Despite their benefits, students use them to a limited extent due to a number of factors influencing behaviors. This study executed a three-tier use model to examine the predictors of students' behavioral intention to use LMSs at a two-year post-secondary military school in Turkey, and the participants consisted of 155 students. The data were collected through an online questionnaire and analyzed through Pearson correlation coefficients and linear regression analyses. Results showed that multimedia instruction had a direct influence on perceived usefulness and perceived ease of use, while interactivity had a direct influence only on perceived satisfaction. Perceived satisfaction was also affected by perceived usefulness and perceived ease of use. Perceived ease of use exerted a direct influence on perceived usefulness, as well. Moreover, perceived usefulness had a great influence on behavioral intention to use LMSs. As a final point, self-efficacy did not take a position in the model due to its insignificant relationships with the other constructs. It is suggested that an increase in the multimedia features and interactivity of the system could lead to higher perceived usefulness and ease of use among learners, and both factors add to learners' perceived satisfaction which in turn increases their engagement.

Keywords: Behavioral intention; blended learning; interactivity; LMS; 3-TUM

Introduction

As a fundamental area of computer science and education, e-learning practices, which stand for learning processes that are Web-based, have started to dominate the majority of the applications. Since e-learning provides learners with educational practices available anywhere at anytime, which is not possible in traditional classroom settings, it appears as a more noteworthy method (Cigdem, 2015). E-learning programs have been used by educational institutions to serve three main purposes: improving their educational systems; meeting their students' needs; and preparing the new generation for challenges of tomorrow's world (Hernandez, Montaner, Sese, & Urquizu, 2011). Today, one of the most widespread innovations used in e-learning practices is learning management systems (LMSs). There is a substantial increase in the use of the LMSs over the Internet to support teaching and learning activities in higher education institutions (Álvarez, Martín, Fernández-Castro, & Urretavizcaya, 2013; Cigdem & Topcu, 2013; Damnjanovic, Jednak & Mijatovic, 2013; Dutta, Roy, & Seetharaman, 2013; Islam, 2013). The LMSs comprise a broad mixture of features that are possibly utilized to support both distance learning and conventional methods (Islam, 2013). As in many other instructional technologies, the major purpose of using the LMSs is to reach the intended learning outcomes of a course or training as well as to increase students' engagement with distance learning, because they have the potential to offer new learning and teaching methods that meet diverse educational needs in diverse settings. With this intention, the Turkish Land Forces Non-Commissioned Officer College has been offering blended courses since the 2012–2013 academic year and is willing to take full advantage of the LMS through MOODLE in all academic programs within the institution. Although a variety of names or labels are attributed the LMS such as platforms, portals, content management systems, and so on, the current institution named the system Portal.

Despite the substantial growth of such systems in recent years, educational institutions are still faced with a number of challenges in relation to e-learning practices. Especially, delivery and acceptance of e-learning programs are among the difficulties that a lot of universities frequently experience (Park, 2009). Lack of interest on the side of the faculty or teaching staff in using the LMSs in their practices are claimed as a challenge (Stantchev, Colomo-Palacios, Soto-Acosta, & Misra, 2014). Some other studies state that a great number of students are not satisfied with e-learning programs they are offered (Bouhnik & Marcus, 2006; Liaw, 2008). According to Selim (2007), there are four critical dimensions influencing the effectiveness of an e-learning application: instructor characteristics, student characteristics, technology, and support. As Campbell and Swift (2006) further clarify, not only instructors but also students are to reconsider and change their attitudes, beliefs, behaviors, perspectives, and habits to be able to adapt to the use of technology efficiently. In this sense, Liaw (2004) highlights three key considerations: learner characteristics, instructional structure, and interactions that serve to assist the efficient adaptation of the institutions and the instructors to e-learning. All the aforementioned propositions reveal that due consideration should be given to understanding learners' perceptions on and behavioral intention to use the LMSs when developing promising systems. The latter one, which refers to perceived likelihood and willingness to be engaged in an action, has been the focus of the educational research in many contexts rapidly as a result of the increase in the use of the LMS by contemporary educational institutions. In this

line, identifying critical factors related to students' behavioral intention to use the LMSs is apt to continue as a significant issue.

Theoretical Framework

The previous literature presents several models that could explain perceptions on the acceptance of or behavioral intentions to use a new technology. A remarkable model in this context was proposed by Liaw (2007) and called the three-tier use model (3-TUM). This model was characterized to explore the attitudes of the users towards information technologies at three levels: (a) individual experiences and system quality; (b) affective and cognitive reactions; and (c) behavioral intentions (see Figure 1).

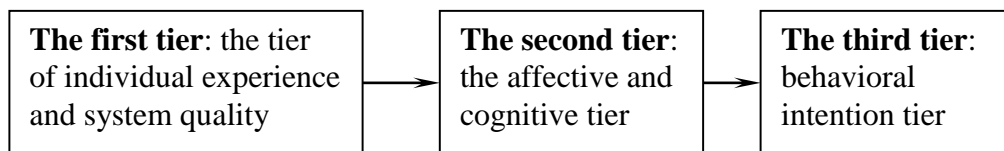


Figure 1. The three-tier use model (3-TUM) (Liaw, 2007).

As shown in Figure 1, the model is conceptualized in a way that the first tier, individual experience and system quality, could positively influence the second tier, affective and cognitive experiences. In a similar vein, the second tier tends to influence positively the third one which is the behavioral intention tier. In the end, the behavioral intention tier focuses on how to predict learners' behaviors to employ the intended technology for certain purposes through the research model. The conceptual foundation that the current study was built upon is the 3-TUM of Liaw (2007). However, other theoretical backgrounds such as the social-cognitive theory of Bandura (1977); the theory of planned behavior by Ajzen (1991); and the technology acceptance model (TAM) of Davis, Bagozzi and Warshaw (1989) and TAM-2 (Venkatesh & Davis, 2000) have contributed to the model and enabled the model to reach an integrated conceptual framework.

On the basis of the findings and propositions suggested in the previous literature, the current study intends to execute the 3-TUM to understand the relationships between the military vocational college students' behavioral intention to use the Portal and the selected factors such as self-efficacy, multimedia instruction, interactivity, perceived usefulness, perceived satisfaction, and perceived ease of use (see Figure 2).

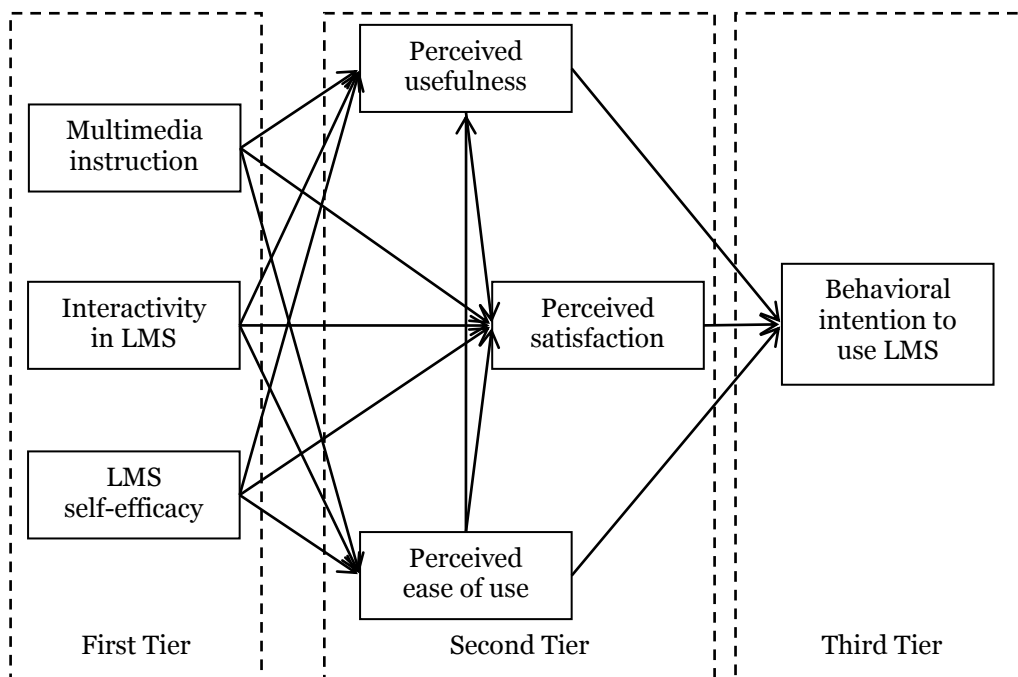


Figure 2. Theoretical framework of the study.

Self-efficacy is defined as “people’s judgments of their capabilities to organize and execute courses of action required attaining designated types of performances” (Bandura 1986, p. 391). The concept of self-efficacy is considered to be one of the variables in the first tier of the 3-TUM and to have a strong influence on the use of a system, owing to its effects on perceived usefulness and perceived ease of use (Venkatesh & Davis, 1996).

Multimedia lectures as a means of distance learning or as a supplement to conventional in-class learning have been around for several decades. With the development of the information technologies and the elimination of the barriers to video production, using multimedia in education has increased. Especially through video lectures, students are offered a rich learning experience, because video lectures have the potential to increase student retention and achievement in distance and blended learning environments (Geri, 2011). Besides, they might help the students who are not able to attend the courses regularly (Wieling & Hofman, 2010). Presenting the course materials through multimedia seems to have positive effects on learners’ satisfaction with the learning environment, which is likely to promote learners’ participation in learning processes (Liw, 2008). Therefore, multimedia instruction is considered to be another significant factor in learners’ satisfaction with the Portal and thus distance learning.

As another key element of e-learning practices, interactivity stands for the interaction between the learners and the system’s sources, the communication between the instructor and the learners, as well as the collaboration among the learners supported by the system under use. The interactivity is an important feature in all contemporary learning environments, regardless of the instructional methods or technologies used (Moore & Kearsley, 1996). The interactivity between students and online resources is

enhanced by using appropriate technologies and pedagogies efficiently. The interactivity within the LMS enables learners to explore and play with the course materials (Michailidou & Economides, 2003) and therefore becomes as a decisive element for improving students' positive feelings such as perceived satisfaction (Yukselturk & Yildirim, 2008) and perceived usefulness (Liaw & Huang, 2007). The interactivity within the LMS is claimed to affect learners' perceived satisfaction (Liaw, 2008; Sahin & Shelley, 2008; Šumak, Heričko, & Pušnik, 2011; Sun, Tsai, Finger, Chen, & Yeh, 2008) and use (Damnjanovic *et al.*, 2013; Pituch & Lee, 2006). All these points justify that a system's interactivity is expected to be a significant dimension that possibly affects the learners' adoption or rejection of the system. This feature of the system was rarely offered to the students in previous applications; hence it is thought to increase the effectiveness of the Portal.

Perceived satisfaction, which is frequently used to evaluate a system's success or failure, is described as one's perception of information systems and the level of comfort while practicing those (Liaw & Huang, 2013). In an e-learning environment, perceived satisfaction appears as an important indicator of the effectiveness of the instructional methods implemented in the online component of the system, and thus it could emerge as a barrier against the successful implementation of the system (Akkoyunlu & Soyulu, 2008; Melton, Graf, & Chopak-Foss, 2009; Paechter, Maier, & Macher, 2010). Several studies reveal that perceived usefulness positively predicts learners' satisfaction with e-learning (Cigdem & Topcu, 2013; Johnson, Hornik, & Salas, 2008; Liaw, 2008) and perceived satisfaction together with perceived usefulness directly affects learners' behavioral intention to use e-learning systems (Damnjanovic *et al.*, 2013; Lee, Cheung & Chen, 2005; Sahin & Shelley, 2008).

Perceived ease of use is defined by Davis *et al.* (1989) as users' perceptions on the ease of adopting a system. In this context, as the level of perceived ease of use regarding an e-learning system increases, the acceptance and use of that system by the participants is most likely to increase (Teo, 2012; Teo, Lee & Chai, 2008). In the TAM, attitude towards usage as well as the constructs like perceived usefulness and perceived ease of use is set to influence behavioral intention. While perceived ease of use exerts a direct impact on perceived usefulness, perceived usefulness together with perceived ease of use influences attitudes toward usage (Teo, 2011). In this sense, if users perceive that a system is easy to use, they tend to see the system as simple and satisfactory (Sun *et al.*, 2008). Consequently, the users are expected to join in, use more, and remain longer in the system, for the reason that participants' acceptance of and use of a Web-based learning system is affected by their perceived ease of use (Zhang, Zhao, & Tan, 2008). Perceived ease of use is claimed to have a direct impact on perceived usefulness but perceived usefulness is not claimed to have any effects on perceived ease of use (Davis *et al.*, 1989).

Perceived usefulness, which is described as "the level that a person thinks using a certain system would enhance his/her job performance within an organizational content" (Davis, 1989, p. 320), is one of the major factors directly influencing the behavioral intention to use a technology (Cigdem & Topcu, 2015; Sun *et al.*, 2008; Venkatesh & Morris, 2000). It is essential to consider the two key factors, which are environmental characteristics and individual learner characteristics, when investigating perceived

usefulness of an e-learning environment (Bouhnik & Marcus, 2006; Liaw & Huang, 2007; Motiwalla, 2007; Šumak et al., 2011).

Behavioral intention is defined as the degree to which a person has formulated conscious plans to perform or not to perform some specified future behavior (Warshaw & Davis, 1985), and there might appear a lot of factors possibly influencing learners' behavioral intention to use the LMS in their learning processes.

Building on the scheme discussed so far, understanding the students' behavioral intention to use the Portal appears as a critical issue not only to enhance the use of the Portal, but also to demonstrate their possible effects. According to Yi and Hwang (2003), self-efficacy operates at two distinct levels: (a) the general computing level and (b) the specific application level, which could be exemplified with the utilization of the LMS. For the current study aiming to exhibit the importance of the LMS, the self-efficacy concept was set to represent the students' judgments of their ability to perform in the LMS and confidence in finding information and communicating with an instructor within the LMS. In this scope, it is assumed that the students who show distrust in their capabilities might perceive that the LMS is too complex to operate and prefer to avoid using the system. As for the multimedia instruction, videos related to office software such as word processing and spreadsheets were produced by the lecturer, and Macromedia Captivate and Camtasia Studio applications were used for the production of the videos through screen capturing. All the videos, presentations, and lecture notes were uploaded to the system to enrich the multimedia feature of the instruction. In the design, the interactivity was ensured through the feedback provided on the assignments and works of the students by the instructors as well as the learners' engagement with the materials in the system. At this point, multimedia instruction and interactivity are regarded as the environmental characteristics of the current design and learner characteristics are considered to be based on their self-efficacy.

Everything considered, this study, based on the conceptual model proposed by Liaw (2007), aimed to examine the predictors of the learners' behavioral intention to use the Portal in a computer literacy course at a post secondary military vocational school from the constructs of perceived self-efficacy, multimedia instruction, interactivity, perceived satisfaction, perceived ease of use, and perceived usefulness. With the help of this study, researchers and providers of the LMS could have a comprehensive understanding about the learners' perceptions on and reactions to the use of LMS and therefore design and deliver better systems that can involve more users and result in more efficient learner outcomes. With the development of computer technologies and learning management systems, constructing multimedia lectures have been easier and communication tools between instructors and learners have increased. Therefore, it has become crucial to study the influence of multimedia and interactivity within a system on learners' behavioral intention to use LMSs. Another significance of the study is about the research context. Military schools have been a unique teaching setting in terms of the limited interaction between students and instructors due to a number of norms. For that reason, utilizing the LMS in such settings is thought to be a valuable opportunity to motivate learners and increase their engagement. As little research has been done at post secondary vocational schools and military schools, through this investigation, this study intends to contribute to the literature and provide samples for similar educational settings.

The specific research questions that the study aimed to answer were as follows:

- Can perceived ease of use be predicted from learners' self-efficacy and multimedia and interactivity features of the LMS?
- Can perceived usefulness be predicted from learners' self-efficacy and multimedia and interactivity features of the LMS and perceived ease of use?
- Can perceived satisfaction be predicted from learners' self-efficacy, multimedia and interactivity features of the LMS, perceived ease of use and perceived usefulness?
- Can learners' behavioral intention to use the LMS be predicted from perceived satisfaction, perceived ease of use and perceived usefulness?

Method

Research Context and Participants

This study was carried out at a two-year post-secondary military school of Balıkesir province in Turkey. Students are accepted to this school based on multi-step selection procedures consisting of a national university entrance examination, a physical test conducted by the Turkish Land Forces, and interviews with the commanders at the school. The candidates are offered vocational and technical training beside military preparation in order to be an NCO (non-commissioned military officer).

Since one of the researchers works as an instructor at the college, the convenient sampling was used to select the participant users, and the designed Portal was used in that researcher's course. The participants consisted of 155 military school students taking Computer Literacy during the first semester of the 2014–2015 academic year. As the research context was military school, all the participants were male students living on the college campus, which makes the research a unique study and at the same time exerts a limitation. The participants' age ranged from 18 to 23 with an average of 19 ($SD = 1.09$). Among the participants, there were students majoring in the Department of Automotive Technologies ($n = 61$) and the Department of Electronics and Communication Technologies ($n = 94$). Most of the participants ($n = 126$) were graduates of vocational high schools and the rest ($n = 29$) of general high schools. As for the prior experience on e-learning, most of the participants ($n = 120$) reported that they did not have any e-learning experiences before, whereas the rest had ($n = 35$).

Portal

The study was conducted in the context of the course titled Computer Literacy, which was compulsory for the Department of Automotive Technologies and the Department of Electronics and Communication Technologies. The course content was offered in a blended format for a 15-week semester as well as through 100-minute face-to-face lectures in each week. In each face-to-face session, students were

presented with the pre-planned content of the week. The course content included almost all office specialties and covered a vast body of office software knowledge, which made the course to be completed in a limited time by the participants. This fact was the rationale behind the course's being offered in a blended format. Completing the face-to-face session, the participant students were asked to create office software projects in computer labs. A short summary and feedback related to common mistakes were provided at the end of each face-to-face session. Students who could not participate in or had difficulty in understanding the face-to-face lectures were expected to log onto the course Web site individually through the intranet.

Within the online part of the course environment, the participants were also provided with the lecture notes, presentations, sample projects, learning activities, online assignments, and videos over the intranet on the Portal. Through this feature, students were able to review the videos, upload assignments, and send messages to the instructor anywhere and anytime in the college campus. Portal gave learners the opportunity to control what subject they would like to work on. Screenshot examples of Portal and the video simulations could be seen in Figure 3 and Figure 4.

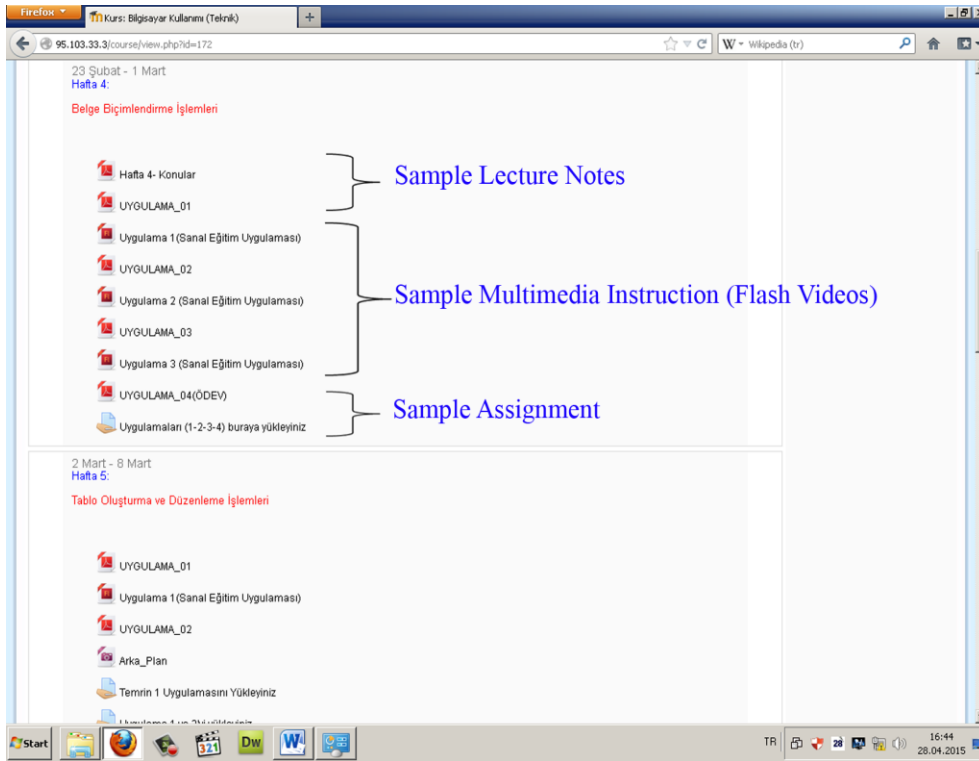


Figure 3. A screenshot of the Computer Literacy Web site.

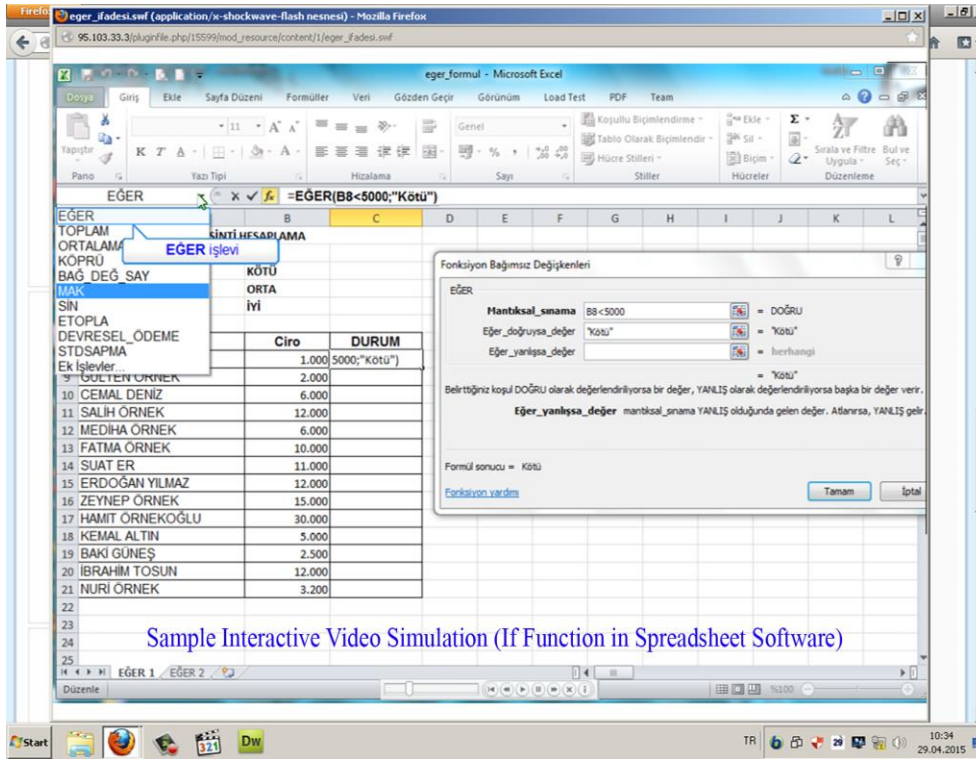


Figure 4. A screenshot of interactive video simulation captured by Adobe Captivate.

Data Collection Instrument

The data were collected through an online questionnaire, which was built on the propositions of Davis (1989) and Liaw (2008). The questionnaire included 21 five-point Likert-type items with a response scale from 5 (*strongly agree*) to 1 (*strongly disagree*) and an additional section inquiring the participants' demographical characteristics. The underlying structure of the questionnaire composed of seven factors representing learners' perceived self efficacy, multimedia instruction, interactivity of the Portal, learners' perceived satisfaction, perceived ease of use and perceived usefulness of the Portal, and learners' behavioral intention to use the Portal. Items placed in each subscale are presented in Table 1.

Table 1

Distribution of Survey Items to Factor Structure

Factor	Item	Mean	SD
LMS self-efficacy*			
I1	I feel confident using Portal.	4.10	.486
I2	I feel confident operating functions of Portal.	4.24	.593
I3	I feel confident using contents of Portal.	3.92	.609
Multimedia instruction*			
I4	I like to use video media instruction in Portal	4.15	.560
I5	I like to use multimedia instruction in Portal	4.40	.526
I6	I like to use presentations/slides in Portal	4.27	.595
		4.45	.636
		4.48	.585
Perceived satisfaction*			
		4.20	.443

I7	I am satisfied with using Portal as a learning assisted tool	4.20	.597
I8	I am satisfied with using functions of Portal	4.34	.584
I9	I am satisfied with multimedia instruction in Portal	4.33	.548
I10	I am satisfied with interactivity in Portal	3.94	.600
Interactivity in Portal*		4.13	.503
I11	I would like to share my e-learning experience	4.08	.683
I12	I believe Portal can assist teacher-learner interaction	4.28	.587
I13	I believe Portal system can assist learner-learner interaction	4.03	.608
Perceived usefulness**		4.48	.475
I14	Using Portal gives me greater control over my work	4.54	.595
I15	Using Portal improves my performance	4.51	.585
I16	Using Portal makes it easier to do my job	4.39	.608
I17	I believe Portal contents are useful	4.49	.562
Perceived ease of use**		4.41	.453
I18	Learning to operate Portal system would be easy for me	4.49	.563
I19	I would find it easy to get Portal to do what I want it to do	4.40	.565
I20	I would find the system easy to use	4.34	.540
Behavioral intention**		4.44	.452
I21	I intend to use Portal to assist my learning	4.41	.579
I22	I intend to use functions of Portal to assist my learning	4.48	.574
I23	I intend to use Portal as an autonomous learning tool	4.33	.582
I24	I would like to see Portal functions implemented further in departmental modules	4.53	.561

Note. *SD* = standard deviation of the mean. *Items were adapted from Liaw (2008, p.871). **Items were adapted from Davis (1989, p.324).

In order to determine the internal consistency of the questionnaire and see whether the items that were summed to create each factor formed a reliable scale, Cronbach's alpha was computed for both the overall questionnaire and the subscales within the questionnaire. The alpha for the subscales ranged from .72 to .84, and the overall alpha was .92. All the values revealed reasonable levels of reliability (see Table 2 for the values of the reliability analyses).

Table 2

Results of Reliability Analyses

Subscale	Items	Cronbach's Alpha
LMS self-efficacy	3	.769
Multimedia instruction	3	.837
Interactivity in Portal	3	.723
Perceived ease of use	3	.750
Perceived usefulness	4	.825
Perceived satisfaction	4	.757
Behavioral intention	4	.796
Total	24	.920

Data Analysis

The data obtained from the responses in the questionnaire were analyzed through inferential statistics. In order to see the relationships and correlations between the constructs within the research design, Pearson correlation coefficients and linear regression analyses were performed to examine the points addressed in the research questions.

Results

In advance of the regression analyses, multicollinearity assumption was checked in order to see whether there was a multicollinearity problem among the predictor variables involved in the analyses. As multicollinearity might occur with a high level of correlation ($r_{xy} > .90$) between two or more variables, the predictors with a value of .90 or higher were determined through an examination of item–item matrix (Field, 2009; Kline, 2011; Tabachnick & Fidell, 2007). With the purpose of examining the correlations among all the factors represented in the scale, Pearson correlation coefficients were performed. In order to control the Type I error across the correlations, a p value of less than .01 was required for significance. Accordingly, all the seven factors were significantly correlated with each other, except for the one between self efficacy and behavioral intention. As demonstrated in Table 3, all the correlations were all less than .80 and there was not any high correlations ($r_{xy} > .90$) among the predictors. As a result, it was assumed that there was no multicollinearity problem among the predictor variables of the regression analyses. The strongest correlations indicated that the multimedia features of the system tended to increase participant learners' perceptions in relation to the ease of use and the usefulness of the system. The weakest correlations were between the self-efficacy of the learners and the other constructs (see Table 3).

Table 3

Pearson Correlations Among the Factors

Factors	2	3	4	5	6	7
1. Self-efficacy	.298*	.642*	.224*	.310*	.428*	.201
2. Multimedia instruction		.376*	.756*	.785*	.369*	.541*
3. Interactivity in Portal			.300*	.376*	.574*	.218*
4. Perceived ease of use				.683*	.414*	.497*
5. Perceived usefulness					.514*	.692*
6. Perceived satisfaction						.436*
7. Behavioral intention						

Note. *Correlation is significant at the .01 level (2-tailed).

As for the first research question inquiring whether perceived ease of use could be predicted by the constructs of learners' self-efficacy, multimedia instruction, and interactivity feature of the system, the regression analysis indicated a significant result, $R^2 = .572$, $F(3,151) = 67.221$, $p < .001$, only in that multimedia instruction within the system positively influenced the scores regarding perceived ease of use (see Table 4).

Table 4

Self-Efficacy, Multimedia Instruction, and Interactivity as Predictors of Perceived Ease of Use

Variables	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
LMS self-efficacy	-.016	.065	-.017	-.249	.804
Multimedia instruction	.647	.050	.750	13.016	.000
Interactivity in Portal	.026	.065	.029	.398	.691

Note. *B*= unstandardized coefficients, *SE* = standard error of the estimate, β =*standardized coefficients*

In a further analysis, learners' self-efficacy, multimedia instruction, interactivity feature of the system, and perceived ease of use were checked to see whether they predict the construct of perceived usefulness. It revealed a significant result, $R^2 = .643$, $F(4,150) = 67.521$, $p < .001$, which turned out that multimedia instruction and perceived ease of use exerted positively significant affects on the scores pertaining to perceived usefulness of the system (see Table 5).

Table 5

Self-Efficacy, Multimedia Instruction, Interactivity, and Perceived Ease of Use as Predictors of Perceived Usefulness

Variables	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
LMS self-efficacy	.048	.063	.049	.763	.447
Multimedia instruction	.535	.070	.592	7.690	.000
Interactivity in Portal	.057	.062	.060	.915	.361
Perceived ease of use	.216	.078	.206	2.767	.006

Note. *B*= unstandardized coefficients, *SE* = standard error of the estimate, β =*standardized coefficients*

Regarding the third research question which is related to the perceived satisfaction's being predicted by the constructs of self-efficacy, multimedia instruction, interactivity, perceived ease of use, and perceived usefulness, the regression analysis also put forward a significant result, $R^2 = .466$, $F(5,149) = 25.975$, $p < .001$. Accordingly, it was seen that interactivity, perceived ease of use, and perceived usefulness tended to exert significantly positive influences on the perceived satisfaction scores. On the other hand, multimedia instruction had a negative effect on perceived satisfaction (see Table 6).

Table 6

Self-Efficacy, Multimedia Instruction, Interactivity, Perceived Ease of Use, and Perceived Usefulness as Predictors of Perceived Satisfaction

Variable	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
LMS self-efficacy	.062	.072	.068	.867	.387
Multimedia instruction	-.258	.094	-.306	-2.744	.007
Interactivity in Portal	.370	.071	.420	5.187	.000
Perceived ease of use	.204	.092	.209	2.223	.028
Perceived usefulness	.403	.093	.433	4.317	.000

Note. *B*= unstandardized coefficients, *SE* = standard error of the estimate, β =*standardized coefficients*

The final analysis was performed to examine the predictors of the learners' behavioral intention to use the LMS, and the constructs of perceived ease of use, perceived usefulness, and perceived satisfaction were tested. The result was significant, $R^2 = .489$, $F(3,151) = 48.124$, $p < .001$. Perceived usefulness of the system seemed to have a significant effect on the learners' behavioral intention to use the system (see Table 7).

Table 7

Perceived Ease of Use, Perceived Usefulness, and Perceived Satisfaction as Predictors of Behavioral Intention

Variable	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
Perceived ease of use	.033	.080	.033	.413	.680
Perceived usefulness	.585	.081	.616	7.250	.000
Perceived satisfaction	.108	.070	.106	1.549	.124

Note. B= unstandardized coefficients, SE = standard error of the estimate, β =standardized coefficients

Discussion and Conclusions

With this study, the case of a unique educational context was explored through the 3-TUM. On the basis of the findings resulting from the analyses, an explanatory model (see Figure 5) was obtained. In the model, the arrows stand for the direct influence of a construct on another construct or other constructs.

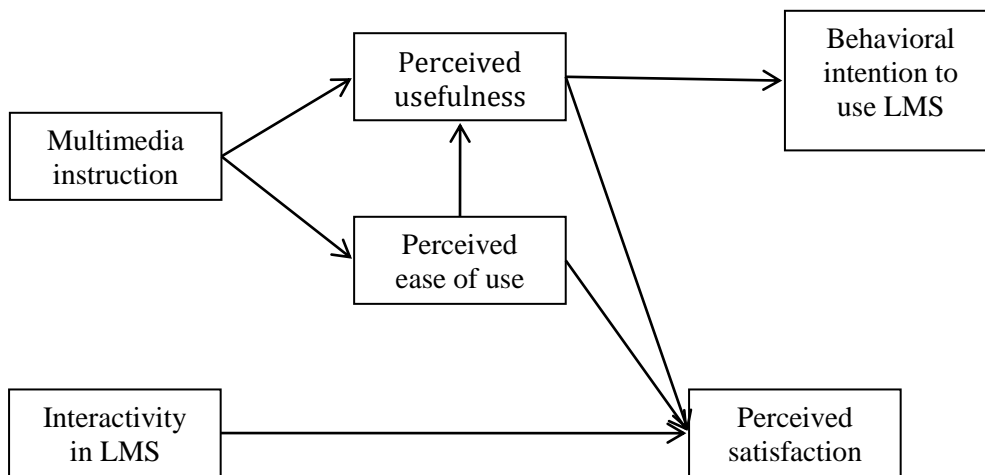


Figure 5. Derived model for students' behavioral intention to use LMS.

Multimedia instruction exerted a direct influence on perceived usefulness and perceived ease of use, which indicated that a system's including instructional multimedia would more probably enable users to think that the system is easy, beneficial, and functional to use for learning purposes. Interactivity exerted a direct influence on perceived satisfaction, which could imply that in the interactivity features of the system would more probably lead to higher level of satisfaction among users. This is consistent with the point proposed by Pituch and Lee (2006) and Damnjanovic et al. (2013). Consistent with Abbad, Morris ,

and Nahlik (2009), there was no strong evidence in our work that the interactivity within the Portal influenced perceived ease of use and perceived usefulness. In this sense, the instructors should be aware of the importance of interactivity for learner satisfaction and thus promote more interactivity with their learners in their lectures through LMSs.

On the other hand, multimedia instructions had a negative effect on perceived satisfaction. It is considered that the students' being directed to check the multimedia instruction within the LMS for any simple question addressed in face-to-face sessions might have affected the learners negatively so that they could feel less satisfied with the system.

Perceived ease of use exerted a direct influence on perceived usefulness, which could mean that when the learners find a system easy to use, they tend to consider the system as beneficial and functional. Similar to Abbad et al. (2009), Cigdem and Topcu (2015) and Davis et al. (1989), it suggests that perceived ease of use has a significant direct effect on perceived usefulness. Thus, system administrators should be aware of the characteristics and needs of learners to make LMS easier to learn and use. However, perceived usefulness and perceived ease of use significantly affected perceived satisfaction. In this regard, learners' perceptions on a system's being easy and beneficial to use would possibly reflect on their satisfaction level with the system. This result reveals a parallel point with some other studies (Cigdem & Topcu, 2013; Johnson, Hornik, & Salas, 2008; Liaw, 2008; Šumak *et al.*, 2011), in which it is also asserted that satisfaction is predicted by perceived usefulness.

An important point the model suggested was about the behavioral intention, which was inclined to be directly affected by only perceived usefulness. Accordingly, when the learners believe that a system is useful or practical, they are likely to use that system for learning purposes. This is consistent with the point proposed by Cigdem and Topcu, (2015), Liaw (2008), Sun et al. (2008), and Venkatesh and Morris (2000), yet inconsistent with the point of Park (2009). As only the construct of perceived usefulness had a direct impact on behavioral intention, this finding is considered to somewhat confirm the literature concerning the TAM.

The last interpretation was about the self-efficacy, which was not able to take a position in the model due to its insignificant relationships with the other constructs in the affective and cognitive tier. Although inconsistent with the studies of Abbad et al., (2009), Davis (1989), Park (2009), Venkatesh and Davis (1996), Wang and Wang (2009) and Yuen and Ma (2008), who found that self-efficacy is an important determinant of perceived ease of use, our findings could mean that today's learners enter colleges with greater knowledge and experiences of information and communication technologies than their predecessors did as a result of the continuing spread of computer and Internet across the educational settings. Thereby, learners' self-efficacy is improving day by day. That could be a reason for the assertion that self-efficacy does not seem to be predicting behavioral intention to use the LMS anymore. Similar to our findings, Motaghian, Hassanzadeh, and Moghadam (2013) claimed that self-efficacy had no significant effect on perceived usefulness of LMS as opposed to the findings in Ong, Lai, and Wang (2004), and Park (2009).

As frequent use of LMSs has increased in many educational institutions, LMS technologies such as video productions have also developed. If we are to satisfy our students with the LMS and increase their engagement with distance learning, we need to use the interactivity and multimedia options of the systems more frequently and improve the interaction facilities within the system through frequent feedback on the works of the students and provision of support and responses to their questions. Besides, we need to reconsider and extend the multimedia features of the system so that we could increase the usefulness of the system among the participants. However, it is essential to limit the scope and the length of those features, because they are supposed to be more effective when they are content-based and not too long.

Considering the challenges of distance education in the twenty-first century, it is vital for distance educators to rethink how well they meet the needs of their students and institution as well as to understand possible factors that might ease or hinder the users' acceptance of and engagement with distance learning environments. Such an inquiry is central to the development of the field of practice and theory for which models and concepts within the models appear as important elements.

In this study, an important step was taken to look into the factors that might possibly affect learners' behavioral intention to use the LMS and engagement with distance learning. However, the study has certain limitations. First of all, a kind of self-reported data were gathered from the participants through an online questionnaire. Secondly, regarding the sampling, the current study assessed military college students, and thus the applicability and generalizability of the findings are limited. The third limitation of the study is the gender issue as all of the participants were male due to the characteristics of the military schools in Turkey. If similar studies are replicated in other educational contexts for further investigations, findings could be discussed through a comparative analysis. As a further step, the users of Portal could be interviewed through focus-group or individual interviews in order to get in-depth data about their perceptions on the system. Additionally, their movements in the system could be inspected through a detailed analysis of the logs.

Finally, similar research needs to be conducted in other e-learning practices. As this study focused on the online mode of a blended learning environment, researchers could carry out similar studies to deal with pure online environments, flipped classrooms, massive open online courses, and so on. Multimedia instruction and interactivity features could also be used in other technology acceptance models.

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