IDENTIFYING FACTORS THAT CONTRIBUTE TO THE SATISFACTION OF STUDENTS IN E-LEARNING

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ABSTRACT

There has been an increasing interest in the application of e-learning through the enhancement of internet and computer technologies. Satisfaction has appeared as a key factor in order to develop efficient course content in line with students' demands and expectations. Thus, a lot of research has been conducted on the concept of satisfaction in electronic environments.

Satisfaction has been seen to be the most significant variable on loyalty and usage intention in marketing and information science terms, which can also be highly related to academic success. In this regard, this study set out to investigate the effects of several variables on the learning processes of 930 e-learning students in the Sakarya University distance learning program. The findings of the research indicated that factors perceived playfulness, perceived ease of use and multimedia content effectiveness had a significant effect on perceived usefulness. Furthermore, it was concluded that satisfaction was affected by perceived usefulness, perceived playfulness and multimedia content effectiveness.

Keywords: **E-learning, Satisfaction, Technology Acceptance Model (TAM), Playfulness, Multimedia Content Effectiveness.**

INTRODUCTION

E-learning has gained traction in educational settings in recent years. E-learning is regarded as a new paradigm in modern education methods, which obviously shifts both industrial perspectives and individuals' behaviors in light of technological advances witnessed in the 21st century.

As far as students are concerned, the needs of 21st centur learners are varied (Prensky, 2001). However, it has become obvious that it is not always easy to accommodate these needs. In terms of e-learning experiences, e-learning has some unsuccessful attempts despite 35,6% growth (Sun, Tsai, Finger, Chen, & Yeh, 2008).

In other words, most of the users stop their online learning experiences after their initial experience as argued by Arbaugh and Duray (2002). In order to encourage these users to continue using e-learning, satisfaction and loyalty have appeared as key factors in determining students' demands and expectations. Many educational institutions have started using either blended learning, a combination of traditional and online learning, or internet-based learning lately.

A lot of profit and non-profit business organizations conduct their "job training" online so as to save time and money and to increase the quality of their training (Lee, Yoon, & Lee, 2009). Likewise, there are a lot of studies presenting the benefits of e-learning in educational settings (Bouhnik & Marcus, 2006; Liaw, Huang, & Chen, 2007; Raab, Ellis, & Abdon, 2001; Shotsberger, 2000). In addition to saving time and money and increasing the quality of learning, according to Bouhnik and Marcus (2006), the four crucial benefits stand out:

- **freedom to decide when each online lesson will be learned,**
- **lack of dependence on the time constraints of the lecturer,**
- **freedom to express thoughts, and ask questions, without limitations, and**
- **the accessibility to the course's online materials at students' own election.**

Moreover, Capper (2001) lists the benefits of e-learning in educational settings. According to Capper (2001, p.8), e-learning has several advantages in terms of:

- **time,**
- **place,**
- **interaction,**
- **collaboration and**
- **modern educational approaches.**

Liaw and Huang (2007) underlines four important elements to be considered when developing e-learning environments.These elements are:

- **environmental characteristics,**
- **environmental satisfaction,**
- **collaboration (learning) activities, and**
- **learners' characteristics.**

At this point, it is mandatory that a continuous and successful e-learning service be provided, and this service be designed in line with individuals' needs and interests and more importantly a multidisciplinary approach be used (Lee, Yoon, & Lee, 2009).

In a similar line, satisfaction and loyalty, the most important aspects of the satisfaction, are essential terms in the scope of modern marketing paradigm (Churchill & Surprenant, 1982; LaTour & Peat, 1979; Yi, 1989).

Thus, this study tries to investigate the effects of cognitive and affective factors on users' satisfaction during an e-learning environment in light of the conceptual framework.

CONCEPTUAL FRAMEWORK: Satisfaction and Loyalty

Marketing research has showed that a satisfied customer has intention to purchase again (In information technology, it refers to the intention to use again.), to inform social group with positive opinion about brands, to decrease interests about rival brands and to prefer different product ranges on the same brand (Dick & Basu 1994; Kotler, 1991). Otherwise, acquiring new customers costs five times more than retaining an existing one (Rust & Zahorik, 1993). Due to a long term relationship with an existing customer, a continuous income would be granted (Bansal, McDougall, Dikolli, & Sedatole, 2004). In addition to studies mentioned above, interdisciplinary studies on information technologies (IT) have revealed significant results.

Bhattacherjee (2001) define loyalty as an intention of using information systems persistently. Likewise, Liao, Chen and Yen (2007) indicate that satisfaction and perceived usefulness have a positive effect on usage intention. As reflected in education paradigma, the occurrence of a more effective learning process and the existence of longer relationships with students are getting more important. Likewise, effective learning processes in distance education and the successful completion of these processes are highly related to students' satisfaction (Taplin, Low, & Brown, 2011). A student who is fully satisfied with his learning process is likely to make use of internet based educational technologies once again. In order for students to continue their e-learning experiences, satisfaction is a mandatory factor which needs to be considered seriously. There are several studies looking at this factor (Arbough, 2000; Arbough & Duray, 2002; Lee et al., 2009; Lin et al., 2005; Sun et al., 2008). However, there is no particular study which specifically examines the effects of multimedia content effectiveness on perceived usefulness, and satisfaction. This study also investigates the effects of perceived playfulness on perceived usefulness and satisfaction. Finally, it tries to seek the relationship between multimedia content effectiveness and perceived playfulness. This study set out to investigate these aspects by making use of Technology Acceptance Model (TAM) proposed by Davis (1986).

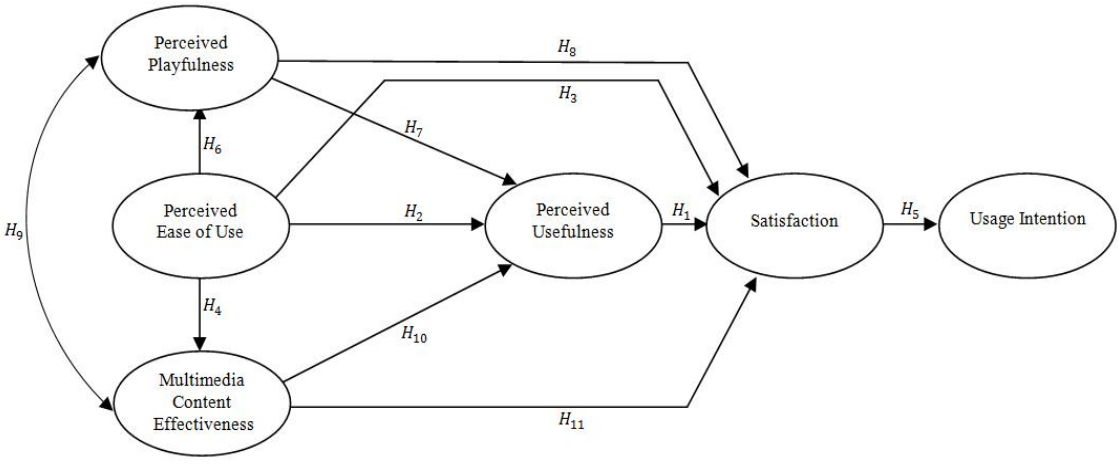

Figure: 1
Conceptual Model

In this framework, improving appropriate methods within the scope of e-learning has become essential. This is of great importance in terms of both providing competitive advantages and increasing the learning efficiency. Figure 1 shows variables and models of the conceptual framework.

Technology Acceptance Model

The technology acceptance model (TAM), originally proposed by Davis (1986), was adapted from the Theory of Reasoned Action by Ajzen and Fishbein in 1975 (Davis, Bagozzi, & Wars, 1989). TAM has focused on technology acceptance tendency of individuals. This model consists of two essential variables; ease of use and perceived usefulness. This model posits that a system with perceived ease of use increases individual's self-efficacy and self-control sense. Therefore, this model relies on the basis that individuals gaining value by perceived usefulness will perform the actual behavior. TAM indicates that the impact of other external variables on intention is fully mediated by usefulness and ease of use (Davis, 1986; Davis et al., 1989).

There has been a remarkable growth of interest in the theory and practice of TAM since it was first proposed by Davis (1986). Studies carried out with TAM in e-learning settings have mostly emphasized on learning system structure and course content presented in e-learning systems in terms of knowledge effectiveness. Findings show that ease of use and perceived usefulness have positive effects on satisfaction and usage intention (Chiua, Hsu, Sun, Lin, & Sun, 2005; Yi & Hwang, 2003). In a similar fashion, Bhattacherjee (2001), Premkumar and Bhattacherjee (2008) present the positive effects of perceived usefulness on satisfaction and usage intention in their interdisciplinary studies by using Oliver's (1980) "disconfirmation approach. On this basis, there are five hypotheses developed in relation to variables mentioned above.

H_1: Perceived usefulness will positively influence satisfaction.
H_2: Perceived ease of use will positively influence usefulness.
H_3: Perceived ease of use will positively influence satisfaction.
H_4: Perceived ease of use will positively influence multimedia content effectiveness.
H_5: Satisfaction will positively influence usage intention.

Studies carried out with TAM indicate that system's ease of usage will reduce the threat perception of individuals (Moon & Kim, 2001) Therefore, perceived ease of use is expected to have a positive effect on perceived playfulness. Ahn, Ryu, and Han (2007) emphasize that perceived ease of use has relatively low but a significant effect on perceived playfulness. Therefore, the hypothesis was formed as follows.

H_6: Perceived ease of use will positively influence perceived playfulness.

Perceived Playfulness

Lave and Wenger (1990) believe that there is a shift from a cognitive process to a process of participation in an emotional sense in the social world. According to this learning theory, students should be involved in a learning environment where they are motivated to take actions to learn. As Rogers (1969) states, the learning atmosphere is affected by several factors, more importantly affective factors. In other words, emotions play a salient role in the process of transmitting the knowledge to students. Thus, the emotional needs of today's students' should be taken into account so that the learning process will be actualized at the very best level.

This is highly important "in terms of humanistic approach as there is almost no perceived threat to the learner's self-image" (Balçıkanlı, 2012, p. 140). Almost no attention is given to the effects of affective dimension on learning processes in most research looking at the factors contributing to satisfaction in e-learning environments (Arbaugh, 2000; Arbaugh & Duray, 2002; Piccoli, Ahmad, & Ives, 2001; Sun et al., 2008). In other words, these studies have tended to neglect affective dimension of learning processes.

However, studies on traditional satisfaction show that satisfaction does not only consist of cognitive process, which evaluates actual product performance, but also has affective components (LaTour & Peat, 1979; Oliver, 1997; Westbrook, 1987; Westbrook et al., 1978). Westbrook (1980, p. 49) claims that a customer who is satisfied feels good otherwise feels bad. Studies of cognitive and social psychology indicate that affective components such as individuals' motivation have a major effect on processing and selecting of knowledge (Westbrook, 1987).

The lack of affective components is also mentioned in the studies based on TAM (Agarwal & Karahanna, 2000; Ahn et al., 2007; Moon & Kim, 2001). For instance, Hara and Kling (1999) suggest that learners may experience frustration and anxiety in virtual learning and this situation undermines the motivation which is a powerful factor in the learning process.

Perceived playfulness is described as the degree of satisfaction that is experienced when a person participates in an activity or a system (Barnett, 1990). In the relevant literature, some researchers integrate perceived playfulness into TAM as a new variable (Chung & Tan, 2004; Lin et al., 2005; Moon & Kim, 2001). Roca and Gagne (2008) revise the usage intention variable as e-learning continuance intention in TAM and integrate the perceived playfulness variable into TAM approach. Furthermore, Lee et al. (2009) incorporate perceived playfulness variable into TAM in their e-learning study. Lin et al. (2005) suggest that perceived playfulness has a positive effect on satisfaction. Yi and Hwang (2003) propose that perceived playfulness (enjoyment) has a positive effect on "perceived usefulness" and "application of self-efficacy".

In this study, we revise application of self-efficacy as "multimedia course effectiveness". It is believed that playfulness components should not be ignored in the course content, which is presented in distance learning systems. According to Lin, Wu and Tsai (2005), individuals who ranked high in playfulness demonstrate better performance and higher affective response to computer training tasks. That is to say, if perceived playfulness is integrated into learning atmosphere, it is likely that the students will do better academically. Thus, there should be a positive correlation between perceived playfulness and perceived multimedia course effectiveness, which makes the point clear that perceived playfulness has a positive effect on perceived usefulness and satisfaction. In this regard, there are three hypotheses.

H_7: *Perceived playfulness will positively influence perceived usefulness*
H_8: *Perceived playfulness will positively influence satisfaction*
H_9: *Perceived playfulness and perceived multimedia content effectiveness have positive correlation*

Multimedia Content Effectiveness

Virtual environment, in a general sense, offers innovation which contains removing time and space limitations and performing communication in a dynamic structure. This is called "hypermedia". (Hoffman & Novak, 1996; 1997).

"Hypermedia" is defined as a new media which has turned into a new dynamic and personalized communication tool different from traditional communication. This new version of media is mostly considered to be a new dynamic and personalized communication tool differently from traditional communication (Agostinho, 2011; McLoughlin, 1999, 2002, 2010; Neumann, Neumann & Hood, 2011).

E-learning is presented in a virtual learning environment which is defined as "computer-based environments allowing interactions and encounters with other participants and providing access to a wide range of resources" (Piccoli et al., 2001, p. 403).

The Australian National Training Authority indicates that e-learning has two major components.

The first one is that e-learning is supported by information and communication technologies, while the second is that diverse media is needed for effective instruction and study purposes (Lin & Gregor, 2006).

It is mandatory that the presentation of e-learning have multimedia content which includes interactive animations, audio and video conference, text-based and visual materials and like.

Studies carried out with TAM in e-learning used the content related variables to extend the TAM with different perspectives. To illustrate, Lee (2006) extends the model by adding the variables namely content quality, perceived network externality, computer self-efficacy and course attributes.

In a similar vein, Lee et al. (2009) extend the TAM approach with teaching materials and design of learning contents variables. Liu et al. (2009) incorporate the e-learning presentation types, which include text-audio, audio-video and text-audio-video, one by one into TAM and compared three cases with each other.

Liaw (2008) proposes a new approach that integrates multidisciplinary approach which are social cognitive theory (SCT), theory of planned behavior (TPB), technology acceptance model (TAM) and incorporates the multimedia instruction which includes audio, video and multimedia effectiveness. By taking into account the pertinent literature on extending the TAM with relevant variables, we also extend TAM by adding "*Multimedia Content Effectiveness*" variable which includes interactive animations, audio and video conference, text-based and visual materials effectiveness in e-learning.

RESEARCH DESIGN

Setting

Sakarya University, which started its e-learning applications in 2000, is the first university to have an open source portal to meet the changing needs of universities in line with technological innovations. E-learning programs carry out with open source and SCORM compliant AkademikLMS developed within the university.

Several dimensions such as content, learning, teaching, support and others were taken into account while the portal was being developed. The multimedia tools, written materials, visual materials and flash animations used in e-Learning in the Sakarya University are given below and application examples are shown in Figure: 2.

Live Classroom

A synchronous activity that instructor, instructor assistant and students participate virtual classroom of related course weekly

Video Conference

Course content assisted by asynchronous video conference which is recorded in a professional studio. The video content is both online and downloadable.

E-Book

Extended lecture notes presented in printable format weekly Online Course Presentation: Summarized lecture notes presented weekly by flash based interface with interactive features such as flash animation, quiz, case study etc.

Figure: 2
Sakarya University e-Learning Portal

In this context, there are two hypotheses.

H_{10}: ***Multimedia Content Effectiveness will positively influence perceived usefulness***

H_{11}: ***Multimedia Content Effectiveness will positively influence satisfaction***

Aim Of The Study

The aim of this study is to suggest a new model for e-learning research and applications by adding variables such as perceived playfulness, satisfaction and multimedia content effectiveness to basic TAM approach. Moreover; it aims that investigating the usage intention with perceived playfulness and multimedia content effectiveness incorporated into model.

This research suggests using a structural equation modeling (SEM) approach as a unified framework to test independent and dependent correlational hypotheses. This study is believed to contribute to academic studies and practical applications with a specific focus on the indirect effect of multimedia content and playfulness usage intention in e-learning.

Instrument and Participants

Our scale was adapted from the previous scales used in the field (Loiacono, 2000; Loiacono et al., 2002; Moon & Kim, 2001; Paechter et al., 2010; Premkumar & Bhattacherjee, 2008). Multimedia tools of AkademikLMS were used in the construction of the variable "multimedia content effectiveness".

A pilot test for the reliability and validity of the instrument was conducted with forty students. Some items were revised. According to the results from the pilot test, some modifications were made to improve face and content validity.As for the participants, out of 930 students, 670 (72%) male and 260 (28%) female respondents took part in this study. Most participants studied under graduate programs (67%), others studied graduate (22%) and postgraduate (11%) programs. Many participants (62%) were between 19-29 years old and the rest (28%) were 30 years old or above.

FINDINGS AND MODEL TESTING

The construct validity for the research instruments was assessed via confirmatory factor analysis (CFA) using the SPSS-AMOS™. Model estimation was made using the maximum likelihood approach.

In this research, convergent validity for six constructs was evaluated using three criteria suggested by Fornell and Larcker (1981), Bagozzi and Yi (1988). As a first criterion, all indicator factor loadings (λ) should be significant and exceed 0.7 (Fornell & Larcker, 1981). As shown in Table 3, all items' loadings in CFA model were higher than 0.7 and statistically significant at p =0.001. Second criterion for satisfactory convergent validity is average variance extracted AVE[1]. AVE should be larger than 0.5 for each construct. Represented in Table: 3, AVE values of all constructs exceeded the minimum 0.5 rule. Last criterion for convergent validity is composite reliability[2] suggested by Bagozzi and Yi (1988). Composite reliabilities of all constructs should exceed 0.6. As shown in Table: 3, all constructs had greater than 0.8 composite reliability values. Finally, all constructs have shown good convergent validity and all criteria were met. iscriminant validity for six constructs was assessed using a chi-square difference test suggested by Bagozzi and Yi (1988). This test consists of comparison of constrained measurement model (covariance between constructs set equal to 1) and unconstrained measurement model (all constructs freely correlated). As shown in Table 1, χ^2 and degrees of freedom differences between two models indicated statistically significant discriminant validity for research model.

Table: 1
Test of Discriminant Validity

Models	χ^2	Df
Constrained Measurement Model	508.8	119
Unconstrained Measurement Model	713.7	134
Δx^2	204.9	-
ΔDf	-	15

Df: Degree of Freedom

As shown in Table 1, Δx^2 value is bigger than 25[3], so each construct which constitute the measurement model was different and fulfilled convergent validity of measurement model.Table: 2

Inter-Construct Correlations

	ρ_c	EOU	MCE	PU	PP	SA	UI
EOU	***.90***	***.90***					
MCE	***.85***	.415	***.81***				
PU	***.91***	.703	.612	***.85***			
PP	***.91***	.556	.584	.760	***.85***		
SA	***.89***	.629	.674	.869	.773	***.86***	
UI	***.94***	.560	.542	.784	.663	.841	***.94***

Note: Diagonal elements (in bold) represent the square root of the average variance extracted (AVE). Off-diagonal elements represent the correlations among constructs. For discriminant validity, diagonal elements should exceed inter-construct correlations.
EOU=Ease of Use, MCE=Multimedia Content Effectiveness, PU=Perceived Usefulness, PP=Perceived Playfulness, SA= Satisfaction, UI=Usage Intention, ρ_c= Composite Reliability,

As shown in Table: 2, the correlation between perceived usefulness and satisfaction is a little larger than the square root of the value of perceived usefulness AVE.

1 $$\frac{\sum \text{square of the summation of the factor loadings}^2}{\sum(\text{square of the summation of the factor loadings})^2+\sum \text{summation of error variances}}$$

2 $$\frac{\sum(\text{square of the summation of the factor loadings})^2}{\sum(\text{square of the summation of the factor loadings})^2+\sum \text{summation of error variances}}$$

3 As seen in chi-square distribution table, chi-square value with 15 degree of freedom and α = 0,05 significant level

Table: 3
Confirmatory Factor Analysis

Construct	Loading (λ)
PERCEIVED PLAYFULNESS *Composite Reliability = 0,91 AVE: 0,72*	
Using e-Learning System is Enjoyable	.86
I Feel Happy When I use e-Learning System	.88
I don't realize the time elapsed When I use e-Learning System	.81
Learning is enjoyable with Using e-Learning System	.86
PERCEIVED EASE OF USE *Composite Reliability = 0,90 AVE: 0,82*	
It's easy to learn how to use e-Learning System	.92
It's easy for me to become skilful at using e-Learning System	.90
PERCEIVED USEFULNESS *Composite Reliability = 0,91 AVE: 0,72*	
e-Learning System enables me to increase my knowledge	.79
e-Learning System enables me to learn effective	.85
e-Learning System improves my learning performance	.85
I find e-Learning System Useful	.90
MULTIMEDIA CONTENT EFFECTIVENESS *Composite Reliability = 0,85 AVE: 0,66*	
Written course materials (pdf, word documents, flash based courses, etc.) are understandable and well established	.78
Visual course materials (video conferences, live classroom, etc.) are understandable and well organized.	.85
I think the flash animations in course contents are adequate and effective	.81
SATISFACTION *Composite Reliability = 0,89 AVE: 0,74*	
The Service provided by e-Learning System makes me feel very pleased.	.84
Experience with e-Learning System makes me feel very satisfied.	.86
I feel using e-Learning System is a wise decision	.89
USAGE INTENTION *Composite Reliability = 0,94 AVE: 0,89*	
I intend to use e-Learning System in Future	.97
I intend to use e-Learning System in Future More Often	.92

All item loadings (λ) in CFA model were significant at p=,0001 level.

This difference in this exploratory study can be understandable because new variables are added to the model (Premkumar & Bhattacherjee, 2008). Hence, the latter discriminant validity of test was met. The overall results indicated that the discriminant validity of construct was acceptable.

For satisfactory discriminant validity, Fornel and Larcker (1981) recommend a stronger test. The square root of the AVE from the construct should exceed the correlation shared between constructs in the measurement model.

The results showed that each construct had adequate convergent and discriminant validity in the measurement model.

Therefore, the measure for each construct had satisfied construct validity. The structural equitation model was used to test research model including eleven hypotheses. Six common "model fit indices" were used to evaluate the research model as seen in Table: 4.

These model fit indices are *(Chi – Square)/df*, Goodness of fix index (GFI), Adjusted goodness of fit index (AGFI), Comparative fit index (CFI), Normed fit index (NFI), Root mean square error of approximation (RMSEA), respectively.

As seen in Table: 4, our research model met all recommended values of six common model fix indices.

Table: 4
Overall Model Fit Indices for SEM Model

Model Fit Indices	Results	Recommended Value
χ^2 /df	4.285	≤ 5
GFI	0.939	≥ 0.9
AGFI	0.915	≥ 0.9
NFI	0.965	≥ 0.9
CFI	0.973	≥ 0.9
RMSEA	0.059	≤ 0.1

The strong effects on satisfaction are "*perceived usefulness*" (0.61), "*perceived playfulness*" (0.20) and "*multimedia content effectiveness*" (0.16) respectively. The research model explained that the variance in satisfaction *is 0*.82. The other variable in the research model "*perceived usefulness*" was affected relatively by "*perceived playfulness*" (0.43), "*perceived ease of use*" (0,38) and "*multimedia content effectiveness*" (0.20). Research model explained that the variance in "*perceived usefulness*" is 0.72.

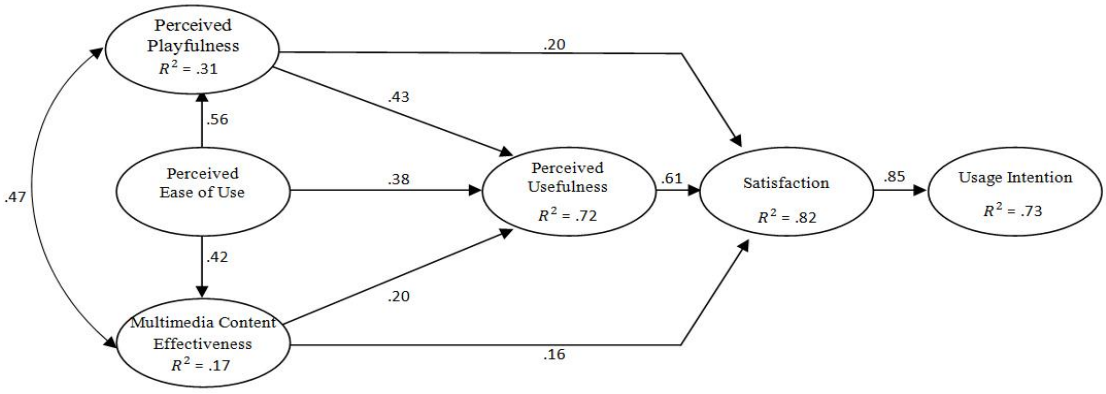

Figure:
3 SEM Model

Standardized solution of SEM model. Note: χ^2 /df=4.285, GFI=0.939, AGFI=0.915 NFI=0.965, CFI=0.973, RMSEA=0.059 All relations except "perceived ease of use" in SEM Model were significant at p=.0001 (Impact of perceived ease of use on satisfaction is not statistically significant)

As explained in the conceptual model framework, the variable "*perceived ease of use*" has a positive effect both on "*perceived playfulness*" (0.56), "*multimedia content effectiveness*" (0.42) and "*perceived usefulness*" (0.38). Nevertheless, the findings showed that "*perceived ease of use*" did not significantly influence "*satisfaction*". Another finding from the research shows that there is a relatively strong correlation (0.47) between "*perceived playfulness*" and "*multimedia content effectiveness*" as proposed in conceptual model framework. Besides, "*satisfaction*" has a strong influence (0.85) on "*usage intention"* variable with 0.73 is explained variance. As is easily seen above, all hypotheses but "perceived ease of use" developed in the study were confirmed in the study.

DISCUSSION AND CONCLUSION

In our study, a new proposed extended TAM approach was tested with SEM. The findings were in tune with those of relevant research findings. More specifically, as much research displayed, perceived ease of use and perceived playfulness had positive effects on

perceived usefulness (Ahn et al., 2007; Roca & Gagne 2008; Yi & Hwang 2003) and perceived ease of use had positive effects on perceived playfulness (Ahn et al., 2007). Furthermore, it was found that perceived playfulness had positive effect on satisfaction (Lin et al. 2005). This finding is particularly important mainly because it is obvious that satisfaction as an output of educational processes should be considered as an emotional affordance. The new version of web technologies calls for entertainment and collaboration of active exciting opportunities for individuals in a variety of ways (Thomas, 2009). In practice, students consider these technologies more specificially e-learning system to increase their knowledge and learning performance and provide effective learning by considering the perception that system is enjoyable, and easy to use. Popular learning tools such as Brainology and Dreambox are examples of effective learning whereby entertainment and learning can be used together. More specifically, using written and visual course materials which are understandable and well-established, as indicated in the scale, constituted an enjoyable part of students' learning processes. Multimedia content effectiveness, which is a new variable to the TAM, has relatively low positive effects on perceived usefulness and satisfaction. Effective visual, written and animated content materials have a positive influence on both satisfaction and perceived usefulness. Indirectly effect of this variable encourages student intent to use e-learning system in future. It is a fact that today's students, also known as "Digital Natives (Prensky, 2001), "Generation N" (Caldwell et al., 2006), "Net Generation" (Toman et al., 2005) "Grasshopper Mind" (Raines, 2005), employ these technologies differently and learn differently from their parents and teachers. Another finding of research is strong positive effect of perceived usefulness on satisfaction (Bhattacherjee, 2001;Lin et al, 2005). This finding indicates that managers of e-learning systems should consider students' perceived learning performance and effectiveness. Moreover, satisfaction has a remarkable effect on usage intention, which is also called "Loyalty" in the marketing science. In light of the findigs of the research, there are certain suggestions as to how these variables impact intention to use. First, a successful e-learning environment should be formed. Second, this environment should be designed in line with individuals' needs and interests. Third, efficiency of an e-learning environment should be evaluated.

RESEARCH LIMITATIONS AND FUTURE STUDIES

Limitations of this research are given below.

- **This study was conducted with students who were active participants of an open source portal, AkademikLMS.**
- **Because of the research conducted only in One University, convenience sampling was selected. Thus, it is not possible to generalize the research findings.**
- **Expectations of the e-learning students were ignored due to time limitations.**
- **Considering these limitations, there are several suggestions for future research.**
  - **Future work could be expanded with different learning platforms (Moodle, Blackboard, JoomlaLMS, etc.) and cross-cultural studies.**
  - **Probabilistic sampling can be used for generalizing the research findings.**
  - **To compare the expectations and satisfaction of e-learning students, two-staged questionnaire process can be used.**
  - **Since there is no adequate studies about perceived playfulness and visual, written and animated e-learning content variable, which we call as "multimedia content effectiveness", the future work could be conducted with these variables and more in order to get better results on the understanding of satisfaction and usage intention.**

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