ADOPTION AND USE
OF LEARNING MANAGEMENT SYSTEMS IN EDUCATION:
THE ROLE OF PLAYFULNESS AND SELF-MANAGEMENT

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THE ROLE OF PLAYFULNESS AND SELF-MANAGEMENT

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DECLARATION OF ORIGINALITY

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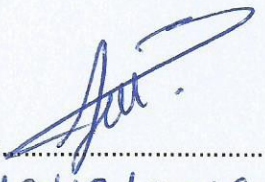

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ABSTRACT

Adoption and Use of Learning Management Systems in Education:

The Role of Playfulness and Self-Management

This dissertation investigates the factors affecting primary and secondary education teachers' behavioral intention to adopt Learning Management Systems (LMSs). In addition, a study that aims to establish the relationship between variables to determine the faculty members' current use and attitude towards Learning Management Systems in Turkish universities is included. Information technology (IT) innovations have the power to change the way we work, we educate, we learn and basically the way we live. Effect of IT innovations on education makes it critical to understand the current usage situation of LMSs and the factors affecting their adoption by teachers. Instructors' evaluation of different daily tasks that can be done via LMSs were used as external factors to see their effect on faculty members' perception and usage intention of LMSs. Unified theory of acceptance and use of technology (UTAUT) was extended with factors from education and game based learning literature. In order to see the effect of individual and organizational level characteristics, multi-group structural equation modelling (SEM) analysis were conducted and discrepancies in relationships were reported. Evaluation of users and non-users and teachers of different fields were also compared to each other. Findings of this study not only contribute to theory through the development and testing of a thorough model relating technology features and individual characteristics to behavioral intention to use but also strong implications for practitioners who would like to increase LMS usage and create a more effective learning environment.

ÖZET

Eğitimde Öğrenme Yönetim Sistemlerin Kabulü ve Kullanımı: Eğlencenin ve Öz Yönetimin Rolü

Bu tez ilköğretim ve orta öğretim öğretmenlerinin Öğrenme Yönetim Sistemleri'nin (ÖYS) kabulüne etki eden faktörleri araştırmaktadır. Ek olarak tezdeki diğer bir çalışma değişkenler arasında ilişkiler kurarak, Türk üniversitelerindeki öğretim görevlilerinin öğrenme yönetim sistemlerin kullanma durumunu ve bu sistemlere yönelik tutumlarını anlamayı amaçlamaktadır. Bilişim teknolojileri çalışma, öğretme, öğrenme ve temelde tüm yaşama biçimlerimizi değiştirme gücüne sahip. Bilişim teknolojilerinin eğitime etkisi, öğrenme yönetim sistemlerinin kullanım durumunu ve bu sistemlerin öğretmenler tarafından kabulüne etki eden faktörlerin araştırılmasını gerektiriyor. Bu araştırma fakültelerdeki öğretim görevlilerinin öğrenme yönetim sistemlerini kullanarak tamamladıkları görevleri dış faktör olarak tanımlayarak, bu faktörlerin öğretim görevlilerinin ÖYS'yi algılama biçimlerine ve kullanma niyetine etkisini araştırmıştır. Bunun yanında birleşik teknoloji kullanımı ve kabulü modeli (UTAUT), eğitim ve oyunlaştırarak öğrenme literatüründen alınan faktörler ile genişletildi. Bireysel ve örgütsel özelliklerin modeldeki ilişkiler üzerine etkisine çoklu grup yapısal eşitlik modeli analizleri ile bakılmış ve farklılıklar raporlanmıştır. Daha önce ÖYS kullanmış ve hiç kullanmamış öğretmenler ve farklı dal öğretmenlerinin faktörleri değerlendirmelerindeki değişkenlikler analiz edilmiştir. Bu tezdeki bulgular geliştirilen ve test edilen teorik model ile yalnızca teknolojinin kabulü teorisine katkıda bulunmayıp, aynı zamanda ÖYS kullanımını artırmak isteyecek eğitimciler ve teknoloji geliştiricileri için de güçlü çıkarımlar içermektedir.

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DEDICATION

This dissertation is dedicated to my beautiful family.

Thank you for your support and unconditional love….

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION……1

CHAPTER 2: RESEARCH OBJECTIVES AND OUTLINE…….5

CHAPTER 3: THEORETICAL BACKGROUND ON CURRENT USE AND ATTITUDE TOWARDS LEARNING MANAGEMENT SYSTEMS IN TURKISH UNIVERSITIES……...8

CHAPTER 4: CURRENT USE AND ATTITUDE TOWARDS LEARNING MANAGEMENT SYSTEMS (LMS) IN TURKISH UNIVERSITIES: METHODOLOGY……13

4.1 Questionnaire……...13

4.2 Data collection method and sample…….14

4.3 Data analysis……14

4.4 Reliability analysis……...16

CHAPTER 5: CURRENT USE AND ATTITUDE TOWARDS LEARNING MANAGEMENT SYSTEMS (LMS) IN TURKISH UNIVERSITIES: DISCUSSION OF RESULTS……18

5.1 LMS features……...18

5.2 Assignment and assessment tasks……...18

5.3 Communication and collaboration tasks……..19

5.4 Group differences……22

5.5 Relations among TAM items……...25

CHAPTER 6: THEORETICAL BACKGROUND ON FACTORS AFFECTING LMS ADOPTION AND USE IN EDUCATION.....…26

6.1 Technology adoption…….....……...26

6.2 Unified theory of acceptance and use of technology……...29

6.3 Perceived playfulness……..30

6.4 Self-management of learning……..……32

6.5 Perceived learning opportunities……..34

6.6 E-learning self efficacy……34

6.7 Control variables……..36

CHAPTER 7: DEVELOPMENT OF THE RESEARCH MODEL AND HYPOTHESES……...37

CHAPTER 8: TESTING AND VALIDATING THE RESEARCH MODEL……...39

8.1 Measurement instrument…….....…….39

8.2 Translation and cross-cultural adaptation of questionnaire…….40

8.3 Data collection method and sample…….41

8.4 Selection of data analysis method: structural equation modeling……44

8.5 Data elimination……...44

8.6 Data analysis and results …….45

CHAPTER 9: FACTORS AFFECTING LMS ADOPTION IN EDUCATION: DISCUSSION OF THE RESULTS……93

CHAPTER 10: IMPLICATIONS AND CONCLUSIONS……99

10.1 Summary and conclusions…….99

10.2 Contribution to theory and implications for researchers……..103

10.3 Implications for practitioners……...105

10.4 Limitations and suggestions for future research……..106

APPENDIX A: SURVEY USED FOR CURRENT USE AND ATTITUDE TOWARDS LMS IN THE TURKISH UNIVERSITIES STUDY……..……108

APPENDIX B: DETAILS OF MULTIPLE REGRESSION ANALYSIS……...114

APPENDIX C: SURVEY ITEMS FOR THE LMS ADOPTION STUDY……...117

APPENDIX D: DETAILS OF SURVEY USED IN THE LMS ADOPTION STUDY……120

APPENDIX E: SCALE RELIABILITIES IN THE LMS ADOPTION STUDY…129

APPENDIX F: ANOVA ANALYSES FOR MULTI GROUPS DETAILS……133

REFERENCES……147

LIST OF TABLES

Table 1. Demographic Information of the Participated Faculty Members.....15

Table 2. Current LMS Use of University Instructors: Scale Statistics……..16

Table 3. Current LMS Use of University Instructors: Scale Reliability Statistics....17

Table 4. Order of Importance in LMS Features…….…….....18

Table 5. Results of Regression Analysis Assignment and Assessment Tasks & TAM Constructs……....20

Table 6. Results of Regression Analysis between Communication Tasks and TAM Constructs……...21

Table 7. Multiple Regression Analysis for Different Gender Groups in Faculty Members…….23

Table 8. Demographic Characteristics of the Primary and Secondary School Participated Teachers……..43

Table 9. Factors Affecting LMS Adoption: Internal Consistency of Scale Statistics….....45

Table 10. Factors Affecting LMS Adoption: Split Half Statistics……..…….....….46

Table 11. Factors Affecting LMS Adoption: Scale Reliability Statistics…….…….46

Table 12. Factors Affecting LMS Adoption: Reliability Statistics of Items…….47

Table 13. Variation Inflation Factor Condition Index……...48

Table 14. Pattern Matrix……51

Table 15. Factor Loadings…….....53

Table 16. Skewness and Kurtosis Test……..53

Table 17. Scale Reliability and Validity Measures in Study 1……..54

Table 18. Structural Model Estimates Study 1……..56

Table19. KMO and Bartlett's Test of Effort Expectancy Construct…….....59

Table 20. Component Matrix of Effort Expectancy Construct……..59

Table 21. Measurement of Model Fit Indices of Effort Expectancy Construct…….59

Table 22. KMO and Bartlett's Test of Social Influence Construct…….……...60

Table 23. Component Matrix of Social Influence Construct…….60

Table 24. Measurement of Model Fit Indices of Social Influence Construct……61

Table 25. KMO and Bartlett's Test of Perceived Playfulness (Teacher's Perspective)…… 61

Table 26. Component Matrix of Perceived Playfulness (Teacher's Perspective)….62

Table 27. Measurement of Model Fit Indices of Perceived Playfulness (Teacher's Perspective)……... …….62

Table 28. KMO and Bartlett's Test of Perceived Playfulness (Student's Perspective)…….62

Table 29. Component Matrix of Perceived Playfulness (Student's Perspective)…..63

Table 30. Measurement of Model Fit Indices of Perceived Playfulness (Student's Perspective)…….....63

Table 31. KMO and Bartlett's Test of Perceived Learning Opportunities……64

Table 32. Component Matrix of Perceived Learning Opportunities…….64

Table 33. Measurement of Model Fit Indices of Perceived Learning Opportunities.....65

Table 34. KMO and Bartlett's Test of Performance Expectancy……..65

Table 35. Component Matrix of Performance Expectancy……...65

Table 36. Measurement of Model Fit Indices of Performance Expectancy……..66

Table 37. KMO and Bartlett's Test of Self-Management of Learning……..66

Table 38. Component Matrix of Self-Management of Learning……...66

Table 39. Measurement of Model Fit Indices of Self-Management of Learning…..67

Table 40. KMO and Bartlett's Test of E-Learning Self Efficacy……..67

Table 41. Component Matrix of E-Learning Self Efficacy……...67

Table 42. Measurement of Model Fit Indices of E-Learning Self Efficacy……..68

Table 43. KMO and Bartlett's Test of Intention to Use……68

Table 44. Component Matrix of Intention to Use……..68

Table 45. Measurement of Model Fit Indices of Intention to Use…….....69

Table 46. Measurement of Model Fit Indices – Preliminary Research Model……..69

Table 47. Kolmogorov-Smirnov normality test……71

Table 48. Factors Affecting LMS Adoption: Final Structural Model Estimates…...73

Table 49. Factors Affecting LMS Adoption: Reliability Analysis of All Constructs……75

Table 50. Factors Affecting LMS Adoption: Regression Analysis Results for Gender……77

Table 51. Factors Affecting LMS Adoption: Regression Analysis Results for Voluntariness of Use…….……..78

Table 52. Factors Affecting LMS Adoption: Regression Analysis Results for Use……..80

Table 53. Factors Affecting LMS Adoption: Regression Analysis Results for Experience……...81

Table 54. Factors Affecting LMS Adoption: Regression Analysis Results for Age.....83

Table 55. Sample Sizes of Course Type Groups……...84

Table 56. Factors Affecting LMS Adoption: Regression Analysis Results for Course Type……86

Table 57. Independent Samples t Test Results of the difference between Female and Male Teachers in Study 2……88

Table 58. Independent Samples t Test Results of the difference between Groups based on their Voluntariness of Use in Study 2……..89

Table 59. Independent Samples t Test Results of the difference between LMS Users and Non LMS Users in Study 2……..90

Table 60. ANOVA Results for Course Type Comparisons in Perceived Playfulness (Teacher's Perspective) Construct……..92

LIST OF APPENDIX TABLES

Table B1. Multiple Regression Analysis for Age……114

Table B2. Multiple Regression Analyses for Computer Skills……115

Table B3. Multiple Regression Analyses for Academic Rank……116

Table C1. Survey Items and Sources……...117

Table E1. Communalities, Extraction Method: Principal Component Analysis….129

Table E2. Total Variance Explained……130

Table E3. Constructs' Means……...132

Table F1. ANOVA Results for Experience Groups…….……133

Table F2. ANOVA Results of Age Groups…….138

Table F3. ANOVA Results for Course Type Groups……..142

ABBREVIATIONS

ACT……..Assignment and Assessment Tasks

AGFI.....Adjusted Goodness-of-Fit Index AGFI,

AMOS….....Analysis of Moment Structures

ANOVA……...Analysis of Variance

ASV……..Average Shared Variance

AVE……..Average Variance Extracted

CFA……..Confirmatory Factor Analysis

CFI……Comparative Fit Index

CMIN/df……The ratio of Chi Square to Degrees of Freedom

COM……..Communication and Collaboration Tasks

CR……..Composite Reliability

EE……...Effort Expectancy

EFA……Exploratory Factor Analysis

GFI…….....Goodness-of-Fit Index

FL……...Foreign Languages Teachers

ICT……Information Communication Technologies

IS……Information Systems

IT……....Information Technology

LMS……...Learning Management System

MSV……..Maximum Shared Variance

M,PE & Others……..Music, Physical Education, Arts and Others Teachers

NFI……Normalized Fit Index

PE……..Performance Expectancy

PEOU……Perceived Ease of Use

Ph.D……Doctor of Philosophy

PPS…….Perceived Playfulness (Student's Perspective)

PPT…….Perceived Playfulness (Teacher's Perspective)

PU……...Perceived Usefulness

PT……Primary School Class Teachers

RMSEA……..Root Mean Square Error of Approximation

SE……Self Efficacy

SEM……Structural Equation Modelling

SI…… Social Influence

SPSS……...Statistical Package for the Social Sciences Software

SS……. Social Science, Turkish Literature, Counselling, Religion & Ethics Teachers

S&M……..Science and Mathematics Teachers

TAM……....Technology Acceptance Model

TLI……..Tucker Lewis Index

TPB……Theory of Planned Behavior

TRA…….Theory of Reasoned Action

UTAUT……Unifies Theory of Acceptance and Use of Technology

CHAPTER 1

INTRODUCTION

A learning management system (LMS) is a software application that helps in administering, documenting, tracking, reporting and delivering educational courses or training programs. LMSs started to be widely used in universities around Turkey. LMSs revolutionize the way instructors educate. LMSs not only form the basis of distance education, but they are also used very frequently to support traditional face-to-face teaching at universities in a so-called blended learning setting (Torrisi-Steele & Drew, 2013). Online course offerings continue to increase. Teaching, designing and developing online courses requires extensive faculty development (Gautreau, 2011). Many faculty members are not motivated to teach using an LMS for a variety of reasons (Gautreau, 2011).

Change in instructors' work routine is inevitable with the integration of LMS. LMSs can have important effect on instructors' performance, on productivity and on communication methods. A challenge for instructors is providing differentiated instruction. An LMS permits faculty to incorporate multimedia elements including audio recordings, music, video, text, interactivity, and sequencing (Klemm, 1998; Smith, 1996). While some instructors easily adapt to new systems some others resist to use newly implemented systems. Even in online universities, which are not strongly rooted in a tradition of face-to-face teaching, innovative methods often fail to be adopted because of a complex tangle of reasons: the university staff must be trained not only in the use of technology, but also in the new collaborative online methods, and the organization of the university must be fit for the purpose. Even the students' expectations and learning habits might turn out to be part of the problem

(Persico, Manca, & Pozzi, 2012a, 2012b; Piskurich, 2004). Further research should be conducted to understand use and attitudes of university instructors towards this new revolutionizing technology, by establishing the relationship between variables to determine the faculty members' current use and attitude towards LMS in Turkish universities.

In addition to universities in Turkey, LMS is widely used in primary and secondary education. Classroom environment has changed radically in last decade. To achieve effective learning environment in the classroom, teachers started to implement digital tools. Since each and every student needs unique personalized education, varied assessment tools, different success criteria, continuous learning in and out of the classroom are in teachers' agenda. Learning technologies help teachers and students to achieve these new goals. Classroom is no more the only place where learning happens. As it is observed lately, online teaching and learning has become a phenomenon and many believe that e-learning can be the next revolutionary change in education. (Psycharis et al., 2011). E-learning is a way of learning supported by information communication technologies (ICT) that makes it possible to deliver education and training to anyone, anytime and anywhere.

With the advancement of technology in general, LMS applications are increasingly becoming the preferred method for learning among students, teachers and others. LMS applications enable students and teachers to benefit from today's technology in their learning and teaching process. Defining the factors affecting adoption of LMS applications are important for future LMS design and educational strategy development and management.

In Turkey primary education covers the education and teaching directed to children aged of 6 to 14 years old. Primary education institutions are schools that

provide eight years of uninterrupted education the first four years of the primary school is referred to as primary school, first level and the second four years of primary education are referred to as middle school, second level. Turkish, mathematics, science, social studies and foreign language are covered during second level of primary schools. High school education is also four years long and covers the education and teaching directed to children aged 15 to19 years old in Turkey. There are different types of high schools such as Anatolian (regular) high schools, science and technology focused high schools, vocational highs schools, military high schools etc. Teachers use LMS applications in teaching during classes such as conducting quizzes, watching videos and more and to give assignments to students. In addition, LMSs are used to communicate with parents and kids, to store and organize course material and to keep track of students' exam and project scores. Content for both regular courses and exam preparation are used in LMSs by teachers and students. However, how effectively or frequently current LMS applications in the market are used in schools and what are the teachers' perceptions on LMS usage need a detailed analysis.

As explained above e-learning and hence LMSs have become widely acknowledged and used in primary and secondary (high school) education institutes in Turkey. However, as far as the understanding of LMS adoption in primary and secondary education is concerned it appears that there are few research efforts focused on the antecedents for explaining users' adoption of the LMS, which is an important topic in today's education system.

Since LMSs became promising technological tools in today's education, antecedents of the adoption and use of these educational technologies should be explored from consumer behavior perspective. Understanding the factors affecting

users' perceptions that affect their intentions in using these technologies, will help developers in designing features and education managers to better plan their organization that will increase usage. Findings will also help both technology developers and the education institution managers in building strategies to increase adoption of LMSs among educators to increase efficiency in their organizations. Most importantly these findings will lead educators to have an effective control over administrative, and communicative tasks and course content management. As a result, findings will help students to have a better and fun learning environment.

CHAPTER 2

RESEARCH OBJECTIVES AND OUTLINE

In this research we aim to understand use and attitudes of instructors towards a new and revolutionizing technology called LMS in universities by establishing the relationship between variables to determine the faculty members' current use and attitude towards LMSs in Turkish universities. The variables include the perceived ease of use, perceived usefulness, items related to assignment and assessment task of LMSs and communication and collaboration tasks of LMSs.

In addition, this thesis's major aim is to explore the factors affecting primary and secondary school teachers' adoption and use of LMS.

This research aims to answer the following research questions:

- How does university instructors' evaluation of tasks that can be done through learning management systems (LMSs) affect their perceptions about these technologies and also their intention to use?
- Do LMS features related to assignment and assessment tasks affect university instructors' perception of usefulness, perception of ease of use and their intention to use LMS?
- Do LMS features related to communication and collaboration tasks affect instructors' perception of usefulness, perception of ease of use and their intention to use LMS?
- Does effort expectancy of using LMS have a positive effect on intention to use LMS?
- Does social influence of using LMS have a positive effect on intention to use LMS?

- Does perceived playfulness (teacher's perspective) of an LMS have a positive effect on intention to use LMS?
- Does perceived playfulness (student's perspective) have a positive effect on intention to use LMS?
- Does perceived learning opportunities of an LMS have a positive effect on intention to use LMS?
- Does performance expectancy of an LMS have a positive effect on intention to use LMS?
- Does e-learning self efficacy of a teacher have a positive effect on intention to use LMS?
- Does e-learning self efficacy of a teacher have a positive effect on effort expectancy of an LMS?
- Does e-learning self efficacy of a teacher have a positive effect on performance expectancy of an LMS?
- Does self-management of learning of a student have a positive effect on intention to use LMS?
- Do the relationships in the research model vary in terms of the age, gender, experience, course type of the teacher and voluntariness of use of LMS in organization?

relationships were analyzed by the standardized estimates of direct effects. The significance of direct effects were analyzed. Effect of control variables on relationships were analyzed via multi-group SEM.

The results of current use and attitude of university instructors towards LMSs are discussed in Chapter 5. The results of factors affecting LMS adoption and use in primary and secondary education are discussed in Chapter 8. Conclusions are

discussed in Chapter 10 where the theoretical contribution and implications of the dissertation are discussed as well as implications for practitioners. Limitations of studies and the suggestions for future research are also included in Chapter 10.

CHAPTER 3

THEORETICAL BACKGROUND ON CURRENT USE AND ATTITUDE TOWARDS LEARNING MANAGEMENT SYSTEMS IN TURKISH UNIVERSITIES[1]

LMS is a relatively new technology that has been integrated as a working instrument in universities. With the intention of reaching a level of proficiency, adequate training needs to be provided for educators (Covington, Petherbridge, & Warrant, 2005). LMS consists of a variety of newly developed tools and/or technologies, among which instructors choose to increase the efficiency in their work. All these tools have differing level of ease of use and usability. The process of accepting these new technologies is the subject of technology acceptance studies.

Many theoretical models have been used to explain users' acceptance/adoption of the information system (IS)/information technology (IT). Among these theoretical models, the technology acceptance model (TAM), proposed by Davis (1989) and Davis et al. (1989), is one of the most widely accepted and applied models in a variety of domains that include related IS and IT acceptance/adoption studies (Chau, 1996; Venkatesh, 2006).

Two prominent theories drawn from theory of reasoned action (TRA) of Fishbein and Ajzen (1975) were used to explain faculty members' adoption, attitude and use of LMS in the institutions. Fishbein and Ajzen (1975) indicated in theory of

[1] From the chapter 'Current Use and Attitude Towards Learning Management Systems (LMS) in Turkish Universities': Akkucuk, U., & Balkaya, S. (2019). Current Use and Attitude Towards Learning Management Systems (LMS) in Turkish Universities. In *Ethical and Sustainable Supply Chain Management in a Global Context* (pp. 278-288). IGI Global. Reprinted with permission.

reasoned action (TRA) that behavioral intentions are the immediate antecedents to behavior (Alghamdi & Bayaga, 2016).

TRA explains the decision process of a human being to perform a new behavior, based on attitudes - subjective norms and behavioral intention. Individual behavior is driven by behavioral intentions where behavioral intentions are a function of an individual's attitude toward the behavior and subjective norms surrounding the performance of the behavior (Fishbein & Ajzen, 1975). Attitude is positive or negative feelings about performing the behavior.

In agreement with TRA, theory of planned behavior (TPB) proposed by Ajzen (1985; 2005) further explains how human action is guided and added a third variable to cater for deliberate behaviors. It postulates that an individual's intention to perform a behavior depends on the attitude towards performing the behavior (behavioral), the subjective norm (normative), and the perceived control of that behavior. (Alghamdi & Bayaga, 2016). In the light of previous technology adoption research and behavioral models TAM helps us to test how attitudes of instructors effect their intention to use LMSs. LMSs have many tools that changes instructors way of doing different tasks in faculties such as communicating with students and other faculty members, collecting assignments, assessing students. Instructors approach to task related LMS features are expected to affect their attitude towards use as well.

Technology acceptance model provides a theoretical framework to explain user acceptance of information technology products/systems. Technology acceptance model (Davis, 1989) suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it. Technology acceptance model (TAM) (Davis, 1989) consists of perceived usefulness

(PU), perceived ease of use (PEOU), attitude toward using, behavioral intention to use, and actual system use.

TAM as well as TRA of Fishbein and Ajzen (1975) noted that external variables influence intentions to the extent that they affect either attitudes or subjective norms. Although the original TAM model was not specifically developed for the evaluation of e-learning systems, its two core indicators are often used to assess the impact of technology in educational contexts (Persico et al., 2014).

Proper LMS usage is based on intentions of the faculty members which are linked to their expectations informed by external variables. External variables such as the institution stands on (provision and promotion to use approved type of), age, personal experiences, resources organization, exams running, social media, etc. are influenced by how faculty members perceive the systems to work for their advantage by yielding better results without struggling in its usage and implementation processes (Alghamdi & Bayaga, 2016).

Features of LMS that change instructors' daily work routine while doing different tasks can be listed as external factors that affect their intention to use. These features or external factors provided by LMSs require instructors to change their habits of doing specific tasks, so are effective on instructors' thoughts about usefulness or ease of use of the technology, i.e. LMS. As Picciano states in their study (2001) "meticulous considerations should be given to the interactions among students and instructors during the design and development phase of the content of the e-learning system". For instance announcement of a change in the due date of an assignment through LMS or collecting assignment on an LMS platform means different things to different instructors.

Many prior studies also found that, not all the functions of LMSs were equally used by the users, some functions are used more frequently than the other functions (Jaschik & Lederman, 2014, Weaver, Spratt & Nair 2008, Panda & Mishra, 2007, Akpinar, Bal & Simsek, 2004; Woods, Baker & Hopper, 2004). Fathema and Sutton (2013) found document uploading; grade posting and assignments were the most frequently used features of Blackboard learning management systems by faculty members. Blackboard is a very popular LMS that provides educators to reach and teach their students via virtual environment. LMSs are designed to provide these functions for instructors to finish their tasks in a more convenient way. Among many other functions instructors choose to use some of them more frequently, even some functions stay idle in the design. Importance of the task in the eye of instructor change his/her decision to choose among the functions to use.

Goodhue and Thompson (1995) proposed that an explanation of information systems success needs to recognize both the task for which the technology is used and the fit between the task and the technology. They define task–technology fit as 'the degree to which a technology assists an individual in performing his or her portfolio of tasks (McGill & Klobas, 2009). In McGill & Klobas's study (2009) task–technology fit was found to play an important role in the utilization and success of LMSs. In their study (2009) task-technology fit consists of task characteristics, technology characteristics, and individual characteristics. In this study (2009) different tasks' characteristics were listed to be evaluated by instructors and to see how these characteristics affect TAM items.

Instructor's evaluation of these daily tasks is expected to affect how they perceive LMSs rather than expecting them to base their perceptions only on their

evaluation of factors rounding technical features of LMSs like self efficacy or poor internet or instructional design.

CHAPTER 4

CURRENT USE AND ATTITUDE TOWARDS LEARNING MANAGEMENT SYSTEMS IN TURKISH UNIVERSITIES: METHODOLOGY

This chapter contains details of methodology used in analyses that examine how instructors' evaluation of tasks that can be done through LMSs affect their perceptions about these technologies and also their intention to use.

4.1 Questionnaire

A questionnaire that includes some of the items from the questionnaire of Alghamdi and Bayaga's study (2016) and items of TAM was prepared. TAM items from Davis' study (1989), Mathieson's study (1991) and Bhattacherjee (2001) were employed in the questionnaire.

The questionnaire consisted of four sections. The first section collected information about the faculty members' demographic information, qualifications and computer skills. The second section elicited information on their personal experiences of using LMS and the type of LMS they use in their institutions, and to pick a statement on how it is used in various teaching activities. The third section, solicited information on the preferred use and attitude towards LMS. The fourth section collected information about instructors' thoughts on ease of use and usefulness of LMSs next to their intention to use LMS currently and in the future. In one subsection, respondents were asked to label various statements regarding LMS use and attitudes from 1 to 4 to indicate their order of importance. Other subsections required respondents to choose options related to LMS preferred usages such as for

assignments, projects, online tests, examinations, communication, feedback and many more (Alghamdi & Bayaga, 2016). In the last section respondents were asked to state their agreement level in 7 point likert scale ranging from completely disagree:1 to completely agree:7 for the statements from technology acceptance model. Use and attitude towards the LMS were captured using the items relationships from the sections.

4.2 Data collection method and sample

An online self-completed survey involving questions in four sections was administered via Google forms. Introductory letter including the Google form link of the questionnaire was sent to over 25.000 instructors in over 50 Turkish universities around Turkey via e-mail. A total of 115 answers were collected. Demographic information of the sample is shown in Table 1. 77% of the sample has degree of Ph.D. or over and majority of them are assistant professor or associate professor. 63% of respondents name their skills in computer use as advanced. Less than 2% respondents are beginner in computer use or non-user. Over 75% of the sample stated that they use LMS in their teaching activities. Even if we did not follow convenient sampling method, distribution of the sample is suitable for the purpose of this study.

4.3 Data analysis

Multiple regression analysis were conducted to examine the relationship between attitude dimensions of instructors with their intention to use and perceived usefulness and perceived ease of use of LMS.

Table 1. Demographic Information of the Participated Faculty Members

Variables	Number (N)	Percent (%)
Age		
20-30	12	10.43
31-40	56	48.70
41-50	34	29.57
51-60	12	10.43
over 60	1	0.87
Gender		
Female	52	45.22
Male	63	54.78
Education		
Bachelor	4	3.48
Master	22	19.13
Ph.D. or over	89	77.39
University Employment Status		
full time	106	92.17
part time	9	7.83
Academic Rank		
Assistant Professor	43	37.39
Instructor	8	6.96
Research/Teaching Assistant	23	20.00
Associate Professor	33	28.70
Professor	8	6.96
Skills as a Computer User		
Advanced	73	63.48
Intermediate	40	34.78
Beginner	1	0.87
Non-user	1	0.87
Total	115	100.00

Independent variables that are processed in our analyses are items that are related to instructors' attitude towards assignment and assessment related tasks (ACT) and communication and collaboration tasks (COM). These items' effect on TAM constructs (PEOU, PU and IU) were tested.

4.4 Reliability analysis

Internal consistency of the scale was tested by using split half method. For split half method items were divided into two groups. First part involved 13, second part involved 12 items. Both parts were found to be highly correlated in their contribution to what the scale measures. Results are presented in Table 2.

Table 2. Current LMS Use of University Instructors: Scale Statistics

Cronbach's Alpha	Part 1	Value	0.785
		N of Items	13[a]
	Part 2	Value	0.967
		N of Items	12[b]
	Total N of Items		25
Correlation Between Forms			0.541
Spearman-Brown Coefficient	Equal Length		0.702
	Unequal Length		0.702
Guttman Split-Half Coefficient			0.58

a. The items are: ACT1, ACT2, ACT3, ACT4, ACT5, ACT6, COM1, COM2, COM3, COM4, COM5, EOU1, EOU2.

b. The items are: EOU2, EOU3, EOU4, EOU5, EOU6, PU1, PU2, PU3, PU4, PU5, PU6, IU1, IU2.

Cronbach's alpha statistics of the scale were calculated, to check scale reliability. Following Nunnally and Bernstein's study (1994), the cut-off level for item elimination was determined as 0.70. Cronbach's alpha value for the scale was 0.937, reliability is optimal. Results are listed in Table 3.

Table 3. Current LMS Use of University Instructors: Scale Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.937	0.925	25

CHAPTER 5

CURRENT USE AND ATTITUDE TOWARDS LEARNING MANAGEMENT SYSTEMS (LMS) IN TURKISH UNIVERSITIES: DISCUSSION OF RESULTS

5.1 LMS features

LMSs include various aspects that helps instructors in their work. Main features that an LMS provides can be listed as course administration (managing class information, tracking students etc.), teaching delivery (providing materials and resources to students), student assessment, class communication. These features have direct impact on instructors' work. When we asked instructors to put these features in order of importance they listed the teaching delivery on top of the list and student testing at the bottom. The order and means are listed in Table 4.

Table 4. Order of Importance in LMS Features

LMS Feature	Mean	Mode
Course Administration	2.37	1
Teaching Delivery	2.15	2
Student Testing	2.98	4
Class Communication	2.49	2

5.2 Assignment and assessment tasks

Instructors were asked to rate items related to assignment and assessment activities from not important at all to very important. Six tasks that are related to assignment and assessments were asked to be evaluated by instructors. Instructors' thoughts and attitude about importance of different tasks that can be conducted through LMSs, affect their thoughts on intention to use and their perception of ease of use and

usefulness of LMSs. We have tested the relationship between items of assignment and assessment tasks and items of TAM.

We conducted multiple regression analysis and added stepwise regression to see which items in assessment and assignment tasks enter as predictor of TAM constructs (IU, PEOU, PU). All items were tested to see how they are related to all TAM constructs. As a result of multiple regression analysis first item of assignment and assessment tasks which is 'distributing specifications for take home activities such as assignments and projects' was found to have significant effect on instructors' perception of usefulness of LMSs and perception of ease of use of LMSs. In other words instructors that finds distributing specifications for assignments important rates perceived ease of use of LMSs and perceived usefulness of LMSs higher in agreement scale from 1 to 7. Other five items (tasks) were found to have no significant effect on perceived usefulness and perceived ease of use of LMSs. Also, none of the items were found to have significant effect on intention to use LMSs. The results of multiple regression analysis can be found in Table 5.

5.3 Communication and collaboration tasks

Instructors were then asked to rate items related to communication and collaboration activities from not important at all to very important. Multiple regression analyses and stepwise regression were conducted to see the prediction strength of all items under communication and collaborations task on TAM constructs (PU, PEOU, and IU). No significant relations were found between other items and TAM constructs. Results of the multiple regression analysis are presented in Table 6.

Table 5. Results of Regression Analysis Assignment and Assessment Tasks & TAM Constructs

		Unstandardized Coefficient		Standardized Coefficient	t	Sig.
Dependent Variable	Predictor Variables	B	Std. Error	Beta	B	Std. Error
Perceived Usefulness (PU)	Constant	1.93	1.071		1.801	0.075
	Distributing specifications for take home activities such as assignments and projects.	0.457	0.228	0.231	2.004	0.048
	Allowing students to submit assignment and project work.	0.09	0.25	0.042	0.362	0.718
	Providing feedback about student performance in submitted work.	0.107	0.195	0.063	0.55	0.584
	Preparing and running online tests and quizzes.	0.265	0.212	0.195	1.25	0.214
	Preparing and conducting on-line exams.	-0.1	0.209	-0.073	-0.479	0.633
	Allowing students to review their marks to verify accuracy before finalizing results.	-0.044	0.179	-0.028	-0.244	0.808
Perceived Ease of Use (PEOU)	Constant	2.396	0.968		2.476	0.015
	Distributing specifications for taken home activities such as assignments and projects.	0.511	0.199	0.296	2.571	0.012
	Allowing students to submit assignment and project work.	-0.029	0.225	-0.015	-0.129	0.898
	Providing feedback about student performance in submitted work.	0.204	0.177	0.133	1.152	0.252
	Preparing and running online tests and quizzes.	-0.152	0.192	-0.125	-0.796	0.428
	Preparing and conducting on-line exams.	0.141	0.191	0.113	0.739	0.461
	Allowing students to review their marks to verify accuracy before finalizing results.	-0.054	0.16	-0.038	-0.335	0.738
Intention to Use (IU)	Constant	3.214	1.113		2.889	0.005
	Distributing specifications for taken home activities such as assignments and projects.	0.234	0.237	0.118	0.989	0.325
	Allowing students to submit assignment and project work.	0.123	0.259	0.057	0.475	0.636
	Providing feedback about student performance in submitted work.	0.098	0.202	0.058	0.486	0.628
	Preparing and running online tests and quizzes.	0.238	0.22	0.175	1.084	0.281
	Preparing and conducting on-line exams.	-0.199	0.218	-0.144	-0.915	0.363
	Allowing students to review their marks to verify accuracy before finalizing results.	-0.007	0.186	-0.005	-0.039	0.969

Table 6. Results of Regression Analysis between Communication Tasks and TAM Constructs

Dependent Variable	Predictor Variables	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
		B	Std. Error	Beta	B	Std. Error
Perceived Usefulness (PU)	Constant	3.604	0.987		3.65	0
	Reminding students when assignments and other assesment tasks are due.	0.147	0.232	0.09	0.633	0.528
	Posting class notices such as hints about how to complete an assesment activity.	0.041	0.269	0.023	0.153	0.879
	Broadcasting important announcements such as updates to assignment specifications or due dates.	0.154	0.251	0.077	0.614	0.541
	Establishing a forum for discussion about questions that arise in class activities.	-0.05	0.199	-0.029	-0.26	0.794
	Integrating social media tools such as Facebook or Twitter into class activities.	0.111	0.149	0.082	0.739	0.461
Perceived Ease of Use (PEOU)	Constant	3.148	0.887		3.55	0.001
	Reminding students when assignments and other assesment tasks are due.	0.056	0.209	0.037	0.268	0.789
	Posting class notices such as hints about how to complete an assesment activity.	0.104	0.24	0.063	0.433	0.666
	Broadcasting important announcements such as updates to assignment specifications or due dates.	0.264	0.227	0.145	1.165	0.246
	Establishing a forum for discussion about questions that arise in class activities.	-0.06	0.171	-0.038	-0.35	0.728
	Integrating social media tools such as Facebook or Twitter into class activities.	0.093	0.135	0.076	0.693	0.49
Intention to Use (IU)	Constant	3.578	0.992		3.607	0
	Reminding students when assignments and other assessment tasks are due.	0.111	0.233	0.068	0.477	0.634
	Posting class notices such as hints about how to complete an assessment activity.	0.012	0.27	0.007	0.044	0.965
	Broadcasting important announcements such as updates to assignment specifications or due dates.	0.246	0.252	0.123	0.975	0.332
	Establishing a forum for discussion about questions that arise in class activities.	0.023	0.2	0.013	0.115	0.909
	Integrating social media tools such as Facebook or Twitter into class activities.	0.032	0.15	0.023	0.211	0.834

5.4 Group differences

Group differences in responses were also investigated. The responses of instructors with different age, gender, academic rank and computer skills were observed to see if there is a significant difference in their evaluation.

Separate multiple regression analyses were conducted for female and male instructors. Significant differences were observed in seven relations. First and fourth items of assignment and assessment tasks and fourth item of communication and collaboration tasks which are:

- ACT1: Distributing specifications for take-home activities such as assignments and projects.
- ACT4: Preparing and running online tests and quizzes.

Preparing and conducting on-line exams.

- COM4: Establishing a forum for discussion about questions

that arise in class activities.

were found to have significant effect on perceived usefulness of LMS for female instructors. There were no significant effect observed for male instructors. First item of assignment and assessment tasks and fourth item of communication and collaboration tasks were also found to have significant effect on perceived ease of use for female respondents, whereas there is no significant relation for male respondents. In addition, second item of assignment and assessment tasks which is:

- ACT2: Allowing students to submit assignment and project work.

was also found to have significant effect on perceived ease of use for female instructors. Lastly fifth item of assignment and assessment tasks were found to have significant effect on intention to use for female instructors. No significant relation was observed for male instructors. The results are shown in Table 7.

Table 7. Multiple Regression Analysis for Different Gender Groups in Faculty Members

Regression Analysis:Gender											
		Female					Male				
Sample Size		52					63				
		Unstandardized Coefficients		Standardized Coefficients			Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.	B	Std. Error	Beta	t	Sig.
Perceived Usefulness (PU)	(Constant)	2.58	1.90		1.35	0.18	4.20	1.47		2.86	0.01
	ACT1	1.25	0.41	0.55	3.03	0.00	0.10	0.28	0.06	0.34	0.74
	ACT2	-0.22	0.36	-0.10	-0.63	0.53	-0.02	0.32	-0.01	-0.08	0.94
	ACT3	-0.11	0.28	-0.07	-0.39	0.70	0.31	0.26	0.19	1.19	0.24
	ACT4	0.72	0.32	0.47	2.24	0.03	-0.28	0.25	-0.25	-1.11	0.27
	ACT5	-0.59	0.31	-0.39	-1.90	0.06	0.46	0.28	0.40	1.67	0.10
	ACT6	-0.01	0.33	-0.01	-0.03	0.97	-0.05	0.21	-0.04	-0.22	0.82
	COM1	0.00	0.37	0.00	0.00	1.00	0.26	0.28	0.20	0.93	0.36
	COM2	0.46	0.44	0.23	1.06	0.30	-0.41	0.29	-0.27	-1.41	0.17
	COM3	-0.40	0.48	-0.18	-0.83	0.41	-0.20	0.27	-0.12	-0.75	0.46
	COM4	-0.71	0.32	-0.32	-2.17	0.04	0.23	0.21	0.18	1.11	0.27
	COM5	0.03	0.22	0.02	0.13	0.90	0.05	0.18	0.05	0.30	0.77
Perceived Ease of Use (PEOU)	(Constant)	5.06	1.83		2.77	0.01	2.71	1.29		2.11	0.04
	ACT1	1.39	0.40	0.66	3.50	0.00	0.18	0.25	0.13	0.75	0.46
	ACT2	-0.74	0.35	-0.34	-2.14	0.04	0.04	0.28	0.03	0.16	0.88
	ACT3	0.38	0.27	0.24	1.39	0.17	0.04	0.23	0.02	0.16	0.87
	ACT4	-0.10	0.31	-0.07	-0.32	0.75	-0.37	0.22	-0.37	-1.69	0.10
	ACT5	-0.25	0.30	-0.18	-0.82	0.42	0.45	0.24	0.43	1.84	0.07
	ACT6	0.02	0.32	0.01	0.07	0.95	-0.14	0.18	-0.12	-0.77	0.44
	COM1	-0.45	0.36	-0.25	-1.26	0.22	0.43	0.24	0.36	1.76	0.08
	COM2	0.73	0.42	0.40	1.72	0.09	-0.33	0.25	-0.23	-1.28	0.21
	COM3	-0.53	0.46	-0.25	-1.14	0.26	0.11	0.24	0.07	0.46	0.64
	COM4	-0.73	0.31	-0.35	-2.34	0.02	0.15	0.18	0.13	0.80	0.43
	COM5	0.05	0.22	0.04	0.25	0.81	0.13	0.16	0.14	0.84	0.40
Intention to Use (IU)	(Constant)	4.57	2.05		2.23	0.03	3.67	1.63		2.25	0.03
	ACT1	0.83	0.44	0.37	1.87	0.07	-0.21	0.31	-0.13	-0.68	0.50
	ACT2	-0.38	0.39	-0.17	-0.99	0.33	0.29	0.35	0.14	0.81	0.42
	ACT3	-0.04	0.31	-0.02	-0.13	0.90	0.25	0.29	0.14	0.88	0.38
	ACT4	0.56	0.35	0.38	1.64	0.11	-0.17	0.28	-0.14	-0.63	0.53
	ACT5	-0.70	0.34	-0.47	-2.08	0.04	0.29	0.31	0.23	0.94	0.35
	ACT6	0.22	0.36	0.12	0.61	0.54	-0.27	0.23	-0.19	-1.17	0.25
	COM1	-0.18	0.40	-0.10	-0.46	0.65	0.35	0.31	0.24	1.15	0.25
	COM2	0.60	0.47	0.31	1.27	0.21	-0.40	0.32	-0.23	-1.23	0.23
	COM3	-0.33	0.52	-0.15	-0.65	0.52	-0.02	0.30	-0.01	-0.07	0.95
	COM4	-0.61	0.35	-0.28	-1.75	0.09	0.40	0.23	0.28	1.71	0.09
	COM5	0.06	0.24	0.04	0.26	0.79	-0.03	0.20	-0.02	-0.14	0.89

Separate multiple regression analyses were run for different age groups. One difference was observed between groups. Third item of communication and collaboration tasks which is:

- COM3: Broadcasting important announcements such as updates to assignment specifications or due dates.

was found to have significant effect on intention to use for instructors who are 41 years old and older. No significant effect was observed for instructors who are 20 to 40 years old. The results of multiple regression analysis for different age groups were listed in Table B1 in Appendix B.

Differences between instructors with different computer skills were also observed. The only significant difference between instructors who indicated that they have advanced computer skills and the ones who indicated that they have intermediate or lower level computer skills, was the effect of second item of assignment and assessment tasks which is 'allowing students to submit assignment and project work' on intention to use. The effect was found to be significant for instructors with advanced computer skills and was found to be insignificant for instructors with intermediate or lower computer skills. The results of multiple regression analyses for group of instructors with different computer skills were listed in Table B2 in Appendix B.

Lastly separate multiple regression analyses were conducted for instructor groups with different academic ranks. Two differences were observed. First item of assignment and assessment tasks which is 'distributing specifications for take-home activities such as assignments and projects', was found to have significant effect on both perceived usefulness and perceived ease of use for instructor group with academic ranks, assistant professor, instructor, lecturer or teaching assistant.

There were no significant effect for instructors group with academic rank professor or associate professor. The results are listed in Table B3 in Appendix B.

5.5 Relations among TAM items

Lastly relations among TAM items were tested by using multiple regression analysis method. Supporting the findings in literature, multiple regression analysis results show that both perceived ease of use and perceived usefulness have significant effect on intention to use in this study. Perceived usefulness is the more powerful indicator of intention to use with standard beta weight of 0.626. Perceived ease of use's standard beta weight is 0.233. This finding is also in agreement with the findings in literature.

In addition, effect of the gender on relationships were analysed. For female instructors, while perceived usefulness' effect on intention to use was found to be significant, perceived ease of use was found not to be a significant indicator of intention to use. For male instructors both constructs' effect on intention to use was significant with standard beta values of 0.586 for PU and 0.269 for PEOU.

CHAPTER 6

THEORETICAL BACKGROUND ON FACTORS AFFECTING LMS ADOPTION AND USE IN EDUCATION

There is an extensive literature investigating the behavioral characteristics of technology adoption and usage. Theories on technology adoption and usage and related research contains many similar hypothesized predictors of intention to use, such as perception on innovations attributes, individual and organizational characteristics and contextual factors. The fundamental ones were included in this chapter.

6.1 Technology adoption

LMS applications are new information technologies (IT) and innovations and the intention to use these technologies would be considered in technology acceptance and technology adoption literature. Previous studies have examined the process and the factors influencing the adoption of IT in organizational level, group level or individual level. Researchers have identified several factors that either help or slow down innovation adoption. The difference between individual level of adoption and organizational adoption is the former measures the user acceptance and the actual use of innovation and the latter is used when an organization makes a research on a new technology that is planned to be acquired (Hameed et al., 2012). As we explore the factors affecting teachers' intentions to use LMS we will focus on individual level of adoption and include only one organizational characteristics as a control variable which is the voluntariness of use of a technology in an organization in this study.

As Gopalakrishnan and Damanpour state in their study (1997) “innovation process is only successful if the innovation is accepted and integrated into the organization and individuals continue to use the innovation over a period of time”. In literature TAM (Technology Acceptance Model), TAM extensions, UTAUT (Unified Theory of Acceptance and Use of Technology), TRA (Theory of Reasoned Action) and TBP (Theory of Planned Behavior) are some models that examine the adoption in individual level.

TAM is a behavioral model developed by Davis (1989), and is built up on TRA. TRA is based on the assumption that individuals are rational decision makers who constantly calculate and evaluate the relevant behavior beliefs in the process of forming their attitude toward the behavior. TRA explains the decision process of a human being to perform a new behavior, based on attitudes, subjective norms and behavioral intention. Individual behavior is driven by behavioral intentions where behavioral intentions are a function of an individual's attitude toward the behavior and subjective norms surrounding the performance of the behavior (Fishbein & Ajzen, 1975). Attitude is positive or negative feelings about performing the behavior. Davis considers all measures of information systems (IS) success used in literature, and asserts that two constructs are the fundamental determinants of system use.

Technology acceptance model provides a theoretical framework to explain user acceptance of information technology products and systems. Technology acceptance model (Davis, 1989) suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it.

TAM (Davis, 1989) consists of perceived usefulness (PU), perceived ease of use (PEOU), attitude toward using, behavioral intention to use, and actual system

use. In TAM (Davis, 1989) PU and PEOU are the two most important determinants of system use. TAM refers to "self efficacy theory," "cost-benefit paradigm," "adoption of innovations" and "channel disposition model" as theoretical foundations. Davis found in his study (1989) that usefulness is more predictive than ease of use and one of the most significant findings is the relative strength of the usefulness and usage relationship compared to the ease of use and usage relationship.

TAM is found to be the most used theory in e-learning acceptance research, and a review of literature shows that TAM related relationships are backed most of the time. Therefore, researchers have accepted TAM as a well-established model for exploring the acceptance of e-learning technologies (Sumak et al., 2011).

Increased interest in end users' reaction to information technology has increased the importance of theories that foresee and explain information technology acceptance and use. TAM is a good one with its power in explaining certain relationships however, model need to be improved and supported with other constructs related to context of studies for a better explanatory power.

On the other hand, in technology acceptance literature the unified theory of acceptance and use of technology (UTAUT) is widely used because of its high explanatory power. UTAUT explains 70% of the variance in technology use, by blending and improving the different models from prior research.

However, in e-learning acceptance and game based learning literature there are few studies that have used UTAUT as a ground theory. Therefore, as Sumak et al. (2011) state "future research need to include studies that will evaluate this state-of-the art theory in the field of e-learning acceptance".

6.2 Unified theory of acceptance and use of technology

The unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh et al. (2003) in user acceptance of information technology. Many studies in literature apply UTAUT to explore and explain factors affecting users' acceptance/adoption of technologies in different contexts.

UTAUT demonstrated 70% of the variance in technology use. Three straight antecedents of behavioral intention to use a technology-i.e., performance expectancy, effort expectancy and social influence-and two straight antecedents of technology use-i.e., behavioral intention and facilitating conditions-and four occasional factors - i.e., gender, age, experience and voluntariness- that may change the influence of the antecedents on intention and /or behavior; were named in UTAUT. In addition, to four contingencies, subject of teaching (course type) was added to the model to see how it would affect the determinants and/or the behavior of teachers.

Performance expectancy is defined as the level to which the user is convinced that the technology will help him or her better achieve important rewards and performance expectancy was found to be a significant antecedent of behavioral intention, with its effect varying across gender and age such that the effect is strongest for younger men (Venkatesh & Zang, 2010).

Effort expectancy is defined as the degree of ease linked with the use of the technology and it was found that the effect of effort expectancy on behavioral intention changes across gender and age such that the effect is strongest for older women when they newly start using the technology (Venkatesh & Zang, 2010).

Social influence is defined as the level to which an individual feels that people who are important to him or her believe he or she should use the new system

and it was found that the effect of social influence on behavioral intention was found to be varied depending on gender, age, experience, and voluntariness, such that it is the strongest for older women who just started using the system and where the use is mandatory (Venkatesh & Zang, 2010).

Facilitating conditions is defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system and it was found that the effect of facilitating conditions on technology use was moderated by age and experience such that the effect was strongest for older workers in later stages of experience (Venkatesh & Zang, 2010). Although this variable showed a significant relationship with intention, it was excluded in this study. Both users and non-users of LMS participated, therefore evaluation of technical support was not included.

UTAUT has been popular in literature with its high explanation power however, many studies found some inconsistencies as well. To increase the proposed theoretical model's explanatory power constructs from literature that has been used to explain intention to use LMSs are added to the constructs taken from UTAUT model in this research.

6.3 Perceived playfulness

Another crucial determinant of technology acceptance and use in learning context is perceived playfulness. Past information technology (IT) research showed that user satisfaction is under strong influence of perceived playfulness of information technology products or services (Hsu & Chiu 2004; Kang & Lee, 2010).

Perceived playfulness can be considered to be a state of mind (Moon & Kim, 2001). Based on Moon and Kim's definition, "perceived playfulness is defined as a state of mind that includes three dimensions: the extent to which the individual (1) Perceives that his or her attention is focused on the interaction with the LMS (i.e, concentration) (2) is curious during the interaction (ie, curiosity); and (3) finds the interaction intrinsically enjoyable or interesting (ie, enjoyment)".

The playfulness concept in use of technology has been explored in previous research (Igbaria et al., 1994; Sun and Zhang, 2006; Van der Heijden, 2004). Information technologies may serve either utilitarian or hedonic purposes (or both); however, perceived playfulness or perceived usefulness' influence depends on the essence of the system (Van der Heijden, 2004). Atkinson and Kydd (1997) found that playfulness is positively linked to the web for both entertainment and coursework purposes. Atkinson and Kydd (1997) and Cheung et al. (2000) have also illustrated the significance of playfulness as the powerful intrinsic motivator underlying hedonic systems.

During interaction and use of LMS there is intensive subjective experience of the individual. Playful state can be seen as an intrinsic motivation. Extrinsic motivation refers to the desire to perform an activity because it is understood as it leads to clear and valuable outcomes (Lu & Wang, 2009). Intrinsic motivation refers to the desire to engage in an activity for no other reason than the process of performing it (Deci & Ryan, 1985; Teo, Lim, & Lai, 1999). Researchers in information systems underlined the role of extrinsic motivation in explaining user behavior in the past. In recent years researchers have gradually understood the importance of intrinsic motivation (Agarwal & Karahanna, 2000).

As Wang and Lin state in their study (2012) “because perceived ease of use contributes to a positive interaction experience, enhanced perceptions of playfulness can be expected”. In Wang and Lin’s study (2012) perceived playfulness was found to be the most powerful antecedent of behavioral intention, followed by perceived ease of use and perceived usefulness.

The positive support from previous studies demonstrates that perceived playfulness should be employed in technology adoption research. Gamification is also, one of the rising approaches in education and playfulness is one of the top factors that affects the success of gamified applications. Perceived playfulness’ effect has been studied in previous research in gamification literature therefore, it is included to explain the intention to use LMSs in research model.

6.4 Self-management of learning

Based on the McVay readiness for online learning survey, Smith et al. (2003) administered an exploratory study to explore factors hidden readiness for online learning, and brought up a two-factor structure, ‘comfort with e-learning’ and ‘self-management of learning’, which is readily accountable and strongly in line with other research findings from the wider flexible learning literature (Wang et al., 2009).

Self-management of learning is defined as the degree to which a person feels he or she is self-disciplined and can engage in autonomous learning (Smith et al., 2003). Zimmerman and Pons (1986) have suggested that learning achievement can be predicted highly with self-management learning capabilities as a key antecedent. Resembling words, similar to the meaning of self-management of learning, jargon consists of autonomous learning, independent learning, and self-directed learning (Regan, 2003; Wang et al., 2009).

As Huang states in their study (2014) “considering the critical impacts of self-management of learning on learning outcomes, although numerous researchers have focused on the relationship between self-management of learning and learning achievements, little is known about the moderating role of self-management of learning in mobile learning satisfaction and continuance intention. There is also little known about self-management of learning’s effect on technology adoption”.

In distance education and resource-based flexible learning literature, researchers clearly observed that self-direction, and/or self-management of learning is required (Evans, 2000; Smith et al., 2003; Warner et al., 1998). Since LMS is an application that facilitates e-learning, a person’s degree of self-management of learning is expected to have a positive effect on his or her behavioral intention to use LMS.

Wang et al. in their study (2009) found that self-management of learning had a significant positive effect on behavioral intention to use m-learning. Also, many studies in the past supports that self-management of learning could moderate the relationships between key mobile learning determinants, satisfaction, and continuance intention which refers to one’s intention to continually use a system or reuse a system (Abar & Loken, 2010; Zou & Zhang, 2013; Moos, 2010; Huanf, 2014).

As LMSs become major contributors to learning process, self-management of learning of individuals is expected to have a crucial role in learning and thereby in intention to use LMS.

6.5 Perceived learning opportunities

Bourgonjon et al. (2010) state in their study that "performance is the keyword in the items measuring usefulness construct from TAM".

However, since the technology acceptance model emerged from the needs in business and commercial settings, the objectives in business are obviously different compared to the goals in education (Hu et al., 2003; Teo, Lee & Chai, 2008; Wolski & Jackson, 1999, Bourgonjon et al., 2013), items do not fully reflect educators' or students' motives.

Bourgonjon et al. (2010) claims that "this conceptualization of performance is too restrictive in education context and therefore, they add a new construct – perceived learning opportunities – to account for the outcomes in learning processes". Perceived learning opportunities is explained as the degree to which a person believes that using video games in the classroom can offer him or her opportunities for learning (Bourgonjon et al., 2010). LMS application with features that gives user better learning tools would also be expected to affect LMS adoption positively.

Bourgonjon et al. (2010) also found that next to ease of use and usefulness, their study (2010) identifies learning opportunities as a critical third user belief for determining students' intention to use video games in the classroom. In this research we will explore the effects of how teachers' beliefs in learning opportunities affect their intention to use LMSs.

6.6 E-learning self efficacy

Self efficacy demonstrates one's beliefs about the ability to perform different individual tasks successfully (Bandura, 1977). Thus, computer self efficacy refers to

the individuals' beliefs on his/her ability to finish specific task while using his/her computer skills (Compeau & Higgins, 1995). Roca et al. (2006) proposed a decomposed TAM in the context of the e-learning system, and they demonstrated that information self efficacy played a critical role in influencing individuals' beliefs of PEOU. Additionally, Kim et al. (2007) built and tested a blended conceptual model of the internet acceptance; they hypothesized that information self efficacy would directly affect PU and PEOU, and they found that information self efficacy is one of the strongest predictors of PEOU.

Teachers' LMS or e-learning self efficacy is their perception of their ability on how effectively they use technology in classroom and how they accomplish tasks involved in lecturing. LMS use significantly affect teachers' actual teaching practices, so their belief on e-learning self efficacy. According to Raudenbush, Rowen, and Chang (1992), "a high sense of efficacy is required if teachers are to cope successfully with the uncertainties of classroom teaching".

In teachers' adoption of technology literature we see that teachers' skills in technology (e.g., technology competence and computer knowledge) are crucial for them to successfully implement a classroom technology in their class (Zhao et al., 2002). First teachers should acknowledge the enabling conditions of certain technologies, and then they can engage their students in technology-based learning activities successfully. Teachers who have lower technology competency usually do not prefer and have less certainty to integrate technology for teaching and learning activities (Windschitl & Sahl, 2002). Therefore, e-learning self efficacy is also expected to affect effort expectancy and performance expectancy/learning outcomes next to teachers' intention to use.

6.7 Control variables

To enhance the understanding of the generalizability of the proposed research model, effects of control variables on relationship paths should be analyzed. Control variables strongly affect the prediction ability of a model. In their study (2000) Venkatesh et al. analyzed eight models and found six models which had enhanced prediction ability due to additional relative control variables. Experience, voluntariness of use, gender and age are some of the control variables that were used in previous studies. In this study voluntariness of use, course type, gender, age and experience were employed as control variables for multi group analysis to test their effect on relations hypothesized in the model.

CHAPTER 7

DEVELOPMENT OF THE RESEARCH MODEL AND HYPOTHESES

The research model derives its theoretical foundations from prior research in technology acceptance models. Many studies have suggested that extending TAM with external variables may provide a more complete picture of the IS/IT acceptance process (Hu et al., 2003; Kim et al., 2008). Several types of external variables can be central to users' intention to use of the LMS in education context. Therefore, these external factors gathered from previous research were included in the research model, aiming to increase its explanatory power.

A quantitative study was designed in order to test the research model depicted in Figure 1. The following hypotheses were derived, relating the factors affecting adoption of LMSs.

Hypothesis 1. Effort expectancy of using LMS has a positive effect on intention to use LMS behavior.

Hypothesis 2. Social influence of using LMS has a positive effect on intention to use LMS behavior.

Hypothesis 3. Perceived playfulness (teacher's perspective) of an LMS has a positive effect on intention to use LMS behavior.

Hypothesis 4. Perceived playfulness (student's perspective) of an LMS has a positive effect on intention to use LMS behavior.

Hypothesis 5. Perceived learning opportunities of an LMS has a positive effect on intention to use LMS behavior.

Hypothesis 6. Performance expectancy of an LMS has a positive effect on intention to use LMS behavior.

The following hypotheses were derived, relating the individual characteristics of the users or potential users of LMSs.

Hypothesis 7. E-learning self efficacy of a teacher has a positive effect on intention to use LMS behavior.

Hypothesis 8. E-learning self efficacy of a teacher has a positive effect on effort expectancy of an LMS.

Hypothesis 9. E-learning self efficacy of a teacher has a positive effect on performance expectancy of an LMS.

Hypothesis 10. Self-management of learning of a student has a positive effect on intention to use LMS behavior.

Hypothesis 11. Control variables have impact on all relationships in the research model.

All relationships and constructs that are included in the model are depicted in Figure 1.

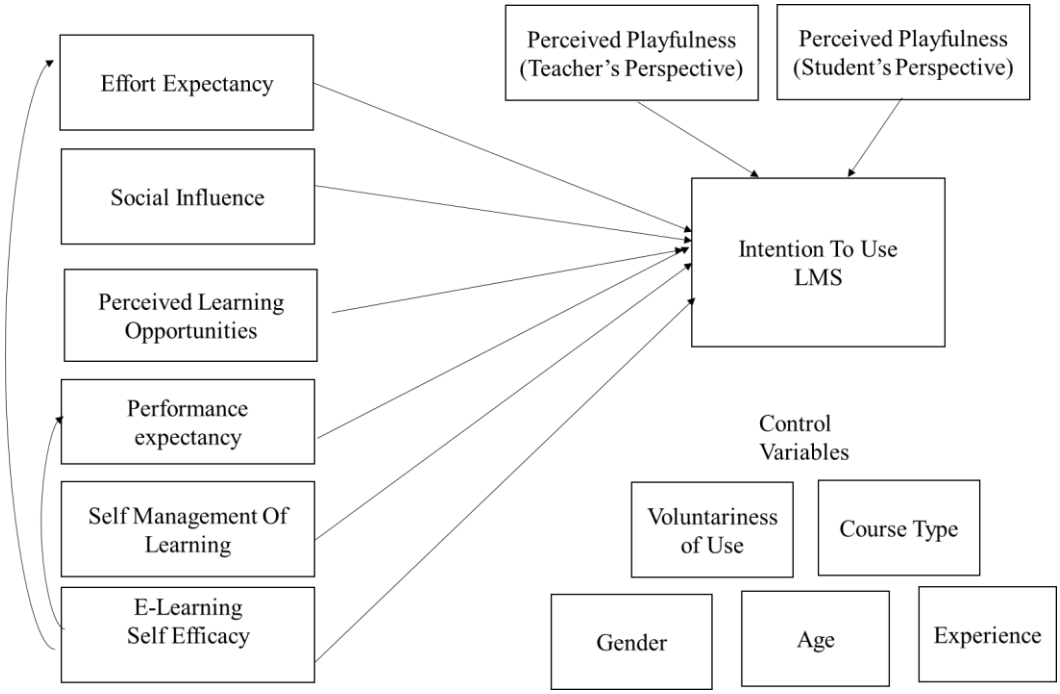

Figure 1. Preliminary research model

CHAPTER 8

TESTING AND VALIDATING THE RESEARCH MODEL

This chapter consists of testing and validating the developed theoretical model through a field study on large- scale user surveys focusing on LMSs. User survey was developed on LMS use. The primary method used for data analysis is structural equation modelling (SEM). The hypotheses were tested. The constructs in the measurement model were validated using confirmatory factor analysis (CFA). The relationships in the structural model were tested through path analysis. Multi group structural equation modelling analysis were conducted to see effects of control variables in the measurement model.

8.1 Measurement instrument

As a data collection technique, a research survey was developed to test all hypotheses formulated from the relationships proposed in the research model and main research questions. A scale was prepared to measure the factors that influence teachers' intention to use the learning management systems. The scales to use to measure constructs in the research model, was adapted from relevant literature.

To ensure the content validity of the scales, the items selected must represent the concept about which generalizations are to be made (Wang et al., 2009). Scale items that are used to measure performance expectancy, effort expectancy, social influence and behavioral intention were adapted from Venkatesh et al. (2003). The items for the perceived playfulness construct were adapted from Moon and Kim (2001). Items for perceived learning opportunities construct were adapted from Bourgonjon, et al. (2010). Items for self-management of learning construct were

adapted from Smith et al. (2003). Finally, one item for self efficacy construct were adapted from Hsu & Chiu (2004), three items were adapted from Roca et al. (2006), one item were adapted from Compeau & Higgins (1995) and last two items were adapted from Ong et al. (2004). All the items were modified to make them relevant in the use of learning management systems context.

The questionnaire consisted of three sections. In the first section aim of the research and subject of the questionnaire were explained, examples from learning management systems were given to be clear. The second section collected information about the teachers' demographic information, their teaching subjects and the voluntariness of use. In third section respondents were asked to state their agreement level in 7 point likert scale ranging from completely agree:1 to completely disagree:7 for the statements (items) of performance expectancy, effort expectancy, social influence, intention to use, perceived playfulness, self-management of learning, e-learning self efficacy and perceived learning opportunities constructs. The effect of these factors on intention to use LMS were examined. In Appendix C the full list of survey items are listed.

8.2 Translation and cross-cultural adaptation of questionnaire

The questionnaire was first prepared in English however, it was conducted in Turkish. A standard back-translation methodology was followed for the production of Turkish version of the questionnaire prepared and cross-cultural adaptation. Our aim was to have all items in questionnaire to be expressed in a way that is appropriate to Turkish language and culture, while maintaining the concept expressed by the original English items.

As Sperber et al. explains in their study (1994) in back translation method the original translation is translated back into the source language by a blinded independent translator. The two source-language versions are then compared and if necessary, revised either by individual translators or by a committee of specialists (Sperber et al., 1994).

The fourty three items questionnaire was translated by an experienced translator. The Turkish version was then sent to another academician who had not seen the English version of the questionnaire and had no prior knowledge about the questionnaire. Academic has back translated the items. Translated version of the questionnaire was filled in by ten teachers and the results were satisfactory as corresponding item were found to have both similar meaning and similar form.

8.3 Data collection method and sample

Non-probability, purposive sampling (also known as judgmental) method was followed in this research. Main goal in purposive sampling is to focus on particular characteristics in our population (teachers) that are of this research's interest. Predefined group is primary and secondary school teachers who work in Turkey. Any male or female primary and secondary school teachers aged between 20 and 60 years old could have participated this research. Participation to this research was based on voluntariness.

Answers were collected in two different methods simultaneously. An online self-completed survey involving questions in three sections was administered via Google forms. Introductory letter including the Google form link of the questionnaire was sent to over 1000 primary school and high school teachers in Turkey via e-mail. At the same time 1000 pieces printed version of the same questionnaire with the

introductory letter were given to over twenty schools' principals. Sixty-two teachers completed the survey online and 390 teachers from twenty different primary and high school completed the printed version of the survey. A total of 452 answers were collected. Demographic information that describes the characteristic of the sample is shown in Table 8.

As Republic of Turkey Ministry of National Education revealed in their national education statistics formal education 2016 -2017 report, 43.11 percent of the teachers in Turkey were male and 56.89% were female. This percentage changes in schools however, it is observed that administrator teachers are male in most of the schools.

Consistent with the report, 70% of the sample of this research is female teachers. 65% of the sample have experienced LMS before and, 35% have no experience in using LMS. Distribution of the sample is found to be suitable for this study. Aside from demographic information voluntariness of use of LMS was asked teachers. 67% of the stated that they use LMS voluntarily in their institutes. Lastly we asked teachers their teaching subjects. 21% of the sample is primary school class teacher, 16% of the sample teach science and 15% percent of the teachers teach foreign languages. Rest of the samples is distributed among other subjects such as mathematics, Turkish literature, social sciences, physical education counseling. Distribution of teachers of different subjects are listed in demograhphic characteristics Table 8.

Table 8. Demographic Characteristics of the Participated Primary and Secondary School Teachers

Variables	Number (N)	Percent (%)
Age		
20-30	105	23.28
31-40	176	39.02
41-50	107	23.73
51-60	54	11.97
Over 60	9	2
Gender		
Female	308	69.84
Male	133	30.16
Experience		
0-5	86	19.11
6 – 10	84	18.67
11 – 20	155	34.44
21 – 30	85	18.89
31 – 40	33	7.33
Over 40	7	1.56
LMS Use Status		
Experienced	294	65.04
Not Experienced	158	34.96
Voluntariness		
Voluntary	291	66.9
Compulsory	144	33.1
Course Type		
Turkish/Literature	37	8.19
Foreign Languages	68	15.04
Social Sciences	37	8.19
Counseling	19	4.2
Science	73	16.15
Mathematics	49	10.84
Religion and Ethics	9	1.99
Physical Education	10	2.21
Art	10	2.21
Music	8	1.77
Primary Class Teacher	96	21.24
Others	36	7.96

8.4 Selection of data analysis method: structural equation modeling

Structural equation modelling (SEM) is a general modelling framework that integrates number of multivariate data analysis techniques. SEM is a dynamic and powerful tool to test models involving dependence relationships and explore the causal relationship among all constructs.

8.5 Data elimination

This section comprises the details of data elimination. 452 questionnaires were completed. The demographic characteristics of the study participants were given in previous sections. Standard deviation p analysis was conducted, to assure data quality and to eliminate the questionnaires that have the same answers to all questions and inconsistent responses. As a result, in 13 questionnaires standard deviation p value were found to be very close to 0. In other words all the answers in the questionnaire were found to be nearly same. Therefore, these 13 questionnaires (namely questionnaires number 18, 23, 24, 33, 40, 48, 61, 152, 153, 159, 195, 227 and 310) were eliminated from data. Following the standard deviation p value, outliers were observed. There were no multivariate outliers identified in data. Thirdly Mahalanobis distance test which is based on a chi- square distribution was conducted to understand if there are any unusual combination of variables' scores in data which can be identified as outliers. And there found to be 3 questionnaires that can be influential outliers and so they were omitted. These three cases were outside range -2.5 and +2.5. These omitted questionnaires are number 111, 234 and 394 questionnaires.

8.6 Data analysis and results

A measurement model that involves eight latent variables were employed to test the theoretical model depicted in Figure 1. A structural model was used to test the hypotheses.

8.6.1 Measurement model reliability

The split half method was used to test the internal consistency of the scale. First part involved total of 22 items from constructs effort expectancy, social Influence, perceived playfulness (teacher's perspective), perceived playfulness (student's perspective) and perceived learning opportunities. Only first four items of perceived learning opportunities were included in the first part, last two items of this construct were included in second part. Therefore, second part involved total of 21 items from constructs, perceived learning opportunities, performance expectancy, self-management of learning, e-learning self efficacy and intention to use. Both parts were found to be highly correlated and so contributed equally to what the scale measures. Results are presented in Table 9 and Table 10.

Table 9. Factors Affecting LMS Adoption: Internal Consistency of Scale Statistics

	Mean	Variance	Std. Deviation	N of Items
Part 1	64.73	775.202	27.842	22[a]
Part 2	64.71	674.034	25.962	21[b]
Both Parts	129.44	2722.27	52.175	43

a. The items are: EE1, EE2, EE3, EE4, SI1, SI2, SI3, SI4, PPT1, PPT2, PPT3, PPT4, PPT5, PPS1, PPS2, PPS3, PPS4, PPS5, PLO1, PLO2, PLO3, PLO4.

b. The items are: PLO5, PLO6, PLO7, PE1, PE2, PE3, PE4, SMOL1, SMOL2, SMOL3, SMOL4, SE1, SE2, SE3, SE4, SE5, SE6, SE7, IU1, IU2, IU3.

Table 10. Factors Affecting LMS Adoption: Split Half Statistics

Cronbach's Alpha	Part 1	Value	0.961
		N of Items	22[a]
	Part 2	Value	0.957
		N of Items	21[b]
	Total N of Items		43
Correlation Between Forms			0.881
Spearman-Brown Coefficient	Equal Length		0.936
	Unequal Length		0.937
Guttman Split-Half Coefficient			0.935

a. The items are: EE1, EE2, EE3, EE4, SI1, SI2, SI3, SI4, PPT1, PPT2, PPT3, PPT4, PPT5, PPS1, PPS2, PPS3, PPS4, PPS5, PLO1, PLO2, PLO3, PLO4.

b. The items are: PLO4, PLO5, PLO6, PLO7, PE1, PE2, PE3, PE4, SMOL1, SMOL2, SMOL3, SMOL4, SE1, SE2, SE3, SE4, SE5, SE6, SE7, IU1, IU2, IU3.

Cronbach's alpha statistic of the scale was calculated, to check scale reliability. Following Nunnally and Bernstein's study (1994), the cut-off level for item elimination was determined as 0.70. Cronbach's alpha value for the scale was 0.977, reliability is optimal. Results are shown in Table 11.

Table 11. Factors Affecting LMS Adoption: Scale Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.977	0.978	43

To further evaluate internal consistency of the scale Cronbach's reliability coefficient alpha for the items of each construct was also calculated. Cronbach's alpha value for all constructs are given in Table 12. Reliability levels of all construct were found to be optimal.

Table 12. Factors Affecting LMS Adoption: Reliability Statistics of Items

	Cronbach's Alpha	N of Items
Effort Expectancy	0.945	4
Social Influence	0.892	4
Perceived Playfulness (Teacher's Perspective)	0.923	4
Perceived Playfulness (Student's Perspective)	0.928	4
Perceived Learning Opportunities	0.965	7
Performance expectancy	0.931	3
Self-Management Of Learning	0.926	4
E-Learning Self Efficacy	0.923	5
Intention to Use	0.976	3

Inter item correlation matrix were also checked. Two items were found to be correlated negatively with all other items. These are:

- Perceived playfulness (teacher's perspective) 2: When using LMS, I will forget the work I must do. When this item was deleted, Cronbach's alpha value were increased to 0.979.
- Performance expectancy 4: If I use LMS, I will increase my chances of getting a raise. When this item was deleted, Cronbach's alpha value were increased to 0.980.

Since they were negatively correlated with all other items of the scale, these two items were omitted from the preliminary research model.

Excluding perceived playfulness (student perspective) 2, all other items correlated with each other with loadings over 0.3. Since the loading of perceived playfulness (students perspective) 2 (PPS2) to all other items were much lower than 0.3, this item was also eliminated. When PPS2 was eliminated, the Cronbach's alpha value was increased to 0.978.

In addition, variation inflation factor (VIF), condition index and tolerance values were observed in order to assess multicollinearity. When two or more

predictors in the preliminary research model are correlated, multicollinearity may occur. According to Hair et al. (2010), a common threshold for multicollinearity is a detection-tolerance value of 0.10, which corresponds to a variance inflation factor VIF = 10 or above. As a result of multiple regression analysis of the variables, the VIF values of all the variables were less than 10 (VIF < 10). It is concluded that current data, all of these statistics are in strict ranges; none of them exceeds cut-off values as shown in Table 13.

Table 13. Variation Inflation Factor Condition Index

	Tolerance	VIF
(Constant)		
Effort Expectancy	0.25	4.01
Social Influence	0.39	2.57
Perceived Playfulness (Teacher's perspective)	0.191	5.24
Perceived Playfulness (Student's Perspective)	0.189	5.3
Perceived Learning Opportunities	0.109	9.15
Performance Expectancy	0.149	6.7
Self-Management of Learning	0.63	1.59
E -Learning Self Efficacy	0.257	3.88

8.6.2 Measurement model and analysis

Two studies were conducted for this research. In study 1 all scale items excluding the eliminated ones were included in one exploratory factor analysis using statistical package for the social sciences software 24 (SPSS 24). All factors were put together to observe scale as a whole in SPSS.

For content validity all the items used in the scale were adapted from different validated scales in literature. Therefore, in Study 2 since all items and constructs

were adapted from different validated scales, exploratory factor analysis was run for all factors separately.

8.6.2.1 Study 1: Exploratory factor analysis of whole scale

An exploratory factor analysis (EFA) was conducted in SPSS to examine whether the proposed factors explain the items and whether the individual items are loaded on their appropriate factors as intended and also to reduce the dimensions. The sample size was 452. Sixteen questionnaires were eliminated before starting exploratory factor analysis as it was explained in data elimination section. Remaining 4436 questionnaires were used for analysis. 43 items from nine factors were determined prior to data collection. Three items were eliminated during scale reliability analysis. These items were perceived playfulness (teacher's perspective) 2 (PPT2), perceived playfulness (student's perspective) 2 (PPS2) and performance expectancy 4 (PE4). Remaining 41 items were included in the analysis.

For all the factors the sampling adequacy was examined with Kaiser-Meyer-Olkin (KMO) measure sampling adequacy and Bartlett's Test. The lowest acceptable level for KMO is 0.50. KMO value of 0.970 (greater than 0.5 level) and significance level of 0.000 were obtained using KMO and Bartlett's sphericity test which suggests that the inter-correlation matrix contains sufficient common variance to make factor analysis worthwhile.

In this part primary concern is data reduction therefore, EFA was run by setting principal component analysis as extraction method, varimax as rotation method and eigenvalue as 1. EFA was also run by setting principal axis factoring as extraction method and promax as rotation method.

The communalities were examined to see how each item was correlated with all other items and in order to indicate which part of the variance of each variable was explained. Communalities are expected to be higher than 0.5, so that all variables load significantly on a factor. All communalities were higher than 0.5. The lowest communality was found to be 0.612 for the first item of perceived playfulness (teacher's perspective) (PPT1). Details of communalities is presented in Table E1, in Appendix E.

Anti-image covariance diagonal was also checked to see if there are items with low correlation even if KMO value is over 0.5 however, none of the items was significantly lower than 0.5, and all were higher than threshold value of 0.5 (Janssens, De Pelsmacker &Van Kenhove, 2008). Therefore, none of the items were omitted.

Total variance explained table shows that four factors represented 75% variance of 40 items. Details of total variance explained statistics is presented in Table E2 in Appendix E.

Also, as seen in pattern matrix, four factors were extracted. As a result of EFA, items of nine factors in preliminary research model were converged under four factors.

In their study (1973) Knapp and Comrey (1973) indicated that loadings in excess of 0.45 could be considered fair, greater than 0.55 good, 0.63 very good, and 0.71 excellent. Because of that, the loadings lower than 0.40 were suppressed. As pattern matrix shows, most loadings on these new four factors are in expected range.

Table 14. Pattern Matrix

	Factor			
	1	2	3	4
Perceived Playfulness (Student's Perspective) 5	0.995			
Perceived Playfulness (Student's Perspective) 4	0.992			
Perceived Playfulness (Student's Perspective) 1	0.903			
Perceived Playfulness (Student's Perspective) 3	0.848			
Perceived Playfulness (Teacher's Perspective) 5	0.828			
PerceivedLearningOpportunities4	0.76			
PerceivedLearningOpportunities1	0.751			
PerceivedLearningOpportunities3	0.718			
Perceived Playfulness (Teacher's perspective) 3	0.711			
PerceivedLearningOpportunities6	0.71			
PerceivedLearningOpportunities7	0.701			
PerformanceExpectancy3	0.687			
PerformanceExpectancy1	0.67			
Perceived Playfulness (Teacher's perspective) 4	0.668			
PerceivedLearningOpportunities2	0.667			
PerceivedLearningOpportunities5	0.651			
PerformanceExpectancy2	0.567			
Perceived Playfulness (Teacher's perspective) 1	0.542			
ElearningSelfEfficacy4		0.908		
ElearningSelfEfficacy3		0.899		
ElearningSelfEfficacy5		0.864		
ElearningSelfEfficacy6		0.823		
ElearningSelfEfficacy2		0.816		
ElearningSelfEfficacy7		0.772		
IntentiontoUse1		0.717		
IntentiontoUse3		0.69		
IntentiontoUse2		0.689		
ElearningSelfEfficacy1		0.628		
SocialInfluence3			0.841	
SocialInfluence1			0.831	
SocialInfluence4			0.825	
SocialInfluence2			0.743	
EffortExpectancy2			0.652	
EffortExpectancy1			0.636	
EffortExpectancy3			0.545	
EffortExpectancy4			0.488	
SelfManagementofLearning2				0.909
SelfManagementofLearning3				0.906
SelfManagementofLearning4				0.782
SelfManagementofLearning1				0.697

In factors correlation matrix high correlation between first and second and first and third factor was observed. However, factors will be used this way in CFA and their validity issues will be checked in confirmatory factor analysis stage.

8.6.2.2 Study 1: Confirmatory factor analysis of whole scale

A confirmatory factor analysis using analysis of moment structures 19 (AMOS 19) was conducted to test the measurement model and develop a model. Six common model-fit measures were used to assess the model's overall goodness of fit: the ratio of chi square to degrees of freedom (CMIN/df), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normalized fit index (NFI), comparative fit index (CFI), Tucker Lewis Index (TLI) and root mean square error of approximation (RMSEA). Factors derived from EFA do not have a good fit with values: CMIN/df: 5.628, GFI: 0.644, CFI: 0.838, NFI: 0.810, RMSEA: 0.104

After examining the modification indices, ten items in first factor, including items perceived playfulness (student's perspective) - PPS4, PPS3, perceived playfulness (teacher's perspective) – PPT1, PPT3, PPT4 perceived learning opportunities - PLO2, PLO5, performance expectancy - PE1, PE2, PE3, seven items in second factor items including self efficacy – SE1, SE2, SE3, SE4, SE5, SE6, SE7 and five items in third factor, items including effort expectancy - EE1, EE2, EE3, EE4 and social influence - SI1 were eliminated due to high cross loadings.

As a result of item elimination, goodness of fit values are CMIN/df: 3.058, GFI: .909, CFI: .968, NFI: .953, RMSEA: .069 which are at acceptable levels suggested by previous research. These results demonstrate that the measurement model with this new factor structure exhibited a fairly good fit with the data collected. Factor loadings are listed in Table 15.

Table 15. Factor Loadings

		Factor	Factor Loadings
Perceived Learning Opportunities 7	<---	F1	0.898
Perceived Learning Opportunities 6	<---	F1	0.824
Perceived Learning Opportunities 3	<---	F1	0.917
Perceived Learning Opportunities 1	<---	F1	0.885
Perceived Learning Opportunities 4	<---	F1	0.893
Perceived Playfulness (Student's Perspective) 1	<---	F1	0.704
Perceived Playfulness (Student's Perspective) 5	<---	F1	0.845
Perceived Playfulnes (Teacher's Perspective) 5	<---	F1	0.833
Intention to Use 1	<---	F2	0.939
Intention to Use 2	<---	F2	0.978
Intention to Use 3	<---	F2	0.972
Social Influence 2	<---	F3	0.696
Social Influence 3	<---	F3	0.839
Social Influence 4	<---	F3	0.907
Self-Management of Learning 1	<---	F4	0.76
Sel-fManagement of Learning 4	<---	F4	0.901
Self-Management of Learning 3	<---	F4	0.939
Self-Management of Learning 2	<---	F4	0.875

Kolmogorov-Smirnov normality test shows us the level of significance for the differences from a normal distribution. Significance levels are 0.000 for all factors which is lower than 0.05 level. Test results are presented in Table 16. This shows us that data are not normally distributed.

Skewness and kurtosis test results were examined. For these two test scores are expected to be between +1.96 and -1.96 at 0.05 error level on Z table. For all variables Zcal score does not exceed Ztable. This shows that distribution is normal Skewness and kurtosis scores will be taken into account for normality test therefore, it is accepted that the data are normally distributed.

Table 16. Skewness and Kurtosis Test

	Kurtosis	Skewness	P
Factor 1	0.193	0.976	0
Factor 2	0.08	0.989	0
Factor 3	0.029	0.916	0
Factor 4	-0.41	0.496	0

Reliability and convergent validity of the factors were estimated by composite reliability (CR) and average variance extracted (AVE). As Wang et al. states in their study (2009) "the interpretation of the composite reliability is similar to that of Cronbach's alpha, except that it also takes into account the actual factor loadings rather than assuming that each item is equally weighted in the composite load determination".

Average shared variance (ASV) and maximum shared variance (MSV) were calculated. Results of calculations show that composite reliabilities of four constructs were higher than 0.70 cut-off value (CRs > 0.70). Convergent validity is sufficient with AVE > 0.5 and CR > AVE for all factors MSV and ASV values are still less than AVE values for all factors which are not sufficient for discriminant validity.

As shown in Figure E1 in Appendix E Factor 1 had high inter construct correlations with Factor 2 (0.813) and Factor 3 (0.765). However, as shown in Table 17, CR, AVE, MSV and ASV values are at acceptable levels therefore, the new factor structure is found to be valid and reliable As a result, no other item or factor was omitted.

Table 17. Scale Reliability and Validity Measures in Study 1

	CR	AVE	MSV	ASV	Cronbach Alpha
Factor 1	.095	.073	.065	.053	.954
Factor 2	.097	.093	.065	.044	.974
Factor 3	.086	.067	.060	.041	.851
Factor 4	.093	.076	.035	.024	.924

8.6.2.3 Study 1: Structural equation modelling

As a result of exploratory factor analysis, 40 items from nine factors were converged to four factors with a different item distribution.

Taking into consideration the newly structured factors, a structural model was built with two independent factors with seven observed items and two dependent factors with eleven observed items identified in CFA. First factor consisted of perceived playfulness from both teachers' and student's perspective and perceived learning opportunities. These two constructs are expected to be separate theoretically, as both were adapted from previous research. Social influence, self-management of learning and intention to use were kept as separate constructs. The factor scores were calculated as the average score of the items that composes that factor.

The model developed in this context has been found to have excellent goodness of fit values which are CMIN /df: .345, GFI: 1.000, CFI: 1.000, NFI: 1.000 and RMSEA: .000.

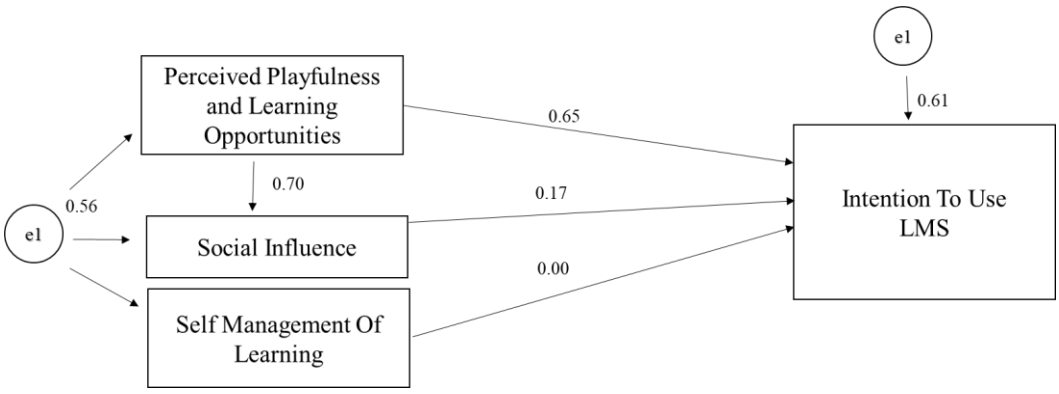

Figure 2. Structural model with standardized estimates

Properties of the causal paths, including standardized path coefficients (beta) and t-values, are shown in Figure 2. The results of path analysis demonstrates that three out of four proposed relationships were supported in the structural model. Since perceived learning opportunities, e-learning self efficacy, effort expectancy, performance expectancy were eliminated in CFA phase due to lack of discriminant validity, the hypothesis consisted of these constructs could not be tested in Study 1.

Also, items under perceived playfulness (student's perspective), perceived playfulness (teacher's perspective) and perceived learning opportunities constructs were converged under one factor in EFA stage. Perceived playfulness and perceived learning opportunities were frequently used in game based learning literature and validated items for these constructs were taken from previous research related to game based learning literature. In EFA it is observed that items under these three constructs are highly correlated and do not discriminate.

Table 18. Structural Model Estimates Study 1

Dependent Variable		Independent Variable	Beta	Std Beta	Std Error	T	P	Result
Social Influence	<--	Perceived Playfulness and Learning Opportunities	0.773	0.703	0.038	20.472	***	Supported
Intention to Use	<--	Perceived Playfulness and Learning Opportunities	0.761	0.649	0.055	13.815	***	Supported
Intention to Use	<--	Social Influence	0.185	0.174	0.045	4.107	***	Supported
Intention to Use	<--	Self-Management of Learning	0.005	0.004	0.041	0.118	0.906	Rejected

The results confirmed that newly formed perceived playfulness and learning opportunities factor had a positive effect on intention to use construct. The standardized beta of the relationship was 0.649 and found statistically significant (p value < 0.050).

The results also confirmed that social influence construct had a positive effect on intention to use construct. The standardized beta of the relationship was 0.174 and found statistically significant (p value < 0.050).

As a result of CFA analysis the preliminary model was revised and another relationship was proposed which was not included among the hypotheses of the preliminary research model. In newly built model with acceptable goodness of fit values, it was proposed that newly formed perceived playfulness and learning opportunities factor has positive effect on social influence factor. This proposed

relationship was supported in SEM analysis with standardized beta value of 0.703 and found to be statistically significant (p value < 0.050)

It was found that self-management of learning did not have direct significant impact on intention to use (p value = 0.906 > 0.050).

8.6.2.4 Summary of study 1's results

The objective of study 1 was to see how items adapted from different validated scales acted together and see how this approach will create results for the proposed relationships in the preliminary research model. In EFA phase discriminant validity issues were observed and nine constructs were converged to four factors. 75% of the variance was explained with these four factors. In CFA phase 22 items out of 40 items were eliminated. The remaining item - construct structure had acceptable goodness of fit values. In SEM phase relationship among the remaining constructs were tested and three out of four relations were supported. In conclusion analysis results also confirmed that perceived playfulness and learning opportunities, social influence factors had a positive effect on intention to use construct. On the other hand self-management of learning construct's effect on intention to use construct as proposed in research model was rejected. In CFA phase a new relation was proposed. With this new path model, goodness of fit values were at acceptable levels. It was proposed that combination of perceived playfulness and perceived learning opportunities factor has positive effect on social influence factor. This proposed relationship was also supported in SEM.

8.6.2.5 Study 2: Separate factor analyses of each construct

Nine separate factor analyses were run covering all dependent and independent variables. As stated in Study 1, the sample size was 452. 16 questionnaires were eliminated before starting factor analysis, as it was explained in data elimination section. Remaining 436 questionnaire was used for all analyses. 43 items from 9 factors were determined prior to data collected.

In first step EFA was completed using principal component extraction method. In second step a CFA using analysis of moment structures 19 (AMOS 19) was conducted to test the measurement model and develop a model. However, different from study 1, CFA was run for each factor separately. Similar to study 1 six common model-fit measures were used to assess the model's overall goodness of fit: the ratio of chi square to degrees of freedom (df), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), normalized fit index (NFI), comparative fit index (CFI), Tucker Lewis Index (TLI) and root mean square error of approximation (RMSEA).

8.6.2.5.1 Factor analysis of effort expectancy

For effort expectancy construct, the sampling adequacy was examined using Kaiser-Meyer-Olkin (KMO) measure sampling adequacy and Bartlett's Test. KMO statistic is 0.831, which is higher than the lowest acceptable level of 0.50. Same method was used for all nine constructs.

Table 19. KMO and Bartlett's Test of Effort Expectancy Construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.831
Bartlett's Test of Sphericity	Approx Chi-Square	1749.39
	Df	6
	Sig	0

Component matrix for effort expectancy construct showed that loadings of the items to the factor are higher than the acceptable level. As Knapp and Comrey explains in their study (1973) loadings that are in excess of 0.45 could be considered fair, greater than 0.55 good, 0.63 very good, and 0.71 excellent.

Table 20. Component Matrix of Effort Expectancy Construct

	Component 1
Effort Expectancy 4	0.934
Effort Expectancy 3	0.93
Effort Expectancy 2	0.928
Effort Expectancy 1	0.911

CFA results show strong goodness of fit measures for effort expectancy construct, only RMSEA value is over the commonly accepted threshold level. Since all other fit indices are in between threshold values the fit of the construct is acceptable. Values and thresholds are presented in Table 21.

Table 21. Measurement of Model Fit Indices of Effort Expectancy Construct

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	2.603	< 3
GFI	0.997	> 0.95
CFI	0.999	> 0.90
TLI	0.995	> 0.90
NFI	0.999	> 0.90
RMSEA	0.6	< 0.05

8.6.2.5.2 Factor analysis of social influence

KMO statistics for social influence construct is 0.759, which is higher than the lowest acceptable level, 0.50.

Table 22. KMO and Bartlett's Test of Social Influence Construct

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.759
Bartlett's Test of Sphericity	Approx Chi-Square	1158.95
	Df	6
	Sig	0

Loadings of the items on social influence construct is above acceptable levels. Values are listed in Table 23.

Table 23. Component Matrix of Social Influence Construct

	Component 1
Social Influence 1	0.876
Social Influence 2	0.873
Social Influence 4	0.87
Social Influence 3	0.859

CFA results for five out of six model fit measures show strong fit for social influence construct. Only CMIN/df is slightly over the threshold value. Overall model fit is adequate as five out six measure show strong fit. Values and thresholds are listed in Table 24.

Table 24. Measurement of Model Fit Indices of Social Influence Construct

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	0.347	< 3
GFI	1	> 0.95
CFI	1	> 0.90
TLI	1.003	> 0.90
NFI	1	> 0.90
RMSEA	0	< 0.05

8.6.2.5.3 Factor analysis of perceived playfulness (teacher's perspective)

KMO statistics for perceived playfulness (teacher's perspective) construct is 0.824, which is higher than the lowest acceptable level, 0.50.

Table 25. KMO and Bartlett's Test of Perceived Playfulness (Teacher's Perspective)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.824
Bartlett's Test of Sphericity	Approx Chi-Square	1452.8
	Df	6
	Sig	0

Loadings of the four items out of five items on perceived playfulness (teacher's perspective) construct is above acceptable levels. Values are listed in Table 26.

All items of perceived playfulness (teacher's perspective) put in EFA. However, confirming the results found in reliability analysis PPT 2 formed a separate factor. In reliability analysis phase inter item correlation matrix was checked, and PPT2 was found to be correlated negatively with all other items. Therefore, PPT2 was omitted.

Table 26. Component Matrix of Perceived Playfulness (Teacher's Perspective)

	Component 1
Perceived Playfulness (Teacher's Perspective) 4	0.937
Perceived Playfulness (Teacher's Perspective) 5	0.925
Perceived Playfulness (Teacher's Perspective) 3	0.896
Perceived Playfulness (Teacher's Perspective) 1	0.851

CFA results show strong goodness of fit measures for perceived playfulness (teacher's perspective) construct. Values and thresholds are listed in Table 27.

Table 27. Measurement of Model Fit Indices of Perceived Playfulness (Teacher's Perspective)

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	0.292	< 3
GFI	1.000	> 0.95
CFI	1.000	> 0.90
TLI	1.003	> 0.90
NFI	1.000	> 0.90
RMSEA	0.000	< 0.05

8.6.2.5.4 Factor analysis of perceived playfulness (student's perspective)

KMO statistic for perceived playfulness (student's perspective) construct is 0.819, which is higher than the lowest acceptable level of 0.50.

Table 28. KMO and Bartlett's Test of Perceived Playfulness (Student's Perspective)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.819
Bartlett's Test of Sphericity	Approx Chi-Square	1635.144
	Df	10
	Sig	0

Loadings of four items out of five items on perceived playfulness (student's perspective) construct is above acceptable levels. Values are listed in Table 29.

All items for perceived playfulness (student's perspective) were put in EFA however, PPS2 did not load on the construct. This is also in line with the reliability analysis as the loadings of PPS2 to all other items were found to be much lower than 0.3. PPS2 was eliminated.

Table 29. Component Matrix of Perceived Playfulness (Student's Perspective)

	Component 1
Perceived Playfulness (Student's Perspective) 4	0.947
Perceived Playfulness (Student's Perspective) 5	0.927
Perceived Playfulness (Student's Perspective) 3	0.908
Perceived Playfulness (Student's Perspective) 1	0.833

CFA results for four out of six model fit measures show strong fit for perceived playfulness (student's perspective) construct. Only CMIN/df and RMSEA values are slightly over the threshold values that are used commonly in literature. This might be due to samples size as our samples is 452 which is very close to 500. Hair et al. states in their study (2010) that "Chi squared value tends to get inflated and may be misleading for sample sizes over 500". Since all other remaining goodness of fit measures are at commonly accepted threshold values, it is found adequate for overall model fit. Values and threshold are listed in Table 30.

Table 30. Measurement of Model Fit Indices of Perceived Playfulness (Student's Perspective)

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	3.023	< 3
GFI	0.997	> 0.95
CFI	0.999	> 0.90
TLI	0.992	> 0.90
NFI	0.998	> 0.90
RMSEA	0.067	< 0.05

8.6.2.5.5. Factor analysis of perceived learning opportunities

KMO statistic for perceived learning opportunities construct is 0.937, which is higher than the lowest acceptable level of 0.50.

Table 31. KMO and Bartlett's Test of Perceived Learning Opportunities

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.937
Bartlett's Test of Sphericity	Approx. Chi-Square	3668.791
	Df	21
	Sig.	0

Loadings of the items on perceived learning opportunities construct is above acceptable levels. Loadings are listed in Table32.

Table 32. Component Matrix of Perceived Learning Opportunities

	Component 1
Perceived Learning Opportunities 3	0.935
Perceived Learning Opportunities 2	0.922
Perceived Learning Opportunities 4	0.915
Perceived Learning Opportunities 7	0.911
Perceived Learning Opportunities 1	0.905
Perceived Learning Opportunities 5	0.896
Perceived Learning Opportunities 6	0.879

CFA results for four out of six model fit measures show strong fit for perceived learning opportunities construct. Similar to perceived playfulness (student's perspective) CMIN/df and RMSEA values are slightly over the threshold values. As explained earlier this might be due to sample size. Since all other remaining goodness of fit measures are at commonly accepted threshold values overall model fit is satisfactory. Values and thresholds are shown in Table 33.

Table 33. Measurement of Model Fit Indices of Perceived Learning Opportunities

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	3.880	< 3
GFI	0.972	> 0.95
CFI	0.991	> 090
TLI	0.984	> 0.90
NFI	0.987	> 0.90
RMSEA	0.080	< 0.05

8.6.2.5.6. Factor analysis of performance expectancy

KMO statistic for performance expectancy construct is 0.765, which is higher than the lowest acceptable level, 0.50.

Table 34. KMO and Bartlett's Test of Performance Expectancy

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.765
Bartlett's Test of Sphericity	Approx. Chi-Square	1093.507
	Df	3
	Sig.	0

Loadings of the three items out of four items on performance expectancy construct is above acceptable levels. Values are listed in Table 35.

Table 35. Component Matrix of Performance Expectancy

	Component 1
Performance Expectancy 1	0.943
Performance Expectancy 3	0.94
Performance Expectancy 2	0.93

CFA results also show strong goodness of fit measures for performance expectancy construct. Values and thresholds are listed in Table 36.

Table 36. Measurement of Model Fit Indices of Performance Expectancy

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	2.126	< 3
GFI	0.997	> 0.95
CFI	0.999	> 0.90
TLI	0.997	> 0.90
NFI	0.998	> 0.90
RMSEA	0.050	< 0.05

8.6.2.5.7 Factor analysis of self-management of learning

KMO statistics for self-management of learning construct is 0.836, which is higher than the lowest acceptable level of 0.50.

Table 37. KMO and Bartlett's Test of Self-Management of Learning

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.836
Bartlett's Test of Sphericity	Approx. Chi-Square	1485.398
	Df	6
	Sig.	0

Loadings of all items on self-management of learning construct is above acceptable levels. Values are listed in Table 38.

Table 38. Component Matrix of Self-Management of Learning

	Component 1
Self-Management of Learning 3	0.939
Self-Management of Learning 2	0.917
Self-Management of Learning 4	0.916
Self-Management of Learning 1	0.845

CFA results show strong goodness of fit measures for self-management of learning construct. Values and thresholds are listed in Table 39.

Table 39. Measurement of Model Fit Indices of Self-Management of Learning

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	1.826	< 3
GFI	0.998	> 0.95
CFI	0.999	> 0.90
TLI	0.997	> 0.90
NFI	0.999	> 0.90
RMSEA	0.043	< 0.05

8.6.2.5.8 Factor analysis of e-learning self efficacy

KMO statistic for e-learning self- efficacy construct is 0.902, which is higher than the lowest acceptable level of 0.50.

Table 40. KMO and Bartlett's Test of E-Learning Self Efficacy

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.902
Bartlett's Test of Sphericity	Approx. Chi-Square	3042.158
	Df	21
	Sig.	0

Loadings of all the items on e-learning self- efficacy construct is above acceptable levels. Values are listed in Table 41.

Table 41. Component Matrix of E-Learning Self Efficacy

	Component 1
E-learning Self Efficacy 2	0.9
E-learning Self Efficacy 4	0.895
E-learning Self Efficacy 5	0.891
E-learning Self Efficacy 1	0.864
E-learning Self Efficacy 3	0.861
E-learning Self Efficacy 6	0.852
E-learning Self Efficacy 7	0.829

CFA results show strong goodness of fit measures for e-learning self-efficacy construct. Values and thresholds are listed in Table 42.

Table 42. Measurement of Model Fit Indices of E-Learning Self Efficacy

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	0.626	< 3
GFI	0.998	> 0.95
CFI	1.000	> 0.90
TLI	0.999	> 0.90
NFI	0.999	> 0.90
RMSEA	0.000	< 0.05

8.6.2.5.9 Factor analysis of intention to use

KMO statistic for intention to use construct is 0.773, which is higher than the lowest acceptable level of 0.50.

Table 43. KMO and Bartlett's Test of Intention to Use

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.773
Bartlett's Test of Sphericity	Approx. Chi-Square	1964.628
	Df	3
	Sig.	0

Loadings of all the items on intention to use construct is above acceptable levels. Values are listed in Table 44.

Table 44. Component Matrix of Intention to Use

	Component 1
Intention to Use 2	0.983
Intention to Use 3	0.978
Intention to Use 1	0.969

CFA results show strong goodness of fit measures for intention to use construct. Values and thresholds are listed in Table 45.

Table 45. Measurement of Model Fit Indices of Intention to Use

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	0.749	< 3
GFI	0.999	> 0.95
CFI	1.000	> 0.90
TLI	1.000	> 0.90
NFI	1.000	> 0.90
RMSEA	0.000	< 0.05

8.6.2.6 Study 2: Structural equation modelling

Preliminary research model was first put into structural equation modelling analysis to see the model fit. However, it was observed that model fit values were not at acceptable levels as presented in Table 46.

Table 46. Measurement of Model Fit Indices – Preliminary Research Model

Measure	Value	Threshold (Hair et al., 2010)
CMIN/df	110.707	< 3
GFI	0.465	> 0.95
CFI	0.400	> 0.90
TLI	0.099	> 0.90
NFI	0.399	> 0.90
RMSEA	0.496	< 0.05

The model needed re-specification. Re-specified structural model was constructed with six exogenous factors with 28 observed variables and three endogenous factors with ten observed variables. Intention to use, effort expectancy and performance expectancy were endogenous factors, whereas social influence, perceived playfulness (teacher's perspective), perceived playfulness (student's

perspective), perceived learning opportunities, e-learning self efficacy and self-management of learning were exogenous factors. Age, gender, experience, course type, voluntariness of use were control variables in the model. Respecified model's goodness of fit values are all in acceptable range (CMIN/df: 3.371, GFI: 0.988, CFI: 0.996, TLI: 0.981, NFI: 0.995 and RMSEA: 0.053). Structural model estimates were presented in the Table 48 and Figure 3.

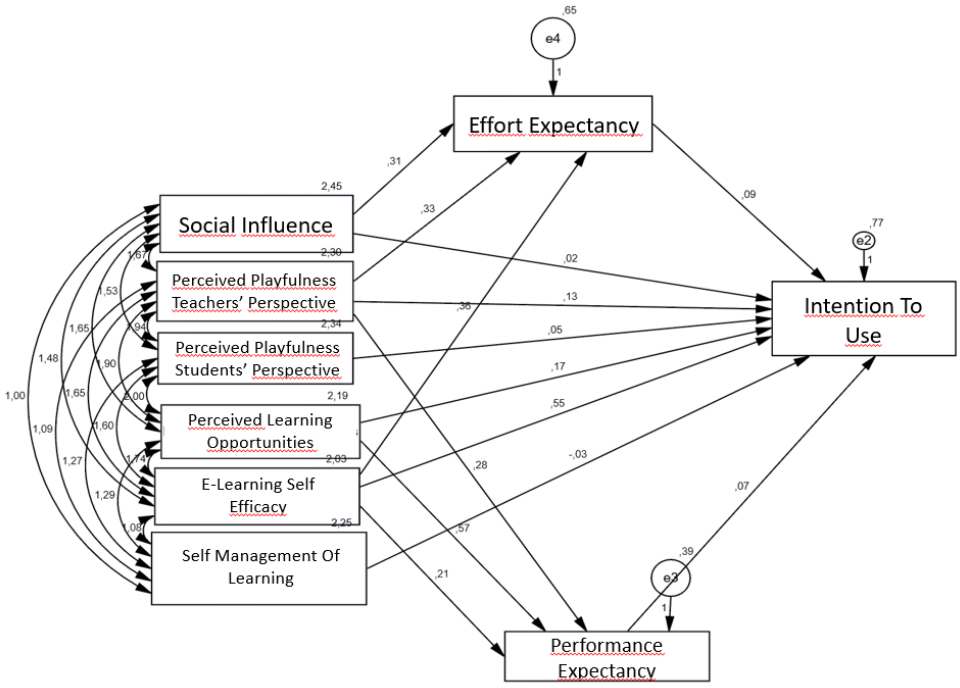

Figure 3. Final structural model with standardized estimates

With re-specification in addition to eleven hypotheses proposed in preliminary research model four new hypotheses were proposed. Therefore, in addition to testing the effect of control variables, fourteen relations were tested using structural equation modelling analysis. Newly proposed hypotheses are as follows.

Hypothesis 12. Social influence has a positive effect on effort expectancy.

Hypothesis 13. Perceived playfulness (teacher' perspective) has a positive effect on effort expectancy.

Hypothesis 14. Perceived playfulness (teacher' perspective) has a positive effect on performance expectancy.

Hypothesis 15. Perceived learning opportunities has a positive effect on performance expectancy.

Kolmogorov-Smirnov normality test was run for the re-specified model to see the level of significance of the differences from a normal distribution. Significance levels for all factors are lower than the 0.05 level. Test results are presented in Table 47. This shows us that data are not normally distributed.

Skewness and kurtosis test results were also examined similar to study 1. Two test scores are expected to be between +1.96 and -1.96 at 0.05 error level on Z table. For all variables Zcal scores do not exceed Ztable. This shows that distribution is normal.

Skewness and kurtosis scores will be taken into account for normality test therefore, it is accepted that the data are normally distributed.

Table 47. Kolmogorov-Smirnov normality test

Variable	Skewness	Kurtosis	Kolmogorov Smirnov
Effort Expectancy	1.206	0.618	0
Social Influence	0.871	-0.022	0
Perceived Playfullness (Teacher's perspective)	0.879	-0.02	0
Perceived Playfullnes (Student's Perspective)	0.894	0.032	0
Perceived Learning Opportunities	1.039	0.371	0
Performance Expectancy	0.969	0.125	0
Self-Management of Learning	0.482	-0.383	0
E -Learning Self Efficacy	1.006	0.401	0
Intention To Use	0.984	0.069	0

Path analysis results showed that nine out of fourteen proposed relationships were supported in the structural model. Five out of the ten proposed relationships

from preliminary research model were supported and four out of four newly proposed relationships were supported in structural model.

The results confirmed that perceived learning opportunities of LMS had positive effect on usage intention (H5) whereas the positive effect of performance expectancy (H6) of LMS on usage intentions as proposed in preliminary research model was rejected. This result confirms Bourgonjon et al.'s (2010) claim that goals in education and business are different and performance expectancy constructs and its items can be too restrictive in education context. Therefore, in line with their proposition, this study supported the positive effect of learning opportunities on usage intention. Learning opportunities construct which is explained as 'the degree to which a person believes that using LMS in the classroom can offer him or her opportunities for learning.' (Bourgonjon et al., 2010) reflected educators' motives better than performance expectancy construct.

In addition, results confirmed that perceived learning opportunities has positive direct impact on performance expectancy (H9) with standard estimate 0.525 at a significant level.

The results also indicated that while perceived playfulness (teacher's perspective) has direct effect on usage intention (H3), perceived playfulness (student's perspective) has no direct effect on usage intention (H4). The standard estimate for relationship in H3 is 0.114 and the relation is found statistically significant (p value < 0.050). In H4 the standard estimate for relationship is 0.047 and the relation found statistically insignificant (p value $= 0.408 > 0.050$). Perceived playfulness construct was defined as state of mind that includes three dimensions in Moon & Kim's study (2001). These three dimensions are users' attention is focused on LMS, user's level of curiosity during interaction with LMS and users' and

enjoyment during using LMS. Survey was conducted among teachers. Data which are collected from teachers show that teachers's behavioral intention to use is postivitely effected by their beliefs on LMSs which have features that attract their attention and interest and which enjoy them during use. On the other hand teachers' beliefs on an LMS that would attract students' attention and curiosity do not have direct positive effect on their behavioral intention to use LMS.

Table 48. Factors Affecting LMS Adoption: Final Structural Model Estimates

	Relationship			Unstandardized Beta	Standard Beta	Standard Error	t value	p value	Result
H13	Effort Expectancy	<--	Perceived Playfulness (Teacher's perspective)	0.331	0.319	0.042	7.798	***	Supported
H9	Performance Expectancy	<--	E -Learning Self Efficacy	0.211	0.186	0.038	5.586	***	Supported
H15	Performance Expectancy	<--	Perceived Learning Opportunities	0.574	0.525	0.044	13.118	***	Supported
H12	Effort Expectancy	<--	Social Influence	0.311	0.309	0.036	8.742	***	Supported
H14	Performance Expectancy	<--	Perceived Playfulness (Teacher's perspective)	0.281	0.264	0.038	7.490	***	Supported
H8	Effort Expectancy	<--	E -Learning Self Efficacy	0.364	0.329	0.043	8.450	***	Supported
H2	Intention To Use	<--	Social Influence_	0.015	0.014	0.043	0.355	0.723	Rejected
H3	Intention To Use	<--	Perceived Playfulness (Teacher's perspective)	0.127	0.114	0.064	1.998	0.046	Supported
H4	Intention To Use	<--	Perceived Playfulness (Student's Perspective)	0.052	0.047	0.062	0.827	0.408	Rejected
H5	Intention To Use	<--	Perceived Learning Opportunities	0.171	0.15	0.085	2.005	0.045	Supported
H10	Intention To Use	<--	Self-Management of Learning	-0.028	-0.025	0.035	-0.8	0.424	Rejected
H7	Intention To Use	<--	E -Learning Self Efficacy	0.552	0.466	0.058	9.449	***	Supported
H6	Intention To Use	<--	Performance Expectancy	0.068	0.066	0.066	1.033	0.302	Rejected
H1	Intention To Use	<--	Effort Expectancy	0.087	0.081	0.052	1.683	0.092	Rejected

The hypotheses which indicated that perceived playfulness (teacher's perspective) has positive effect on performance expectancy (H14) and effort expectancy (H13) were also confirmed. The standard estimate of the relationship for H14 is 0.264 and the standard estimate for H13 is 0.319. Both relationships were found to be significant. Previous research, several studies have tested the empirical relevance of perceived playfulness as an integrative variable of the TAM model, as Padilla-Melendez et. al found in their study (2013) perceived playfulness has significant positive effect on PU and PEOU.

As it was proposed in H1 effort expectancy's effect on usage intentions was not confirmed, since p- value (0.092) was greater than the cut-off level (0.050). It was also found that social influence doesn't have positive effect on teachers' intention to use LMS (H2) (p- value = 0.723 > 0.050). On the other side social influence was found to have positive impact on effort expectancy (H12) at a significant level. Social influence was found as an important antecedent of effort expectancy in previous studies in literature as well (Sung et. al, 2015). E-learning self efficacy had significant effect on usage intention (H7) with standardized estimate 0.466, performance expectancy (H8) with standardized estimate 0.186 and effort expectancy (H9) with standardized estimate 0.329. As Bandura explains in their study (1977) self-efficacy is demonstration of users' beliefs about the ability to perform different individual tasks successfully. This study confirms that teachers' belief in their abilities to use LMS successfully, has positive impact on their intention to use LMS, on their beliefs in how much effort they need to put to be able to use LMS, and also on their beliefs about how much LMS will be useful for their work. Their beliefs in their ability to use the technology not just affect their intention to use but also affect their beliefs on features of the technology.

Results indicated that self-management of learning didn't have direct impact on teachers' usage intention with p- value of 0.424 which is higher than the threshold value.

8.6.2.7 Summary of study 2

The sampling adequacy was examined for all factors using Kaise Meyer Olkin (KMO) and Bartlett's test. All KMO statistics are higher than 0.50, the lowest acceptable level.

As a result of the separate pattern analyses for each construct, 40 out of 43 items' loadings on target factors are in good range. Also, average variance extracted (AVE) value for each construct was checked for constructs' discriminant validity. AVE values for all constructs are above the commonly accepted threshold value of 0.50. Values are listed in Table 49.

Table 49. Factors Affecting LMS Adoption: Reliability Analysis of All Constructs

Construct	Cronbach's Alpha	Average Variance Extracted	N of Items
Effort Expectancy	0.945	0.857	4
Social Influence	0.892	0.756	4
Perceived Playfulness (Teacher's Perspective)	0.923	0.815	4
Perceived Playfulness (Student's Perspective)	0.928	0.819	4
Perceived Learning Opportunities	0.965	0.827	7
Performance expectancy	0.931	0.879	3
Self-Management Of Learning	0.926	0.819	4
E-Learning Self Efficacy	0.923	0.754	5
Intention to Use	0.976	0.984	3

After eliminating the items which formed separate factors or which had loadings under acceptable level, factors reached their final form. Structural equation modelling analysis was conducted with the final structure. Since the goodness of fit values of the preliminary research model was not at acceptable levels, the model was

re-specified. With re-specification of the model four new hypotheses were proposed in addition to the eleven hypotheses in the preliminary research model. Results showed that nine out of fourteen relationships were supported. Following study 2 multi group analyses were conducted. Effects of control variables on relationships proposed in the re-specified model in study 2 were tested.

8.6.2.8 Multiple-group structural equation modelling

A multi group analyses were conducted following the testing of the final structural model. When a variable is observed to change the interaction effect between exogenous and endogenous variable, it is called moderator variable (Keikhosrokiani et al., 2018). Moderator variable can be metric like psychological constructs, etc. or categorical such as gender, social class and so on but for multi-group comparison, categorical type is preferred (Baron and Kenny, 1986; Henseler and Fassott, 2010).

Group differences were analyzed using samples t-tests for all the relations proposed in the final model. First regression analyses were conducted for structural model for women and men. In order to understand the differences, the standard estimates with their significance levels were observed for all hypotheses proposed in the final model. The results are presented in Table 50.

There are 307 women and 129 men in the sample. The goodness of fit values of model for both women and men are at acceptable levels. In one path, differences were found. The path between performance expectancy and intention to use was insignificant for men whereas it was significant for women with estimate 0.037 (p value = 0.037 < 0.050).

Table 50. Factors Affecting LMS Adoption: Regression Analysis Results for Gender

Standardized Regression Weights: Gender						
			Women		Men	
Sample Size			307		129	
Model Fit			CMIN/df=2.814, GFI:.981, CFI=.994, TLI=.970, NFI=.991, RMSEA=.065, P=.035			
Path*			Estimate	P value	Estimate	P Value
Effort Expectancy	<--	Perceived Playfulness Teacher's perspective	0.278	***	0.409	***
Performance Expectancy	<--	E -Learning Self Efficacy	0.164	***	0.219	0.003
Performance Expectancy	<--	Perceived Learning Opportunities	0.556	***	0.488	***
Effort Expectancy	<--	Social Influence_	0.304	***	0.28	***
Performance Expectancy	<--	Perceived Playfulness Teacher's perspective	0.267	***	0.247	0.001
Effort Expectancy	<--	E -Learning Self Efficacy	0.355	***	0.291	***
Intention To Use	<--	Social Influence_	0.043	0.341	-0.106	0.206
Intention To Use	<--	Perceived Playfulness Teacher's Perspective	0.078	0.248	0.159	0.191
Intention To Use	<--	Perceived Playfulness Student's Perspective	0.027	0.672	0.173	0.17
Intention To Use	<--	Perceived Learning Opportunities	0.159	0.069	-0.029	0.852
Intention To Use	<--	Self-Management of Learning	-0.016	0.659	0.015	0.801
Intention To Use	<--	E -Learning Self Efficacy	0.386	***	0.676	***
Intention To Use	<--	Performance Expectancy	0.171	0.037	-0.121	0.257
Intention To Use	<--	Effort Expectancy	0.079	0.139	0.13	0.212

***p value=0.000

Secondly, regression analyses were conducted to the structural model for voluntariness of use. Standard estimates and significance levels in these two groups were observed to see if there are any differences in relationships proposed in the final model. The results are listed in Table 51.

There were differences in two paths. Perceived learning opportunities was found to have significant positive impact on intention to use for the group who indicated, using LMS is compulsory in their institution, whereas this path was found insignificant for the group who indicated LMS use is voluntary in their institution.

Table 51. Factors Affecting LMS Adoption: Regression Analysis Results for Voluntariness of Use

Standardized Regression Weights: Voluntariness of Use						
			Yes		No	
Sample Size			292		141	
Model fit			CMIN/df=2.636, GFI:.983, CFI=.995, TLI=.972, NFI=.991, RMSEA=.062, P=.091			
Path*			Estimate	P value	Estimate	P Value
Effort Expectancy	<--	Perceived Playfullnes Teacher's perspective	0.371	***	0.178	0.014
Performance Expectancy	<--	E -Learning Self Efficacy	0.183	***	0.172	0.003
Performance Expectancy	<--	Perceived Learning Opportunities	0.514	***	0.575	***
Effort Expectancy	<--	Social Influence_	0.314	***	0.334	***
Performance Expectancy	<--	Perceived Playfullnes Teacher's perspective	0.275	***	0.227	***
Effort Expectancy	<--	E -Learning Self Efficacy	0.272	***	0.458	***
Intention To Use	<--	Social Influence_	-0.071	0.168	0.099	0.126
Intention To Use	<--	Perceived Playfullnes Teacher's perspective	0.123	0.083	0.013	0.895
Intention To Use	<--	Perceived Playfullnes Student's Perspective	0.065	0.328	0.032	0.77
Intention To Use	<--	Perceived Learning Opportunities	0.063	0.467	0.311	0.037
Intention To Use	<--	Self-Management of Learning	-0.066	0.076	0.045	0.461
Intention To Use	<--	E -Learning Self Efficacy	0.542	***	0.362	***
Intention To Use	<--	Performance Expectancy	0.083	0.273	0.085	0.46
Intention To Use	<--	Effort Expectancy	0.143	0.019	-0.001	0.986

***p value=0.000

Effort expectancy was found to have positive impact on intention to use construct at a significant level for the group who indicated that LMS use is voluntary whereas the path was found to be insignificant for the group who indicated LMS use is compulsory.

Standard regression weights for LMS users and non LMS users were also observed. Results showed differences in two paths. Perceived playfulness (teacher's perspective) was found to have significant impact on usage intentions of teachers who used LMS before with estimate 0.171 and p value 0.015 which is less than the threshold value (0.050). For teachers who did not use LMS before, perceived playfulness (teacher's perspective) did not have significant impact on usage intention.

Perceived learning opportunities had positive impact on usage intention at significant level for teachers who did not use LMS before whereas there is no significant impact in this path for teachers who used LMS before. Regression results are presented in Table 52.

Regression analyses were conducted for different experience groups. There were six different year intervals to be chosen from in the questionnaire. However, since total number of teachers with 31-40 years of experience and 40 and above years of experience is 40, it is decided to merge these two groups in to one group and it was named 31 and above years of experience as shown on the Table 53.

Differences were observed in eight paths in different experience groups. Perceived playfulness (teacher's perspective) construct were found to have no significant impact on effort expectancy for teachers experienced 0-5 years, on the other hand in all other experience groups there is a significant relationship. Social influence construct was found to have significant positive impact on effort

expectancy construct for all experience groups except 31 and above years of experience group.

Table 52. Factors Affecting LMS Adoption: Regression Analysis Results for Use

Standardized Regression Weights: LMS USE						
			Yes		No	
Sample Size			294		153	
Model Fit		CMIN/df=2.238, GFI:.985, CFI=.996,	TLI=.980, NFI=.983, RMSEA=.053, P=.096			
Path*			Estimate	P value	Estimate	P Value
Effort Expectancy	<-	Perceived Playfullnes Teacher's perspective	0.349	***	0.243	***
Performance Expectancy	<-	E -Learning Self Efficacy	0.165	***	0.219	***
Performance Expectancy	<-	Perceived Learning Opportunities	0.519	***	0.538	***
Effort Expectancy	<-	Social Influence_	0.293	***	0.35	***
Performance Expectancy	<-	Perceived Playfullnes Teacher's Perspective	0.29	***	0.216	***
Effort Expectancy	<-	E -Learning Self Efficacy	0.308	***	0.383	***
Intention To Use	<-	Social Influence_	-0.049	0.339	0.115	0.065
Intention To Use	<-	Perceived Playfullnes Teacher's Perspective	0.171	0.015	-0.104	0.282
Intention To Use	<-	Perceived Playfullnes Student's Perspective	0.084	0.228	0.04	0.673
Intention To Use	<-	Perceived Learning Opportunities	0.112	0.212	0.323	0.012
Intention To Use	<-	Self-Management of Learning	-0.069	0.072	0.061	0.277
Intention To Use	<-	E -Learning Self Efficacy	0.504	***	0.374	***
Intention To Use	<-	Performance Expectancy	0.025	0.75	0.13	0.203
Intention To Use	<-	Effort Expectancy	0.092	0.13	0.027	0.72

Perceived playfulness (teacher's perspective) was found to have significant positive impact on performance expectancy construct for all experience groups except 31 years and above experience group. Path from e-learning self efficacy construct to effort expectancy construct was found to be significant for all experience groups except 21-30 years of experience group. Perceived playfulness (teacher's perspective) was found to have significant impact on usage intentions of teachers with experience 21-30 years only with standard estimate 0.345 and p value 0.006 which is below threshold, for the rest of the groups the relation was found to be

insignificant. Perceived playfulness (student's perspective) were found to have significant positive impact on intention to use of teachers with 0-5 years of experience with standard estimate 0.316, the relationship is insignificant for the rest of the groups. The relationship between performance expectancy and intention to use was found to be significant only in the experience group 11-20 years.

Table 53. Factors Affecting LMS Adoption Regression Analysis Results Experience

Standardized Regression Weights: Experience											
			0-5 Years		6-10 Years		11-20 Years		21-30 Years		31 And Above	
Sample Size			85		83		153		84		40	
Model Fit:			CMIN/df=1.749, GFI:.972, CFI=.994, TLI=.971, NFI=.987, RMSEA=.041, P=.000									
Path*			Estimate	P value	Estimate	P Value	Estimate	P Value	Estimate	P Value	Estimate	P Value
Effort Expectancy	<--	Perceived Playfullnes Teacher's perspective	0.07	0.41	0.20	0.02	0.45	***	0.34	***	0.67	***
Performance Expectancy	<--	E -Learning Self Efficacy	0.08	0.35	0.24	0.00	0.20	***	0.36	***	0.08	0.47
Performance Expectancy	<--	Perceived Learning Opportunities	0.55	***	0.38	***	0.62	***	0.42	***	0.51	0.01
Effort Expectancy	<--	Social Influence_	0.28	0.00	0.41	***	0.27	***	0.46	***	0.12	0.20
Performance Expectancy	<--	Perceived Playfullnes Teacher's perspective	0.34	***	0.36	***	0.18	0.00	0.21	0.01	0.34	0.08
Effort Expectancy	<--	E -Learning Self Efficacy	0.60	***	0.37	***	0.24	***	0.12	0.21	0.20	0.03
Intention To Use	<--	Social Influence	0.11	0.15	0.01	0.93	0.06	0.36	-0.04	0.74	-0.13	0.38
Intention To Use	<--	Perceived Playfullnes Teacher's perspective	-0.04	0.68	0.05	0.75	0.04	0.67	0.35	0.01	0.19	0.55
Intention To Use	<--	Perceived Playfullnes Student's Perspective	0.32	0.00	0.02	0.89	0.07	0.45	-0.13	0.39	-0.38	0.16
Intention To Use	<--	Perceived Learning Opportunities	0.26	0.11	0.26	0.13	-0.03	0.82	0.32	0.03	0.26	0.42
Intention To Use	<--	Self-Management of Learning	-0.04	0.45	-0.04	0.56	-0.05	0.34	-0.03	0.67	0.14	0.18
Intention To Use	<--	E -Learning Self Efficacy	0.30	0.00	0.62	***	0.41	***	0.49	***	0.35	0.02
Intention To Use	<--	Performance Expectancy	0.15	0.17	-0.23	0.14	0.26	0.05	-0.01	0.93	0.26	0.19
Intention To Use	<--	Effort Expectancy	-0.08	0.35	0.18	0.14	0.16	0.06	-0.06	0.59	0.22	0.34

Regression analyses were conducted to the structural model for age of teachers. There were five different age groups to be chosen from in the questionnaire. However, since there were only nine respondents in age group above 60 years old and total number of teachers who are 51 to 60 years old plus those who are above 60 years old was sixty-three, it is decided to merge these two groups in to one group and it was named 51 years old and above as shown on the Table 54. Standard estimates and significance levels in these four groups were observed to see if there were any differences in relationships proposed in the final model. Results are presented in Table 54. Differences were observed in six different paths for different age groups.

Perceived playfulness (teacher's perspective) construct were found to have no significant impact on effort expectancy for teachers aged between 20 and 30 years old, on the other hand in all other age groups there is a significant relationship. This was found in line with experience variable. For teachers with 0-5 years of experience this relation was found insignificant.

Perceived playfulness (teacher's perspective) construct were found to have no significant impact on performance expectancy for teachers aged between 51 years old and above, there is a significant relationship in all other age groups. E-learning self efficacy construct's impact on effort expectancy was found to be insignificant for teachers aged 51 years old and above, there is a significant positive relationship in all other age groups.

Social influence construct was found to have significant negative impact on intention to use construct for teachers aged 51years old and above with standard estimate -0.255 and p value = 0.025 < 0.05, whereas this relationship is insignificant for all other age groups.

Table 54. Factors Affecting LMS Adoption: Regression Analysis Results for Age

Standardized Regression Weights: Age										
			20-30		31-40		41-50		51 and Above	
Sample Size			104		174		105		63	
Model Fit:			CMIN/df=2.031, GFI:.974, CFI=.993, TLI=.967, NFI=.988, RMSEA=.048, P=.004							
Path*			Estimate	P value	Estimate	P Value	Estimate	P Value	Estimate	P Value
Effort Expectancy	< --	Perceived Playfullnes Teacher's perspective	0.06	0.49	0.36	***	0.38	***	0.61	***
Performance Expectancy	< --	E -Learning Self Efficacy	0.16	0.03	0.22	***	0.15	0.03	0.23	0.01
Performance Expectancy	< --	Perceived Learning Opportunities	0.51	***	0.46	***	0.57	***	0.64	***
Effort Expectancy	< --	Social Influence_	0.32	***	0.32	***	0.24	0.00	0.27	0.00
Performance Expectancy	< --	Perceived Playfullnes Teacher's perspective	0.31	***	0.30	***	0.26	***	0.08	0.43
Effort Expectancy	< --	E -Learning Self Efficacy	0.56	***	0.29	***	0.32	***	0.08	0.35
Intention To Use	< --	Social Influence	0.06	0.34	0.06	0.39	0.09	0.33	-0.26	0.03
Intention To Use	< --	Perceived Playfullnes Teacher's perspective	0.09	0.28	0.06	0.61	0.08	0.51	0.32	0.10
Intention To Use	< --	Perceived Playfullnes Student's Perspective	0.25	0.01	-0.03	0.72	0.10	0.38	-0.15	0.42
Intention To Use	< --	Perceived Learning Opportunities	0.32	0.03	0.06	0.63	0.06	0.65	0.20	0.40
Intention To Use	< --	Self-Management of Learning	-0.05	0.30	-0.01	0.80	-0.10	0.14	0.05	0.60
Intention To Use	< --	E -Learning Self Efficacy	0.31	0.00	0.56	***	0.47	***	0.42	***
Intention To Use	< --	Performance Expectancy	0.03	0.80	0.03	0.82	0.21	0.08	0.07	0.68
Intention To Use	< --	Effort Expectancy	-0.05	0.55	0.18	0.03	-0.01	0.92	0.20	0.19

Perceived playfulness (student's perspective) construct were found to have significant positive impact on intention to use for teachers who are 20 to 30 years old, with standard estimate 0.249 and p value = 0. 01 < 0. 05. This relationship is insignificant for all other age groups. This finding is in line with the findings in

experience groups. Relationship was found to be significant for teachers who have 0 to 5 years of experience. This shows us that younger teachers put more emphasis on LMS's playfulness features for students. Game based learning is a fairly new concept in Turkish education system. In order to increase usage of LMSs among teachers, institutions should focus on trainings that shows opportunities provided by game based learning tools and playfulness elements' positive effect on learning outcomes.

Effort expectancy construct was found to have positive significant impact on intention to use construct for teachers aged between 31 and 40 years old whereas the relationship was found to be insignificant for all other age groups.

Finally, regression analyses were conducted to the structural model for course type of teachers. There were eleven different course type options were listed in questionnaire including 'others' option. Some groups were merged to reach the required minimum for sample size for regression analysis. Regression analyses were conducted for five groups. These five groups' details and samples size were listed in Table 55.

Table 55. Sample Sizes of Course Type Groups

Course Type	Sample Size
Primary School Class Teachers	92
Social Science, Turkish Literature, Counselling,Religion & Ethics Teachers	100
Science and Mathematics Teachers	122
Foreign Languages Teachers	68
Music, Physical Education, Arts and Others Teachers	65

Differences were observed in seven different paths. Perceived playfulness (teacher's perspective) construct were found to have no significant impact on effort expectancy construct for foreign language teachers, on the other hand in all other course type teachers there is a significant relationship. E-learning self efficacy

construct were found to have no significant impact on performance expectancy constructs for primary school class teachers and for science and mathematics teachers whereas the relationship is significant for other teacher groups. Social influence was found to have positive significant impact on effort expectancy for all course type groups excluding primary school class teachers. Perceived playfulness (teacher's perspective) construct were found to have no significant impact on intention to use for all course type groups excluding music, physical education, arts and others teachers. Perceived learning opportunities construct were found to have no significant impact on intention to use for all course type groups excluding social sciences, Turkish literature, counselling and religion & ethics teachers. Self-management of learning construct were found to have no significant impact on intention to use for all course type groups excluding music, physical education, arts and others teachers. Performance expectancy construct was found to have no significant impact on intention to use for all course type groups excluding social sciences, Turkish literature, counselling and religion & ethics teachers.

Table 56. Regression Analysis Results for Course Type

Standardized Regression Weights: Course Type											
			Primary Class		Social Sciences		Science & Math		Foreign Languages		Music, PE, Arts and Other	
Sample Size			92		100		122		68		65	
Model Fit:			CMIN/df=2.038, GFI:.968, CFI=.992, TLI=.958, NFI=.985, RMSEA=.048, P=.000									
Path*			Estimate	P value	Estimate	P Value	Estimate	P Value	Estimate	P Value	Estimate	P Value
Effort Expectancy	< --	Perceived Playfullnes Teacher's perspective	0.46	***	0.40	***	0.19	0.02	0.21	0.08	0.20	0.04
Performance Expectancy	< --	E - Learning Self Efficacy	0.09	0.09	0.18	0.03	0.13	0.07	0.25	0.00	0.36	***
Performance Expectancy	< --	Perceived Learning Opportunities	0.69	***	0.57	***	0.43	***	0.49	***	0.41	***
Effort Expectancy	< --	Social Influence	0.09	0.12	0.35	***	0.31	***	0.44	***	0.45	***
Performance Expectancy	< --	Perceived Playfullnes Teacher's perspective	0.21	0.00	0.20	0.01	0.40	***	0.26	0.00	0.21	0.03
Effort Expectancy	< --	E - Learning Self Efficacy	0.44	***	0.18	0.02	0.46	***	0.29	0.02	0.29	0.00
Intention To Use	< --	Social Influence	-0.07	0.31	0.13	0.19	-0.06	0.56	0.08	0.40	-0.05	0.65
Intention To Use	< --	Perceived Playfullnes Teacher's perspective	0.24	0.08	-0.04	0.68	0.17	0.20	0.00	0.99	0.40	***
Intention To Use	< --	Perceived Playfullnes Student's Perspective	0.08	0.54	-0.01	0.91	0.04	0.76	0.00	0.99	-0.05	0.68
Intention To Use	< --	Perceived Learning Opportunities	0.26	0.17	0.35	0.01	-0.05	0.79	-0.06	0.76	0.09	0.52
Intention To Use	< --	Self-Management of Learning	0.12	0.11	-0.10	0.05	0.00	0.99	-0.09	0.27	0.14	0.05
Intention To Use	< --	E - Learning Self Efficacy	0.24	0.01	0.33	***	0.49	***	0.72	***	0.69	***
Intention To Use	< --	Performance Expectancy	-0.06	0.70	0.24	0.02	0.06	0.68	0.06	0.74	-0.17	0.16
Intention To Use	< --	Effort Expectancy	0.14	0.18	0.00	1.00	0.22	0.05	0.17	0.13	-0.05	0.64

8.6.2.9 Testing effect of gender on constructs

Independent samples t test was conducted to test the effect of different gender groups on the constructs in the final model. Means of the two groups were observed to see if the difference is significant. The results are listed in Table 57. Significant difference is observed between male and female participants' evaluation on six out of nine constructs. The significant difference between means were observed for effort expectancy, social influence, perceived playfulness (teacher's perspective), perceived learning opportunities, e-learning self efficacy and intention to use. There is no significant difference between means of female and male group for perceived playfulness (students' perspective), performance expectancy and self-management of learning.

8.6.2.10 Testing effect of voluntariness of use on constructs

Samples t test were conducted to two groups that stated their use of LMS based on voluntariness or not to see if there is a significant differences in their evaluation of constructs. The only significant difference observed between means of two groups was for e-learning self efficacy construct. No significant difference were observed in other constructs' evalution. Results are presented in Table 58.

8.6.2.11 Testing effect of users and non-users on construct

Samples t test were conducted to see if there is any difference between LMS users and non-users in their evaluation of all constructs in the final model. As presented in Table 59, no significant difference between means of LMS users and non-users was observed.

Table 57. Independent Samples t Test Results of the difference between Female and Male Teachers in Study 2

Levene's Test for Equality of Variances				t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Effort Expectancy	Equal variances assumed	17.9	0	-2.3	434	0.02	-0.38	0.17	-0.71	-0.06
	Equal variances not assumed			-2.1	197.4	0.04	-0.38	0.18	-0.74	-0.02
Social Influence	Equal variances assumed	6.02	0	-2.7	434	0.01	-0.45	0.16	-0.77	-0.13
	Equal variances not assumed			-2.6	213.7	0.01	-0.45	0.17	-0.79	-0.11
Perceived Playfullnes Teacher's perspective	Equal variances assumed	7.1	0	-2.7	434	0.01	-0.42	0.16	-0.73	-0.11
	Equal variances not assumed			-2.5	209.3	0.01	-0.42	0.17	-0.76	-0.09
Perceived Playfulness Student's perspective	Equal variances assumed	2.8	0.1	-2.3	434	0.02	-0.37	0.16	-0.68	-0.05
	Equal variances not assumed			-2.2	219.1	0.03	-0.37	0.17	-0.7	-0.03
Perceived Learning Opportunities	Equal variances assumed	11.4	0	-2.3	434	0.02	-0.37	0.16	-0.67	-0.06
	Equal variances not assumed			-2.2	203.7	0.03	-0.37	0.17	-0.7	-0.03
Performance Expectancy	Equal variances assumed	3.87	0.1	-1.9	434	0.06	-0.33	0.17	-0.66	0.01
	Equal variances not assumed			-1.8	214.8	0.07	-0.33	0.18	-0.68	0.03
Self-Management of Learning	Equal variances assumed	1.38	0.2	-2	434	0.05	-0.3	0.16	-0.61	0
	Equal variances not assumed			-1.9	222	0.06	-0.3	0.16	-0.62	0.02
E -Learning Self Efficacy	Equal variances assumed	4.47	0	-2.2	434	0.03	-0.33	0.15	-0.62	-0.03
	Equal variances not assumed			-2.1	212	0.04	-0.33	0.16	-0.64	-0.01
Intention To Use	Equal variances assumed	9.84	0	-2.9	434	0	-0.51	0.18	-0.86	-0.16
	Equal variances not assumed			-2.7	205.3	0.01	-0.51	0.19	-0.89	-0.13

Table 58. Independent Samples t Test Results of the difference between Groups based on their Voluntariness of Use in Study 2

	Levene's Test for Equality of Variances			t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Effort Expectancy	Equal variances assumed	0.03	0.87	-2.52	431.00	0.01	-0.41	0.16	-0.73	-0.09
	Equal variances not assumed			-2.59	296.95	0.01	-0.41	0.16	-0.72	-0.10
Social Influence	Equal variances assumed	0.10	0.76	-4.38	431.00	0.00	-0.69	0.16	-1.00	-0.38
	Equal variances not assumed			-4.49	296.29	0.00	-0.69	0.15	-0.99	-0.39
Perceived Playfullnes Teacher's perspective	Equal variances assumed	0.42	0.52	-3.70	431.00	0.00	-0.57	0.15	-0.88	-0.27
	Equal variances not assumed			-3.74	284.52	0.00	-0.57	0.15	-0.87	-0.27
Perceived Playfulness Student's Perspective	Equal variances assumed	3.75	0.05	-3.36	431.00	0.00	-0.53	0.16	-0.83	-0.22
	Equal variances not assumed			-3.28	260.93	0.00	-0.53	0.16	-0.84	-0.21
Perceived Learning Opportunities	Equal variances assumed	2.08	0.15	-3.95	431.00	0.00	-0.59	0.15	-0.89	-0.30
	Equal variances not assumed			-3.92	272.12	0.00	-0.59	0.15	-0.89	-0.30
Performance Expectancy	Equal variances assumed	2.33	0.13	-3.37	431.00	0.00	-0.56	0.17	-0.88	-0.23
	Equal variances not assumed			-3.34	270.02	0.00	-0.56	0.17	-0.89	-0.23
Self-Management of Learning	Equal variances assumed	0.01	0.94	-1.56	431.00	0.12	-0.24	0.16	-0.55	0.06
	Equal variances not assumed			-1.56	275.82	0.12	-0.24	0.16	-0.55	0.06
E -Learning Self Efficacy	Equal variances assumed	4.64	0.03	-3.31	431.00	0.00	-0.48	0.15	-0.77	-0.20
	Equal variances not assumed			-3.22	258.22	0.00	-0.48	0.15	-0.77	-0.19
Intention To Use	Equal variances assumed	2.73	0.10	-3.63	431.00	0.00	-0.62	0.17	-0.96	-0.29
	Equal variances not assumed			-3.58	268.33	0.00	-0.62	0.17	-0.97	-0.28

Table 59. Independent Samples t Test Results of the difference between LMS Users and Non LMS Users in Study 2

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Effort Expectancy	Equal variances assumed	0.00	0.98	-2.83	445.00	0.01	-0.44	0.16	-0.75	-0.14
	Equal variances not assumed			-2.90	327.29	0.00	-0.44	0.15	-0.74	-0.14
Social Influence	Equal variances assumed	0.69	0.41	-4.61	445.00	0.00	-0.70	0.15	-1.00	-0.40
	Equal variances not assumed			-4.61	307.04	0.00	-0.70	0.15	-1.01	-0.40
Perceived Playfullnes Teacher's perspective	Equal variances assumed	0.12	0.73	-3.33	445.00	0.00	-0.50	0.15	-0.79	-0.20
	Equal variances not assumed			-3.36	316.82	0.00	-0.50	0.15	-0.79	-0.21
Perceived Playfulness Student's Perspective	Equal variances assumed	2.66	0.10	-3.35	445.00	0.00	-0.51	0.15	-0.80	-0.21
	Equal variances not assumed			-3.27	288.09	0.00	-0.51	0.15	-0.81	-0.20
Perceived Learning Opportunities	Equal variances assumed	2.24	0.14	-3.45	445.00	0.00	-0.50	0.15	-0.79	-0.22
	Equal variances not assumed			-3.39	293.05	0.00	-0.50	0.15	-0.80	-0.21
Performance Expectancy	Equal variances assumed	2.11	0.15	-2.90	445.00	0.00	-0.46	0.16	-0.78	-0.15
	Equal variances not assumed			-2.85	292.92	0.01	-0.46	0.16	-0.79	-0.14
Self-Management of Learning	Equal variances assumed	0.00	0.99	-0.87	445.00	0.38	-0.13	0.15	-0.42	0.16
	Equal variances not assumed			-0.87	307.27	0.38	-0.13	0.15	-0.43	0.16
E -Learning Self Efficacy	Equal variances assumed	3.44	0.06	-2.80	445.00	0.01	-0.39	0.14	-0.67	-0.12
	Equal variances not assumed			-2.74	290.13	0.01	-0.39	0.14	-0.68	-0.11
Intention To Use	Equal variances assumed	1.37	0.24	-3.05	445.00	0.00	-0.51	0.17	-0.84	-0.18
	Equal variances not assumed			-3.03	301.81	0.00	-0.51	0.17	-0.84	-0.18

8.6.2.12 Testing effect of experience year on all constructs

Since experience year intervals were more than 2, one-way ANOVA was conducted. No significant difference was reported between different experience groups. The results are listed in Table F1 in Appendix F.

8.6.2.13 Testing effect of age on all constructs

ANOVA was conducted to observe if there is any significant difference in evaluation of the constructs in final model between different age groups. However, no significant difference was observed. The results are shown in Table F2 in Appendix F.

8.6.2.14 Testing effect of course type on all constructs

ANOVA was conducted lastly for course type variable. Differences among means of groups of teachers of different course types were observed. Significant difference in evaluation of perceived playfulness (teacher's perspective) construct was observed. No other significant difference was observed. All ANOVA results are listed in Table F3 in Appendix F.

In evaluation of perceived playfulness (teacher's perspective) construct most significant differences were observed between science and mathematics teachers and foreign language teachers where the mean difference is 0.58. Second most significant difference observed is between music, Physical Education and others teacher group and foreign language teachers where mean difference is 0.55. The mean differences observed in evaluation of perceived playfulness (teacher's perspective), between all course type teacher groups are listed in Table 60.

Table 60. ANOVA Results for Course Type Comparisons in Perceived Playfulness (Teacher's Perspective) Construct

Dependent Variable	(I) Course Type	(J) Course Type	Mean Difference (I-J)	Std Error	Sig	95% Confidence Interval		P
						Lower Bound	Upper Bound	
Perceived Playfulness Teacher's perspective	PT	SS	-0.31	0.22	0.61	-0.91	0.29	0.046
		S&M	-0.43	0.21	0.23	-1.01	0.14	
		FL	0.15	0.24	0.97	-0.51	0.81	
		M.PE & Others	-0.40	0.24	0.47	-1.07	0.27	
	SS	PT	0.31	0.22	0.61	-0.29	0.91	
		S&M	-0.12	0.20	0.97	-0.68	0.43	
		FL	0.46	0.24	0.30	-0.19	1.11	
		M.PE & Others	-0.09	0.24	1.00	-0.75	0.57	
	S&M	PT	0.43	0.21	0.23	-0.14	1.01	
		SS	0.12	0.20	0.97	-0.43	0.68	
		FL	0.58	0.23	0.08	-0.04	1.21	
		M.PE & Others	0.03	0.23	1.00	-0.60	0.67	
	FL	PT	-0.15	0.24	0.97	-0.81	0.51	
		SS	-0.46	0.24	0.30	-1.11	0.19	
		S&M	-0.58	0.23	0.08	-1.21	0.04	
		M.PE & Others	-0.55	0.26	0.22	-1.27	0.17	
	M.PE & Others	PT	0.40	0.24	0.47	-0.27	1.07	
		SS	0.09	0.24	1.00	-0.57	0.75	
		S&M	-0.03	0.23	1.00	-0.67	0.60	
		FL	0.55	0.26	0.22	-0.17	1.27	

CHAPTER 9

FACTORS AFFECTING LMS ADOPTION IN EDUCATION: DISCUSSION OF THE RESULTS

In this chapter, we discuss the findings of our final model test in study 2. Based on UTAUT and previous studies, a theoretical model was proposed to observe the factors affecting adoption and use of LMS by adding five constructs related to education context, self-management of learning, perceived playfulness (teacher's perspective), perceived playfulness (student's perspective), e-learning self efficacy and perceived learning opportunities to three factors from UTAUT. This study' aim is to apply UTAUT to adoption of technology in education.

The results indicate that e-learning self efficacy, perceived learning opportunities, and perceived playfulness (teacher's perspective) were significant determinants of behavioral intention to use LMS.

Contrary to findings in literature, in final model in study 2 the relation between performance expectancy and intention to use was not supported. However, multiple group analysis for gender showed that performance expectancy have positive direct effect on intention to use for female teachers. The relation is insignificant for male teachers. This shows that female teachers with high performance expectancy is more likely to adopt LMS than a female teacher with lower performance expectancy. Also, sample t-tests showed that, even if there is no significant difference in evaluation of performance expectancy between female and male teachers, evaluation of intention to use between females and males are significantly different from each other.

Secondly in experience groups the relation between performance expectancy and intention to use was found to be significant for teachers with 11 to 20 years of experience. Lastly in social science, literature, counselling and ethics teachers group the relation was found significant. Therefore, it is believed that teachers of these two groups who have higher performance expectancy tend to have higher intention to use LMS.

Perceived learning opportunities was found to have significant effect on usage intention of LMS. Bourgonjon et al. used this construct in their study (2010) since they claimed that conceptualization of performance as used in technology acceptance literature is too restrictive. Performance indicators in business and education are different, so they created this new construct and found that it has positive significant impact on usage intention. Consistent with their findings (2010) the relation was found significant in this study. In addition to this finding another relation between perceived learning opportunities and performance expectancy that was proposed in the final model was also supported. This indicates that teachers who think that LMS will be useful in creating a better learning environment will positively affect their beliefs in using LMS will help them to get better rewards and performance in the end. So, teachers see the learning outcomes as the indicator of their performance.

In multi group analyses perceived learning opportunities was found to have significant positive effect on intention to use for teachers who indicated, use of LMS was compulsory in their institutions. The relation is insignificant for those who indicated, LMS use is based on teachers' voluntariness. Teachers who are obliged to use LMS with high perception of learning opportunities- meaning teachers believe

LMS creates a better learning environment - is more likely to have a positive attitude towards using LMS.

Also, perceived learning opportunities was found to have no significant impact on intention to use for LMS users, but there is significant relationship for LMS non-users. This shows that if LMS non-users expect LMS to create opportunities to makes improvements in learning outcomes, they are more likely to adopt LMS.

The results show that effort expectancy doesn't have direct significant impact on behavioral intention to use LMS in our study. However, in multi group analyses it is observed that effort expectancy had significant impact on intention to use for teachers who declared that using LMS was voluntary in their institution. This shows that when using LMS was not based on voluntariness, teachers' beliefs on the time and effort they need to put to use LMS do not have significant impact on their usage intention. In other words it is believed that teachers who indicated that using LMS is voluntary in their institution, expect LMS to be easy to use, to have more positive intention to use LMS. Effort expectancy was also found to have significant positive impact on teachers' behavioral intention to use LMS for teachers who aged between 31 and 40 years old.

The proposed relation between perceived playfulness (teacher's perspective) and effort expectancy was found to be significant. Therefore, we believe teachers think that LMSs which have fun features that makes them lost track of time while using them, are more likely to be easy to use.

It was also proposed with hypothesis 12 that social influence has positive direct impact on effort expectancy. The relation was found significant. This shows that teachers who perceive that important others believe he or she should use LMS,

also perceives that LMS would not require too much effort for them to learn how to use it. Once other users, colleagues and friends start using an LMS this persuades teachers that LMS is easy to use.

Contrary to findings in literature the relation between social influence and intention to use was not supported. In multi group analysis the relation was found significant for only the age group 51 years old and above, the relation was significant but negative.

Self-management of learning construct's positive direct impact on intention to use was also rejected in the final model's analyses. In multi group analyses significant positive relation between self-management of learning and intention to use was found for the group of music, physical education, arts and others teachers.

This observation is believed to be the result of approach to education in most institutions in Turkey. Teachers' beliefs on students' ability in managing their own studies should be examined more. Since parents, teachers and institutions' focus is national exam scores, most students do not have the freedom and responsibility to manage their own studies in Turkish education system. When the means for constructs were checked, the highest mean observed was for self-management of learning construct. The results are presented in Table E3 in Appendix E. This shows that teachers who rated 1 (Strongly Agree) to 7 (Strongly Disagree) all items, are least sure about self-management of learning skills of students compared to their evaluation of other constructs.

E-learning self- efficacy was found to have positive direct effect on intention to use. Teachers who feel experienced and think positively about their capacity in using LMS and producing desired outcomes, create a more positive attitude toward adopting that technology.

In line with the findings in literature, e-learning self efficacy was also found to have positive direct effect on both effort expectancy and performance expectancy. This shows us that teachers who feel confident about using LMS will also believe that LMS is easier to use and LMS would get them better outcomes and let them perform better.

Perceived playfulness (teacher's perspective) was found to have positive direct effect on teachers' intention to use LMS. Teachers who believe using LMS would be enjoyable and fun, so teachers who have higher playfulness perceptions towards using LMS had a higher intention to use LMS than those with lower playfulness perception. In literature, it is suggested that an individual likes to encounter challenges and experiences the greatest perceived playfulness when challenges and skills are matched (Csikszentmihalyi, 1975; Kiili, 2005; Woszczynski, Roth & Segars, 2002).

In addition to its effect on intention to use perceived playfulness (teacher's perspective) was found to have significant positive effect on performance expectancy. Teachers who have higher perception for playfulness, find LMS more beneficial and rewarding than those who have lower perception of playfulness.

Perceived playfulness (student's perspective) was found to have no significant impact on teachers' usage intention. This questionnaire was conducted among teachers. Analyses showed the significant positive effect of perceived playfulness (teacher's perspective) on teachers' intention to use while no significant impact of perceived playfulness (student's perspective) on teachers' intention to use LMS. While teachers' beliefs on LMS having fun features for their use affect them positively in their intention to use LMS, their beliefs on fun features of LMS for students' use don't significantly affect their decision in adoption of technology.

However, in multiple group analysis significant relationship was observed the 0-5 years of experience group. Teachers with 0 to 5 years of experience who have higher perception of playfulness for students' use, have higher intention to use LMS than those who believe LMS doesn't have fun features for students' use. Same significant relation was observed for the youngest teachers group. For teachers who aged 20 to 30 years old, perceived playfulness student's perspective had significant positive effect on their usage intention. This result reflects the effect of teachers' age on their evaluation of playfulness construct from student's perspective. Younger teachers put more emphasis on playfulness features for students' use of LMS in their technology adoption behavior compared to other age groups.

CHAPTER 10

IMPLICATIONS AND CONCLUSIONS

10.1 Summary and conclusions

Learning management systems have become major strategic component of education institutes. Efficient use of these technological platforms allow effective control of administration automisation, communication with users, teachers, students and parents, and content management. Many education institutes include these technological platforms as one of their value propositions in their marketing communications. While LMS developing companies claim that these technologies will have a positive effect on education management and learning environment, factors affecting teachers' beliefs on use of these innovations have not been fully defined, analysed or explained in previous literature. There are some research based on university students and faculty member however, there are very few research explaining primary and secondary school teachers' beliefs on LMS usage .This research attempted to fill this gap. This study can be a foundation for future research regarding learning management systems adoption and use of teachers in primary, secondary schools and universities.

This dissertation aimed to answer following questions: How university instructors' evaluation of tasks that can be done through learning management systems (LMSs) affect their perceptions about these technologies and also their intention to use? Do the evaluation of different type of tasks affect university instructors' perception of usefulness, perception of ease of use and their intention to use LMS? Do the perceived attributes of information technology (IT) innovations positively affect attitude toward usage intentions of IT innovations in the context of

LMSs? Do the individual characteristics of the users or potential users positively affect attitude toward usage intentions of IT innovations in the context of LMSs? Do the relationships in the research model vary in terms of the individual characteristics such as age, gender, experience, subject of teacher, and organizational level characteristic, voluntariness of use? Do the usage difference (users or non-users) have impact on the relationships proposed in this research?

A research model that was used to understand factors affecting adoption of LMS by primary and secondary school teachers was built on unified theory of acceptance and use of technology. Two surveys were prepared to collect data for current LMS use of university instructors and factors affecting LMS adoption research. Items for both surveys were adapted from relevant literature in the light of the exploratory study and context dynamics.

A hundred and fifteen faculty members completed the online survey and these 115 observations were used in analysis of the model for current LMS use of university instructors study.

Sixty-two primary and secondary school teachers completed online self completed survey and 390 primary and secondary school teachers from 20 different schools completed the printed survey for factors affecting LMS usage study. Total of 452 observations were obtained and observations reflected the target population in the study.

Regression analysis was conducted to understand the relation between external factors based on faculty members' evaluation of tasks and TAM items. The research model for research on factors affecting usage intention of primary and secondary school teachers was validated through confirmatory factor analysis (CFA) and revised accordingly. In factor analysis stage two approaches were adopted. In

study 1 all factors were analysed together, the model was revised however, was not tested due to its factor formation. On the other hand in study 2 factors were analysed separately. The revised model in study 2 was tested with structural equation modelling (SEM). Multi-group structural equation modelling was conducted for moderation analysis.

In current LMS use of university instructors study among assignment and assessment tasks 'distributing specifications for take-home activities such as assignments and projects' was found to have significant positive impact on both perceived usefulness and perceived ease of use. Faculty members' evaluation of only one task that is done through LMSs were found to have significant effect on two TAM constructs. When group differences were observed most significant differences were found between male and female instructors. Effect of three items which are:

- distributing specifications for take-home activities such as assignments and projects
- preparing and running online tests and quizzes, preparing and conducting on-line exams
- establishing a forum for discussionabout questions that arise in class activities

on perceived uselfulness and effect of one item which is:

- allowing students to submit assignment and project work

on perceived ease of use were found to be significant for female instructors. No such significant relation was found for male instructors.

Both perceived ease of use and perceived usefulness was found as significant indicators of instructors' usage intention. This finding did not change for male instructors. However findings show that perceived ease of use is not a significant

indicator of usage intention for female instructors. Perceived usefulness is powerful indicator of female instructors' intention to use.

In factors affecting LMS usage of primary and secondary school teachers study, e-learning self efficacy was found as the strongest positive determinant of the usage intention. Powerful positive relationships between e-learning self efficacy and performance expectancy and e-learning self efficacy and effort expectancy were proved. Perceived learning opportunities was also found to be a strong indicator of usage intention. While perceived playfulness (teacher's perspective) construct's positive impact on usage intention was proved, perceived playfulness (student's perspective) construct's impact was rejected. Perceived playfulness' (teacher's perspective) effect on performance expectancy and effort expectancy were added as two new relationships to model after CFA and both were found to be positive and significant. While social influence's effect on usage intention was rejected, its effect on effort expectancy was supported. Perceived learning opportunities was also found to have positive impact on performance expectancy.

Multi-group analyses indicated that performance expectancy has positive direct effect on usage intention for female teachers only. This relation was rejected in final model for all respondents. In our findings of the study explaining attitudes of instructors in Turkish universities towards use of LMS, perceived usefulness was also found as a significant indicator of intention to use for female instructors. Perceived ease of use's effect was found to be insignificant on intention to use for female instructors. Perceived usefulness and performance expectancy are referring to similar beliefs of users, and findings in both studies show that female's beliefs on LMS's positive effect on outcomes in their job have positive direct effect on their usage intention. Perceived learning opportunities' effect on usage intention was

found to be significant for group of teachers who indicated that LMS use is not voluntary in their institutions. On contrary performance expectancy's effect on usage intention was found to be significant for teachers who indicated that LMS use is voluntary in their institutions. In terms of LMS use perceived playfulness (teacher's perspective) was found to have significant impact on usage intention for those who have used LMS before. Perceived learning opportunities have significant positive impact on usage intention for those who have not used LMS before. Differences in relationships were observed in experience groups. Perceived playfulness' (student's perspective) effect on usage intention was found to be significant for teachers with 0 to 5 years of experience only, the relation was found to be significant for teachers who are 20 to 30 years old too. The relation was rejected in the model. Social influence was found to have significant impact on usage intention for only teachers who are 51 years old and over but the relation was negative.

Effect of control variables on evaluation of constructs were also tested. It is observed that there are a significant differences in evaluation of effort expectancy, social influence, perceived playfulness (teacher's perspective), perceived learning opportunities, e-learning self efficacy and intention to use between male and female teachers. The most significant difference in evaluation of perceived playfulness (teacher's perspective) was found between teachers of science mathematics and teachers of foreign language.

10.2 Contribution to theory and implications for researchers

This study has important theoretical implications concerning adoption and use of LMS in education context. One of the contributions of this study is examination of technology acceptance and use in end-user context. Sample used for factors affecting

LMS use research is also an important data contribution to theory since there are very few studies explored beliefs of primary and secondary schools teachers.

How faculty members' evaluation of tasks that can be done through LMSs affect their perception about these technologies were demonstrated by showing the relationships between members' evaluation of tasks and their perceptions of technology. Most significant indicator was found to be one of the assignment tasks which is 'distributing specifications for take-home activities such as assignments and projects'.

Following the study on faculty members' current LMS use, how individual and organizational characteristics influence the relationships in technology acceptance and use models was demonstrated in factors affecting LMS use study. Gender, age, experience, LMS use status, course type and voluntariness of use was explored. Moderation effect of these variables on relationships and on evaluation of constructs were explained in this study.

In this dissertation not only a holistic model defining the direct effects of perception of technological features and individual characteristics on usage intention was provided, but also four new relationships were proposed and supported. Constructs from UTAUT model was enriched with factors from education and game based learning literature. Effect of these factors on usage intention was tested and perceived playfulness (teacher's perspective) and perceieved learning opportunities constructs' effect on usage intention was found significant. As it was proposed in final model perceived playfulness (teacher's perspective) effect on both effeort expectancy and performance expectancy was found to be significant. Self-management of learning constructs effect on usage intention was rejected. In addition, as it was proposed in the final model perceived learning opporunities' effect

on performance expectancy was significant and strong. Lastly social influence was found to have significant positive impact on effort expectancy.

10.3 Implications for practitioners

Our findings have important implications for practitioners, especially for those specializing in educational technologies development, education management and school management. Developing technologies require deep understanding of technological features, individual characteristcs of target users as well as organizational characteristics of institutions. In addition to factors in business context LMS developers should take into account factors that are specific to education context.

Distributing specification for take home activities such as assingnments and projects were the most significant task in faculty members' perception of technology. Features that will simplify the process of distributing, collecting and evaluation of assignments should be developed to increase use. The study showed that most relations were insignificant for male istructors, while significant for female instructors. Institutions need to understand the source for this variation and develop training programs accordingly.

Perceived learning opportunities is a very effective innovation attribute. Therefore, developers should work with educators to understand the effective learning process, so should include features supporting this process in LMS design. In addition, developers should understand playfulness elements for both students and teachers very well before developing technologies. E-learning self efficacy is one the strongest indicators of usage intention. Both innovation developers and education managers should take into consideration the users' abilities in using technologies and organize effective on job trainings and provide support to users to increase usage.

Inovations attributes and individualistic characteristics that affect users' intention to use should be considered separately for different customer segments. Beliefs of teachers about these factors change according their age, experience or teaching subject. School managers should organize mixed groups of teachers from different age and experience groups to work on these perceptions of LMS, to increase LMS usage. Perception of teachers from different age groups and experience groups are different. Evaluation of percieved playfulness was observed to be significantly different between science and math teachers and foreign language teachers. Learning process and teaching techniques in different course types should be taken into account and features relevant to course type should be integrated in different subjects' modules in LMS design. Differences among evaluation of effort expectancy, social influence, perceived playfulness (teacher's perspective), perceived learning opportunities, e-learning self efficacy and intention to use was significantly different between male and female teachers. School and education managers should take into account these differences, so should provide a working environment accordingly to increase usage of LMS among both male and female teachers.

Lastly voluntariness of use affect the perceptions of users. Teacher trainings should aim to convince teachers about positive impact of LMS on tasks that should be completed and on learning environment. Demonstrating how much effort they will need to put to use these technologies, and what they will get in return may reduce teachers' concerns in their perception of effort expectancy.

10.4 Limitations and suggestions for future research

For current use of LMS study, effect of evaluation of different tasks by university instructors on TAM constructs were analysed and differences among different groups

were observed. Future studies may analyse the effect of evaluation of task technology fit on LMSs' usage intention and, on factors that affect usage intention in Turkish universities.

The data were collected via online forms for this study and 115 answers were collected. A wider field study can be conducted to reach a data with a better coverage of instructors in Turkish universities.

For factors affecting LMS adoption in primary and secondary schools study a complex model was built and tested in order to provide a comprehensive view. However, because of discriminant validity issues, the model that was revised after factor analysis of scale as a whole. The revised first model was not used due its factor formation. Instead, since all items were taken from different validated scales, all factors in preliminary research model were analysed separately, and items were dropped from constructs accordingly. Future studies may focus on discriminant validity issues of the scale by redefining some constructs and analyse the scale as a whole. The scale items can be redefined by using different wording that is more related to education and can be validated in education context.

The data were collected mostly from schools in İstanbul. Future studies should focus on collecting data from all around Turkey. To better observe the playfulness constructs' affect on usage an experimental study can be designed. This way playfulness level of technology can be controlled and its affect can be measured. Use intention of students would be expected to be an indicator of LMS adoption by teachers. An experimental study can be designed to observe students' usage of LMSs as well.

APPENDIX A

SURVEY USED FOR CURRENT USE AND ATTITUDE TOWARDS LMS IN THE TURKISH UNIVERSITIES STUDY

Use and Attitude Towards LMS (Learning Management Systems) In Universities

Learning Management System

This questionnaire was designed to understand the relationships between faculty members' use and attitude towards Learning Management Systems (LMSs).

A learning management system (LMS) is a software application for the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) courses or training programs. Learning management systems range from systems for managing training and educational records to software for distributing online or blended/hybrid college courses over the Internet with features for online collaboration, school districts, and schools use LMSs to deliver online courses and augment on-campus courses. LMSs also act to augment the lessons the teacher is giving in a brick and mortar environment, not just replace them. Most LMSs are web-based to facilitate access to learning content and administration. They are also used by educational institutions to enhance and support classroom teaching and offering courses to a larger population of learners.

Some examples to LMSs used by instructors are Blackboard, Moodle, Desire2Learn...etc.

Thanks is advance for your time.

1. What is your country of residence?
2. What is your age?
    - 20 - 30
    - 31 - 40
    - 41 - 50
    - 51 - 60
    - Over 60
3. What is your gender?
    - Male
    - Female

4. What is the highest level of education that you have completed?
    - Bachelor
    - Master
    - PhD or over

5. What is your university employment status?
    - Full time
    - Part time

6. What is your academic rank?
    - Professor
    - Associate Professor
    - Assistant Professor
    - Lecturer
    - Instructor
    - Research/teaching assistant

7. Please state your years of experience in teaching.

8. I teach in a .....
    - Private University
    - Public University

9. What is the department you are teaching at?
……..

10. How would you rate your skills as a computer user?
    - Non-user
    - Beginner
    - Intermediate
    - Advanced

Personal Experience Of Using LMS (Learning Management System)

11. Which statement best indicates how you use a LMS (Learning Management Syst em) in your current teaching duties? Please pick only one statement.

- My university does not provide a LMS for use in my work.
- My university has a LMS, but I don't use it.
- I use a LMS for some teaching activities.
- I use a LMS for many teaching activities.
- I use a LMS for almost all teaching activities.
- My university provides a LMS that is mandatory to use.

12. Which of the following LMS (Learning Management System) do you currently use?
Choose the one you use the most frequently

- Blackboard
- Moodle
- Desire2Learn
- Jusur
- Dokeos
- I don't use LMS.
- Others:

Preferred Use of LMS (Learning Management System)

13. A LMS (Learning Management System) includes facilities to help teachers in various aspects of their work. Please label the following activities from 1-4 to indicate the order ofimportance you assign using a LMS to assist with each activity, with 1 indicating the most important activity and 4 the least important.

- Course administration (managing class information, tracking student activities). 1 2 3 4
- Teaching delivery (providing materials and resources to students). 1 2 3 4
- Student testing (assessing and evaluating students). 1 2 3 4
- Class communication (communicating and collaborating with students). 1 2 3 4

14. Depending on how it is set up, the facilities provided by a LMS (Learning Management System) for a particular course can be restricted so that they are available only to authorised people. Which of the following statements best indicates the level of access you believe should apply for LMS resources in courses you teach? Please, pick only one statement.

•LMS resources should be available to everyone without restriction. LMS resources should be available to all teachers and students of my university, but to nobody else.
•LMS resources should be available to all teachers and students in my college, but to nobody else.
•LMS resources should be available to all teachers of my topics and students enrolled in my topics, but to nobody else.

•LMS resources should be available only to students who are enrolled in my topics.

15. A LMS (Learning Management System) provides tools for organizing resources in various ways. For example, all of the teaching handouts, activities, and assessment tasks for a particular week's classes could be grouped together. Or perhaps lecture notes could be grouped in one folder, tutorial materials in another, and assignments in yet another.

Whichof the following statements best describes your thoughts about how decisions about such matters should be made? Please, pick only one statement.

•Having materials organized in a consistent way in all courses a student studies will help students to be able to quickly find what they need.
•Each course is different, so each course will potentially need course materials organized differently. I would prefer to be able to choose the best organization for my own courses
•As a teacher, my job is to prepare and deliver the teaching materials. It should be someone else's job to decide how they are organized in a LMS.
•The arrangement of materials does not matter much. Students are generally able to find the materials they need no matter how the materials are organized.

16. Which statement best indicates your preference for when (or if) teaching handouts should be made available on a LMS (Learning Management System)?

•Teaching handouts should be available to all students before class.
•Teaching handouts for a particular class should be available to all students after the class has been delivered.
•Teaching handouts for a particular class should be available only after the class has been delivered and only to students who attended the class.
•Teaching handouts should not be made available to students.

17. A LMS (Learning Management System) provides tools that can be used to assess student understanding and provide feedback about their performance. Please indicate how important you think a LMS is for the following assessment-related tasks? Please choose one option for each statement.

•Distributing specifications for take-home activities such as assignments and projects.
Very Important Neutral Not Important Not Important at all

•Allowing students to submit assignment and project work.
Very Important Neutral Not Important Not Important at all

•Providing feedback about student performance in submitted work.

Very Important Neutral Not Important Not Important at all

•Preparing and running online tests and quizzes. Preparing and conducting on-line exams.
Very Important Neutral Not Important Not Important at all

•Allowing students to review their marks to verify accuracy before finalizing results.
Very Important Neutral Not Important Not Important at all

18. A LMS (Learning Management System) provides a variety of ways for lecturers to communicate and collaborate with their students about topic information. Please indicate how important you think an LMS is for the following communication tasks. Please choose one option for each statement.

•Reminding students when assignments and other assessment tasks are due.
Very Important Important Neutral Not Important Not Important at all

•Posting class notices such as hints about how to complete an assessment activity.
Very Important Important Neutral Not Important Not Important at all

•Broadcasting important announcements such as updates to assignment specifications or due dates.
Very Important Important Neutral Not Important Not Important at all

•Establishing a forum for discussion about questions that arise in class activities.
Very Important Important Neutral Not Important Not Important at all

•Integrating social media tools such as Facebook or Twitter into class activities.

LMS (Learning Management System) Acceptance

19. Based on your experience using LMS (Learning Management System) in your job, please indicate your level of agreement on with the following statements. (1=strongly disagree and 7 = strongly agree). 1 2 3 4 5 6 7

•I find LMS easy to use.
•Learning how to use LMS is easy for me.
•It is easy to become skillful at using LMS.
•I find it easy to get LMS to do what I want it to do.
•My interaction with LMS would be clear and understandable.
•Interaction with LMS does not require a lot of effort.
•Using LMS in my job would enable me to accomplish tasks more quickly.
•Using LMS would improve my job performance.
•Using LMS in my job would increase my productivity.
•Using LMS would enhance my effectiveness on the job.
•Using LMS would make it easier to do my job.

•I find LMS useful in my job.
•I will use LMS on a regular basis in the future.
•I will frequently use LMS in the future.
•Any Question or Comments?

20. Please state if you have any questions or comments.
…….

Thank you for your time.

APPENDIX B

DETAILS OF MULTIPLE REGRESSION ANALYSIS

Table B1. Multiple Regression Analysis for Age

		20-40					41 +				
Sample Size		68					47				
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta			B	Std. Error	Beta		
Perceived Usefulness (PU)	(Constant)	2.02	1.64		1.23	0.23	-0.34	2.35		-0.14	0.89
	ACT1	0.56	0.38	0.27	1.49	0.14	0.1	0.36	0.06	0.28	0.78
	ACT2	0.1	0.32	0.05	0.31	0.76	0.37	0.48	0.16	0.77	0.45
	ACT3	0.44	0.28	0.26	1.55	0.13	-0.15	0.31	-0.09	-0.49	0.62
	ACT4	0.02	0.39	0.01	0.04	0.97	0.28	0.26	0.22	1.07	0.29
	ACT5	-0.05	0.4	-0.04	-0.13	0.89	0.03	0.26	0.02	0.11	0.91
	ACT6	-0.04	0.26	-0.03	-0.17	0.86	0.26	0.29	0.18	0.89	0.38
	COM1	-0.26	0.33	-0.17	-0.78	0.44	0.64	0.4	0.32	1.61	0.12
	COM2	0.02	0.41	0.01	0.04	0.97	-0.05	0.37	-0.03	-0.15	0.88
	COM3	-0.03	0.33	-0.01	-0.08	0.93	0.22	0.4	0.1	0.56	0.58
	COM4	-0.03	0.26	-0.01	-0.1	0.92	-0.27	0.28	-0.18	-0.97	0.34
	COM5	0	0.2	0	-0.01	0.99	-0.15	0.24	-0.12	-0.62	0.54
Perceived Ease of Use (PEOU)	(Constant)	2.8	1.58		1.77	0.08	-0.85	1.91		-0.45	0.66
	ACT1	0.5	0.37	0.25	1.36	0.18	0.34	0.29	0.24	1.14	0.26
	ACT2	-0.08	0.31	-0.04	-0.25	0.81	0.33	0.39	0.17	0.85	0.4
	ACT3	0.42	0.27	0.26	1.54	0.13	-0.16	0.25	-0.11	-0.64	0.53
	ACT4	-0.32	0.38	-0.24	-0.84	0.4	-0.15	0.21	-0.15	-0.74	0.46
	ACT5	0.21	0.39	0.15	0.54	0.59	0.13	0.21	0.12	0.61	0.54
	ACT6	-0.23	0.25	-0.15	-0.92	0.36	0.3	0.23	0.24	1.27	0.21
	COM1	-0.1	0.32	-0.06	-0.3	0.77	0.36	0.32	0.21	1.13	0.27
	COM2	0.07	0.39	0.04	0.17	0.87	-0.17	0.3	-0.12	-0.56	0.58
	COM3	0.08	0.31	0.05	0.27	0.79	0.49	0.32	0.27	1.52	0.14
	COM4	-0.19	0.25	-0.11	-0.74	0.46	0.01	0.23	0.01	0.06	0.96
	COM5	0.13	0.19	0.1	0.65	0.52	-0.15	0.2	-0.14	-0.78	0.44
Intention to Use (IU)	(Constant)	3.53	1.68		2.1	0.04	-0.28	2.53		-0.11	0.91
	ACT1	0.02	0.39	0.01	0.04	0.96	0.21	0.39	0.12	0.55	0.59
	ACT2	0.22	0.32	0.11	0.69	0.49	0.1	0.52	0.04	0.19	0.85
	ACT3	0.34	0.29	0.2	1.16	0.25	-0.04	0.33	-0.02	-0.12	0.91
	ACT4	0.05	0.4	0.04	0.12	0.9	0.31	0.28	0.23	1.1	0.28
	ACT5	-0.25	0.41	-0.18	-0.61	0.54	-0.13	0.28	-0.1	-0.48	0.64
	ACT6	-0.06	0.26	-0.04	-0.23	0.82	-0.05	0.31	-0.03	-0.17	0.87
	COM1	0.04	0.34	0.03	0.12	0.9	0.16	0.43	0.07	0.37	0.72
	COM2	0.11	0.41	0.06	0.26	0.8	-0.13	0.39	-0.07	-0.32	0.75
	COM3	-0.17	0.33	-0.09	-0.5	0.62	0.95	0.43	0.42	2.23	0.03
	COM4	0.16	0.27	0.09	0.6	0.55	-0.06	0.31	-0.04	-0.21	0.83
	COM5	-0.05	0.21	-0.04	-0.25	0.81	-0.08	0.26	-0.06	-0.3	0.77

Table B2. Multiple Regression Analyses for Computer Skills

Regression Analysis: Computer Skills											
		Advanced					Intermediate				
Sample Size		73					42				
		Unstandardized Coefficients		Standardized Coefficients			Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.	B	Std. Error	Beta	t	Sig.
Perceived Usefulness (PU)	(Constant)	1.238	1.268		.976	.333	2.063	2.396		.861	.396
	ACT1	-.298	.254	-.175	-1.172	.246	.806	.417	.395	1.934	.063
	ACT2	1.005	.280	.534	3.589	.001	-1.025	.476	-.467	-2.155	.039
	ACT3	.102	.175	.081	.585	.561	.116	.442	.051	.262	.795
	ACT4	.124	.195	.120	.634	.528	.538	.423	.311	1.272	.213
	ACT5	-.127	.202	-.117	-.629	.532	-.223	.400	-.136	-.559	.580
	ACT6	-.088	.168	-.075	-.524	.602	.068	.431	.032	.159	.875
	COM1	.294	.212	.198	1.386	.171	-.640	.517	-.370	-1.239	.225
	COM2	.030	.239	.020	.124	.902	.246	.528	.121	.466	.645
	COM3	-.206	.224	-.121	-.919	.362	.650	.509	.301	1.278	.211
	COM4	.112	.165	.090	.677	.501	-.499	.453	-.211	-1.102	.279
	COM5	.076	.137	.075	.556	.580	.694	.382	.396	1.818	.079
Perceived Ease of Use (PEOU)	(Constant)	.540	1.179		.458	.648	2.945	2.233		1.319	.197
	ACT1	.255	.236	.166	1.080	.284	.460	.388	.250	1.186	.245
	ACT2	.471	.261	.276	1.809	.075	-.796	.443	-.402	-1.796	.083
	ACT3	-.014	.162	-.012	-.084	.933	.575	.412	.278	1.396	.173
	ACT4	-.149	.182	-.159	-.820	.415	-.022	.394	-.014	-.055	.956
	ACT5	.080	.188	.082	.426	.672	.044	.372	.030	.117	.907
	ACT6	-.047	.156	-.044	-.298	.767	-.292	.402	-.150	-.726	.473
	COM1	.135	.197	.101	.687	.495	-.317	.481	-.203	-.659	.515
	COM2	.346	.222	.253	1.559	.124	-.232	.492	-.127	-.471	.641
	COM3	-.079	.209	-.051	-.379	.706	.849	.474	.437	1.791	.083
	COM4	.106	.154	.094	.692	.492	-.533	.422	-.250	-1.264	.216
	COM5	-.002	.127	-.002	-.016	.987	.698	.356	.442	1.961	.059
Intention to Use (IU)	(Constant)	1.129	1.417		.797	.429	4.347	2.695		1.613	.117
	ACT1	-.227	.284	-.126	-.799	.427	.401	.469	.198	.856	.399
	ACT2	.669	.313	.335	2.138	.037	-.660	.535	-.303	-1.233	.227
	ACT3	.073	.195	.055	.376	.708	.096	.497	.042	.194	.848
	ACT4	.187	.218	.170	.857	.395	.450	.476	.263	.946	.352
	ACT5	-.305	.226	-.265	-1.347	.183	-.206	.450	-.126	-.458	.650
	ACT6	.033	.188	.026	.174	.863	-.351	.485	-.164	-.725	.474
	COM1	.312	.237	.199	1.319	.192	-.409	.581	-.238	-.704	.487
	COM2	-.037	.267	-.023	-.140	.889	.220	.594	.109	.370	.714
	COM3	.053	.251	.029	.212	.833	.562	.572	.263	.982	.334
	COM4	.284	.185	.215	1.539	.129	-.431	.509	-.184	-.846	.404
	COM5	-.017	.153	-.016	-.112	.911	.514	.430	.296	1.197	.241

Table B3. Multiple Regression Analyses for Academic Rank

Regression Analysis: Academic Rank											
		Professor & Associate Professor					Assistan Professor, Instructor, Lecturer, Teaching Assistant				
Sample Size		41					74				
		Unstandardized Coefficients		Standardized Coefficients			Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.	B	Std. Error	Beta	t	Sig.
Perceived Usefulness (PU)	(Constant)	5.911	2.929		2.018	.053	.262	1.305		.201	.842
	ACT1	-.150	.447	-.094	-.335	.740	.819	.308	.382	2.660	.010
	ACT2	.366	.541	.179	.677	.504	.057	.271	.027	.211	.833
	ACT3	.323	.422	.181	.764	.451	.048	.221	.030	.219	.827
	ACT4	.133	.392	.089	.339	.737	.428	.252	.334	1.696	.095
	ACT5	-.090	.367	-.061	-.244	.809	-.230	.258	-.176	-.889	.377
	ACT6	.129	.322	.081	.399	.693	-.166	.229	-.106	-.726	.471
	COM1	-.387	.469	-.226	-.826	.415	-.069	.268	-.042	-.258	.798
	COM2	-.272	.427	-.163	-.636	.530	.593	.343	.310	1.729	.089
	COM3	-.132	.605	-.052	-.218	.829	-.128	.269	-.070	-.476	.636
	COM4	-.050	.409	-.028	-.123	.903	-.164	.207	-.101	-.795	.429
	COM5	.074	.288	.057	.258	.798	-.085	.176	-.064	-.483	.631
Perceived Ease of Use (PEOU)	(Constant)	6.704	2.770		2.420	.022	.188	1.168		.161	.872
	ACT1	.210	.423	.142	.496	.624	.715	.276	.368	2.596	.012
	ACT2	.025	.512	.013	.048	.962	-.041	.243	-.021	-.167	.868
	ACT3	.165	.399	.100	.412	.683	.240	.198	.161	1.214	.229
	ACT4	-.120	.371	-.087	-.325	.748	-.054	.226	-.047	-.240	.811
	ACT5	.127	.348	.093	.364	.718	-.020	.231	-.017	-.088	.931
	ACT6	.023	.305	.016	.075	.941	-.227	.205	-.160	-1.105	.273
	COM1	-.387	.444	-.245	-.873	.390	.013	.240	.008	.053	.958
	COM2	-.136	.404	-.089	-.337	.738	.477	.307	.275	1.553	.126
	COM3	-.210	.572	-.089	-.367	.717	.142	.241	.086	.588	.558
	COM4	.034	.387	.020	.088	.931	-.217	.185	-.148	-1.172	.246
	COM5	-.049	.272	-.041	-.182	.857	.053	.158	.044	.337	.737
Intention to Use (IU)	(Constant)	6.636	2.928		2.267	.031	.546	1.365		.400	.690
	ACT1	-.149	.447	-.092	-.334	.741	.374	.322	.172	1.161	.250
	ACT2	.119	.541	.057	.220	.827	.214	.284	.100	.754	.454
	ACT3	.205	.422	.113	.485	.631	.032	.231	.019	.138	.891
	ACT4	.220	.392	.145	.563	.578	.392	.264	.303	1.487	.142
	ACT5	-.301	.367	-.201	-.819	.420	-.352	.270	-.266	-1.302	.198
	ACT6	-.190	.322	-.117	-.589	.560	-.008	.240	-.005	-.035	.972
	COM1	-.471	.469	-.271	-1.005	.323	.049	.281	.029	.173	.863
	COM2	-.379	.427	-.225	-.887	.382	.652	.359	.336	1.816	.074
	COM3	.357	.605	.138	.591	.559	-.091	.281	-.049	-.323	.748
	COM4	.238	.409	.130	.581	.565	-.012	.216	-.007	-.056	.956
	COM5	.070	.288	.052	.243	.810	-.182	.184	-.135	-.989	.327

APPENDIX C

SURVEY ITEMS FOR THE LMS ADOPTION STUDY

Table C1. Survey Items and Sources

No	Questionnaire Items By Construct	Turkish Version	Source
1	What is your gender?	Cinsiyetiniz nedir?	
2	What is your age?	Kaç yaşındasınız?	
3	Please state your years of experience in teaching	Kaç yıldır öğretmenlik yapıyorsunuz?	
4	What is your subject?	Dalınız nedir?	
5	Have you used the Learning Management Systems before?	Daha Önce Öğrenme Yönetim Sistemi kullandınız mı	
6	Using LMS is voluntary in my institution	Kurumumda Öğrenme Yönetim Sistemlerini gönüllü olarak kullanıyorum (zorunlu değil)	
	Effort Expectancy		
7.1	My interaction with LMS would be clear and understandable	Öğrenme yönetim sistemleri ile etkileşimim açık ve anlaşılabilir olur	Venkatesh, et al. (2003)
7.2	It would be easy for me to become skillful at using LMS	Öğrenme Yönetim Sistemlerini kullanmada becerikli olmak benim için kolay olur	Venkatesh, et al. (2003)
7.3	I would find LMS easy to use	Öğrenme Yönetim Sistemlerini kullanmayı kolay bulurum	Venkatesh, et al. (2003)
7.4	Learning to operate LMS is easy for me	Öğrenme yönetim sistemlerini kullanmayı öğrenmek benim için kolay olur	Venkatesh, et al. (2003)
	Social Influence		
7.5	People who influence my behavior will think that I should use LMS	Davranışımı etkileyen insanlar (çalışma arkadaşlarım, yöneticilerim) Öğrenme Yönetim Sistemlerini kullanmam gerektiğini düşünüyor	Venkatesh, et al. (2003)
7.6	People who are important to me will think that I should use LMS	Görüşlerini önemsediğim insanlar Öğrenme Yönetim Sistemlerini kullanmam gerektiğini düşünüyor	Venkatesh, et al. (2003)
7.7	The seniors in my organization have been helpful in the use of LMS	Çalıştığım kuruluştaki üst düzey görevliler (yöneticilerim) Öğrenme Yönetim Sistemlerini kullanmamda yardımcı olurlar	Venkatesh, et al. (2003)
7.8	In general, my organization has supported the use of LMS	Genel olarak, çalıştığım kuruluş Öğrenme Yönetim Sistemlerini kullanımını destekliyor	Venkatesh, et al. (2003)
	Perceived playfulness from teacher's perspective		
7.9	When using LMS, I will not realize the time elapsed	Öğrenme Yönetim Sistemlerini kullanırken zamanın nasıl geçtiğini anlamam	Moon and Kim (2001)
7.10	When using LMS, I will forget the work I must do	Öğrenme yönetim sistemlerini kullanırken yapmam gereken diğer işleri unutuyorum	Moon and Kim (2001)
7.11	Using LMS will give enjoyment to me for my working	Öğrenme Yönetim Sistemlerini kullanarak işimi yapmak bana keyif verir	Moon and Kim (2001)
7.12	Using LMS will stimulate my curiosity	Öğrenme Yönetim Sistemlerini kullanmak merak duygumu tetikler	Moon and Kim (2001)
7.12	Using LMS will lead to my exploration	Öğrenme Yönetim Sistemlerini kullanmak beni araştırmaya yöneltir	Moon and Kim (2001)
	Perceived playfulness from Student's perspective		

7.14	When using LMS, students will not realize the time elapsed	Öğrenciler Öğrenme Yönetim Sistemlerini kullanırken zamanın nasıl geçtiğini anlamaz	Moon and Kim (2001)
7.15	When using LMS, students will forget the work they must do	Öğrenciler Öğrenme Yönetim Sistemlerini kullanırken yapmaları gereken diğer görevlerini unutur	Moon and Kim (2001)
7.16	Using LMS will give enjoyment to students for their learning	Öğrenme Yönetim Sistemlerini kullanarak öğrenmek öğrencilere keyif verir	Moon and Kim (2001)
7.17	Using LMS will stimulate students' curiosity	Öğrenme Yönetim Sistemleri öğrencilerin merak duygusunu tetikler	Moon and Kim (2001)
7.18	Using LMS will lead to students' exploration	Öğrenme Yönetim Sistemleri öğrencileri araştırmaya yönlendirir	Moon and Kim (2001)
	Perceived Learning Opportunities		
7.19	LMSs offer opportunities to experiment with knowledge	Öğrenme Yönetim Sistemleri bildiklerinizi deneme/ test etme imkanı verir	Bourgonjon, et al. (2010)
7.20	LMSs offer opportunities to take control over the learning process	Öğrenme Yönetim Sistemleri öğrenme süreci üzerinde kontrol sahibi olma imkanı verir	Bourgonjon, et al. (2010)
7.21	LMSs offer opportunities to experience things you learn about	Öğrenme Yönetim Sistemleri öğrendiğiniz şeyleri deneyimleme imkanları sunar	Bourgonjon, et al (2010)
7.22	LMSs offer opportunities to stimulate transfer between various subjects	Öğrenme Yönetim Sistemleri farklı konular arasında aktarım yapmayı teşvik eder	Bourgonjon, et al. (2010)
7.23	LMSs offer opportunities to interact with other students	Öğrenme Yönetim Sistemleri diğer öğrencilerle etkileşim kurma imkanı sunar	Bourgonjon, et al. (2010)
7.24	LMSs offer opportunities to think critically	Öğrenme Yönetim Sistemleri eleştirel düşünme olanakları verir	Bourgonjon, et al. (2010)
7.25	LMSs offer opportunities to motivate students	Öğrenme Yönetim Sistemleri öğrencilerin motivasyonlarını artırma fırsatları sunar	Bourgonjon, et al. (2010)
	Performance Expectancy		
7.26	I would find LMS useful in my job	Öğrenme Yönetim Sistemlerini işimde faydalı bulurum	Venkatesh, et al. (2003)
7.27	Using LMS enables me to accomplish tasks more quickly	Öğrenme Yönetim Sistemlerini kullanarak görevlerimi daha hızlı tamamlarım	Venkatesh, et al. (2003)
7.28	Using LMS increases my productivity	Öğrenme Yönetim Sistemlerini kullanmak verimliliğimi artırır	Venkatesh, et al. (2003)
7.29	If I use LMS, I will increase my chances of getting a raise	Öğrenme Yönetim Sistemlerini kullanırsam maaşıma zam alma (terfi) şansımı artırırım	Venkatesh, et al. (2003)
	Self-management of learning		
7.30	When it comes to learning and studying, I am a self-directed person	Öğrenciler öğrenme konusunda kendi kendilerini yönetirler	Smith, et al. (2003)
7.31	In my studies, I am self-disciplined and find it easy to set aside reading and homework time	Öğrencilerin öz disiplinleri var, okuma ve ödev zamanlarını kolaylıkla kendileri ayarlar	Smith, et al. (2003)
7.32	I am able to manage my study time effectively and easily complete assignments on time	Öğrenciler çalışma zamanlarını verimli kullanır ve ödevlerini (görevlerini) zamanında kolaylıkla bitirir	Smith, et al. (2003)
7.33	In my studies, I set goals and have a high degree of initiative	Öğrenciler çalışmalarında hedeflerini belirler ve çalışma sorumluluğunu alırlar	Smith, et al. (2003)
	LMS Self Efficacy (items will be eliminated and returned into context related ones)		
7.34	I feel confident in the LMS finding information and downloading files	Öğrenme Yönetim Sistemini kullanarak aradığım bilgiyi bulma ve dosya yüklemeyi rahatlıkla yapabilirim	Hsu & Chiu (2004)
7.35	I feel confident in the e-learning system attaching files to emails	Öğrenme Yönetim Sistemini kullanarak e-postalarıma rahatlıkla dosya eki ekleyebilirim	Roca, et al. (2006)
7.36	I feel confident in the e-learning system exchanging messages with other users in discussion forums	Öğrenme Yönetim Sistemlerindeki tartışma forumlarında diğer kullanıcılar ile rahatlıkla mesajlaşırım	Roca, et al. (2006)

7.37	I feel confident in the e-learning system posting messages on a bulletin board	Öğrenme Yönetim Sistemlerindeki duyuru panolarına rahatlıkla mesaj yollayabilirim	Roca, et al. (2006)
7.38	I could complete my learning activities using the e-learning system if I had never used a system like it before	Daha önce hiç böyle bir sistem kullanmamış da olsam, Öğrenme Yönetim Sistemlerini kullanarak görevlerimi tamamlayabilirim	Compeau & Higgins, (1995)
7.39	I could complete my learning activities using the e-learning system if I had only the system manuals for reference	Referans olarak sadece sistem el kitabım olsa dahi Öğrenme Yönetim Sistemini kullanarak görevlerimi tamamlayabilirim	Ong, et al. (2004)
7.40	I could complete my learning activities using the e-learning system if I had seen someone else using it before trying it myself	Daha önce başkasının kullanırken gördüğüm bir Öğrenme Yönetim Sistemini kullanarak görevlerimi tamamlayabilirim	Ong, et al. (2004)
	Behavioral intention to use LMS		
7.41	I intend to use LMS in the future	Gelecekte Öğrenme Yönetim Sistemlerini kullanmaya niyetliyim	Venkatesh, et al. (2003)
7.42	I predict I would use LMS in the future	Gelecekte Öğrenme Yönetim Sistemlerini kullanacağımı umuyorum	Venkatesh, et al. (2003)
7.43	I plan to use LMS in the future	Gelecekte Öğrenme Yönetim Sistemlerini kullanmayı planlıyorum	Venkatesh, et al. (2003)

APPENDIX D

DETAILS OF SURVEY USED IN THE LMS ADOPTION STUDY

ÖĞRENME YÖNETİM SİSTEMLERİ KABUL ANKETİ
KATILIMCI BİLGİ VE ONAM FORMU

Araştırmayı destekleyen kurum: Boğaziçi Üniversitesi, İşletme Bölümü
Araştırmanın adı: Eğitimde Öğrenme Yönetim Sistemlerin Kullanımı ve Kabulü: Eğlence ve Öz Yönetim Etkisi
Proje Yürütücüsü/Araştırmacının adı: Doç. Dr. Ulaş Akküçük , Selen Balkaya Soyer
Adresi: Boğaziçi Üniversitesi, İktisadi İdari Bilimler Binası, Bebek, İstanbul
E-mail adres: selen.soyer@boun.edu.tr
Telefonu: 02123595400

Değerli Öğretmenim,

Boğaziçi Üniversitesi İşletme Bölümü'nde doktora öğrencisiyim. Doktora tezim kapsamında tez danışmanım Doç. Dr. Ulaş Akküçük ile birlikte, Öğrenme Yönetim Sistemlerinin kullanıcılar tarafından kabulü ile ilgili araştırma yürütüyoruz.

Bu araştırmanın amacına uygun olarak siz değerli öğretmenlerin Öğrenme Yönetim Sistemini kullanma niyetine etki eden faktörleri ölçen bir anket hazırlanmıştır. Bu ankette Öğrenme Yönetim Sistemleri ve Öğrenme konuları ile ilgili sizlerin görüş, düşünce ve tutumlarınız ile ilgili sorular sorulmaktadır. Ankete katılımınız ve verdiğiniz bilgiler sayesinde Öğrenme Yönetim Sistemleri kullanımı ile ilgili tüketicilerin tutumlarını analiz edebileceğiz ve analiz sonucu elde edilen bulguları bilimsel dergi ve konferanslarda yayınlayarak bu alandaki ilgili kurum/kuruluşların, akademisyenlerin ve genel olarak toplumun bilgisi olmasını sağlayacağız. Bu araştırmanın kapsamı dâhilinde inovasyon ve teknolojinin eğitim öğretim alanında sağlayabileceği sosyal fayda konusunda tüketici iç görüsüne dayalı sonuçlar ortaya çıkacaktır. Bu sonuçlar ile birlikte toplum olarak Öğrenme Yönetim Sistemleri hakkında bilgi edineceğiz, farkındalığımız artacak ve bu teknolojileri kabulü ve kullanımı ile ilgili fikir sahibi olacağız. Özellikle eğitimcilerin çalışma verimliliğini artması ve bunu destekleyen Öğrenme Yönetim Sistemlerinin kullanımının çok yönlü olarak anlaşılabilmesi için bu araştırma önem taşımaktadır.

Bu araştırmaya katılımınızı rica ediyoruz. Bu araştırma bilimsel bir amaçla yapılmaktadır ve katılımcı bilgilerinin gizliliği esas tutulmaktadır. Ankete yanıt vermeniz gönüllüdür ve verdiğiniz cevaplar gizli kalacaktır. Yanıtlarınız bireysel olarak belirlenmeyecek, tüm cevaplar birlikte derlenecek ve toplu olarak analiz edilecektir. Anketi bitirmek yaklaşık olarak 15 dakikanızı alacaktır. Bu çalışmayı dilediğiniz herhangi bir safhada bırakabilir, çalışmaya katılmaktan vazgeçebilirsiniz. Katılmaktan vazgeçtiğiniz durumda sizden alınan bilgiler çalışmada kullanılmayacaktır ve imha edilecektir.

Anketi cevaplama veya bu çalışmaya katılma ile ilgili herhangi bir sorunuz veya endişeniz olursa, bize aşağıdaki telefon numarasından ve e-posta adresinden ulaşabilirsiniz.

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Saygılarımızla,

Selen Balkaya Soyer, Doktora Öğrencisi, İşletme Bölümü
Doç. Dr. Ulaş Akküçük, İşletme Bölümü

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Öğrenme Yönetim Sistemleri, elektronik eğitim teknolojilerinin (e-öğrenme olarak da adlandırılır) kursların veya eğitim programlarının yönetimi, dokümantasyonu, takibi, raporlanması ve teslim edilmesi için hazırlanmış yazılımlardır.

Öğrenme Yönetim Sistemleri eğitim kayıtlarının yönetimi, takibi ve raporlanması için kullanıldığı gibi, elektronik eğitim teknolojilerinin (e-öğrenme olarak da adlandırılır) alıcıya iletilebildiği elektronik platformlardır.

Çoğu Öğrenme Yönetim Sistemleri web tabanlı programlardır ve kullanıcılar çevrimiçi olarak içeriklere ve hesaplarına ulaşabilirler. Birçok okul ve kurum tarafından kullanılan Öğrenme Yönetim Sistemleri uzaktan eğitimi mümkün kılarak çok daha fazla sayıda öğrenciye eğitim içeriklerinin ulaşmasını sağladıkları gibi öğretmenlerin sınıf içerisinde derslerini daha verimli yürütmelerine de yardımcı olurlar.

Öğrenme Yönetim Sistemleri Örnekleri:
Derslerde çevrimiçi içeriklerin (videolu anlatım, dijital kitap, interaktif aktiviteler, dijital deneyler grafikler, ödevler…) kullanıldığı gibi ödevlendirme ve sınav yapılmasına da olanak sağlayan ve öğrencilerin performanslarının saklanıp rapor olarak alınabildiği Öğrenme Yönetim Sistemleri - Örnekler; Morpa Kampüs, Okulistik, Your Learning Place, Vitamin… gibi.
Tüm ders kayıtlarının ve planlarının tutulabildiği, öğrenci kayıtlarının ve puanların tutulabildiği, ders materyallerinin organize edilip, sınıflandırılabildiği, tartışma forumların oluşturulabildiği, veliler öğrenciler ve diğer öğretmenler ile mesajlaşmanın yapılabildiği, e-posta ve anlık mesajlaşmaların mümkün olduğu Öğrenme Yönetim Sistemleri – Moodle, Blackboard, Okulların kendi iç kullanımları için geliştirdikleri yazılımlar… gibi.

Eğer bu araştırma projesine katılmayı kabul ediyorsanız, lütfen bu formu imzalayıp kapalı bir zarf içerisinde bize geri yollayın.
Bu formu imzalamadan önce, çalışmayla ilgili sorularınız varsa lütfen sorun. Daha sonra sorunuz olursa, Selen Balkaya Soyer'e ve/veya Doç. Dr. Ulaş Akküçük'e (Telefon:0212 359 54 00) sorabilirsiniz. Araştırmayla ilgili haklarınız konusunda yerel etik kurullarına da danışabilirsiniz.
Adres ve telefon numaranız değişirse, bize haber vermenizi rica ederiz.

Ben, (katılımcının adı) ....., yukarıdaki metni okudum ve katılmam istenen çalışmanın kapsamını ve amacını, gönüllü olarak üzerime düşen sorumlulukları tamamen anladım. Çalışma hakkında soru sorma imkanı buldum. Bu çalışmayı istediğim zaman ve herhangi bir neden belirtmek zorunda kalmadan bırakabileceğimi ve bıraktığım takdirde herhangi bir olumsuzluk ile karşılaşmayacağımı anladım.

Bu koşullarda söz konusu araştırmaya kendi isteğimle, hiçbir baskı ve zorlama olmaksızın katılmayı kabul ediyorum.

Formun bir örneğini aldım / almak istemiyorum (bu durumda araştırmacı bu kopyayı saklar).

Katılımcının Adı-
Soyadı:.....
İmzası:.....
Adresi (varsa Telefon No, Faks No):.....
.....
Tarih (gün/ay/yıl):...../...../.....

ÖĞRENME YÖNETİM SİSTEMLERİ KABUL ANKETİ

1. Kaç yaşındasınız? Tek bir seçeneği işaretleyiniz.
☐20 – 30
☐31 – 40
☐41 – 50
☐51 – 60
☐60 üstü

2. Cinsiyetiniz nedir? Tek bir seçeneği işaretleyiniz.
☐ Kadın ☐Erkek

3. Kaç senedir öğretmenlik yapmaktasınız? Tek bir seçeneği işaretleyiniz.
☐0 – 5
☐6 – 10
☐11 – 20
☐21 – 30
☐31 – 40
☐40 üstü

4. Dalınız nedir? Tek bir seçeneği işaretleyiniz.
☐ Sınıf Öğretmeni
☐ Türkçe/Edebiyat
☐ Matematik
☐ Fen (Genel, Biyoloji, Fizik, Kimya)
☐ Yabancı Dil (İngilizce, Almanca, Fransızca… vs.)
☐ Rehberlik ve Psikolojik Danışmanlık
☐ Sosyal Bilimler (Tarih, Coğrafya, Sosyal Bilgiler…)
☐ Din
☐ Görsel Sanatlar
☐ Müzik
☐ Beden Eğitimi
☐ Diğer

5. Daha Önce Öğrenme Yönetim Sistemi kullandınız mı? Tek bir seçeneği işaretleyiniz.
☐ Evet ☐ Hayır

6. Kurumumda Öğrenme Yönetim Sistemlerini gönüllü olarak kullanıyorum (zorunlu değil) ? Tek bir seçeneği işaretleyiniz.
☐ Evet ☐ Hayır

7. Daha önce Öğrenme Yönetim Sistemi kullandıysanız Öğrenme Yönetim Sistemleri kullanma deneyiminize dayanarak aşağıdaki ifadelere katılımınıza 1'den 7'ye kadar bir değer veriniz.
Daha önce Öğrenme Yönetim Sistemi kullanmadıysanız size tanımı ve örnekleri verilmiş olan Öğrenme Yönetim Sistemleri ile ilgili oluşan düşüncelerinize dayanarak aşağıdaki ifadelere katılımınıza 1'den 7'ye kadar bir değer veriniz.

(1: Kesinlikle katılıyorum 2:Katılıyorum 3: Biraz Katılıyorum 4:Kararsızım 5:Biraz Katılmıyorum 6:Katılmıyorum 7: Kesinlikle Katılmıyorum)

7.1. Öğrenme Yönetim Sistemleri ile etkileşimim açık ve anlaşılabilir olur.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.2. Öğrenme Yönetim Sistemlerini kullanmada becerikli olmak benim için kolay olur.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.3. Öğrenme Yönetim Sistemlerini kullanmayı kolay bulurum.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.4. Öğrenme Yönetim Sistemlerini kullanmayı öğrenmek benim için kolay olur.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.5. Davranışımı etkileyen insanlar (çalışma arkadaşlarım, yöneticilerim) Öğrenme Yönetim Sistemlerini kullanmam gerektiğini düşünüyor.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.6. Görüşlerini önemsediğim insanlar Öğrenme Yönetim Sistemlerini kullanmam gerektiğini düşünüyor.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.7. Çalıştığım kuruluştaki üst düzey görevliler (yöneticilerim) Öğrenme Yönetim Sistemlerini kullanmamda yardımcı olurlar.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.8. Genel olarak, çalıştığım kuruluş Öğrenme Yönetim Sistemlerini kullanımını destekliyor.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.9. Öğrenme Yönetim Sistemlerini kullanırken zamanın nasıl geçtiğini anlamam.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.10. Öğrenme Yönetim Sistemlerini kullanırken yapmam gereken diğer işleri unuturum.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.11. Öğrenme Yönetim Sistemlerini kullanarak işimi yapmak bana keyif verir.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.12. Öğrenme Yönetim Sistemlerini kullanmak merak duygumu tetikler.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.13. Öğrenme Yönetim Sistemlerini kullanmak beni araştırmaya yöneltir.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.14. Öğrenciler Öğrenme Yönetim Sistemlerini kullanırken zamanın nasıl geçtiğini anlamaz.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.15. Öğrenciler Öğrenme Yönetim Sistemlerini kullanırken yapmaları gereken diğer görevlerini unutur.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.16. Öğrenme Yönetim Sistemlerini kullanarak öğrenmek öğrencilere keyif verir.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.17. Öğrenme Yönetim Sistemleri öğrencilerin merak duygusunu tetikler.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.18. Öğrenme Yönetim Sistemleri öğrencileri araştırmaya yönlendirir.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.19. Öğrenme Yönetim Sistemleri bildiklerinizi deneme/ test etme imkânı verir.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.20. Öğrenme Yönetim Sistemleri öğrenme süreci üzerinde kontrol sahibi olma imkânı verir.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.21. Öğrenme Yönetim Sistemleri öğrendiğiniz şeyleri deneyimleme imkânları sunar.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.22. Öğrenme Yönetim Sistemleri farklı konular arasında aktarım yapmayı teşvik eder.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.23. Öğrenme Yönetim Sistemleri diğer öğrencilerle etkileşim kurma imkânı sunar.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.24. Öğrenme Yönetim Sistemleri eleştirel düşünme olanakları verir.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.25. Öğrenme Yönetim Sistemleri öğrencilerin motivasyonlarını artırma fırsatları sunar.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.26. Öğrenme Yönetim Sistemlerini işimde faydalı bulurum.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.27. Öğrenme Yönetim Sistemlerini kullanarak görevlerimi daha hızlı tamamlarım.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.28. Öğrenme Yönetim Sistemlerini kullanmak verimliliğimi artırır.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.29. Öğrenme Yönetim Sistemlerini kullanırsam maaşıma zam alma (terfi) şansımı artırırım.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.30. Öğrenciler öğrenme konusunda kendi kendilerini yönetirler.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.31. Öğrencilerin öz disiplinleri var, okuma ve ödev zamanlarını kolaylıkla kendileri ayarlar.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.32. Öğrenciler çalışma zamanlarını verimli kullanır ve ödevlerini (görevlerini) zamanında kolaylıkla bitirir.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.33. Öğrenciler çalışmalarında hedeflerini belirler ve çalışma sorumluluğunu alırlar.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7
7.34. Öğrenme Yönetim Sistemini kullanarak aradığım bilgiyi bulma ve dosya yüklemeyi rahatlıkla yapabilirim.
☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.35. Öğrenme Yönetim Sistemini kullanarak e-postalarıma rahatlıkla dosya eki ekleyebilirim.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.36. Öğrenme Yönetim Sistemlerindeki tartışma forumlarında diğer kullanıcılar ile rahatlıkla mesajlaşırım.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.37. Öğrenme Yönetim Sistemlerindeki duyuru panolarına rahatlıkla mesaj yollayabilirim.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.38. Daha önce hiç böyle bir sistem kullanmamış da olsam, Öğrenme Yönetim Sistemlerini kullanarak görevlerimi tamamlayabilirim.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.39. Referans olarak sadece sistem el kitabım olsa dahi Öğrenme Yönetim Sistemini kullanarak görevlerimi tamamlayabilirim.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.40. Daha önce başkasının kullanırken gördüğüm bir Öğrenme Yönetim Sistemini kullanarak görevlerimi tamamlayabilirim.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.41. Gelecekte Öğrenme Yönetim Sistemlerini kullanmaya niyetliyim.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.42. Gelecekte Öğrenme Yönetim Sistemlerini kullanacağımı umuyorum.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

7.43. Gelecekte Öğrenme Yönetim Sistemlerini kullanmayı planlıyorum.

☐ 1 ☐ 2 ☐ 3 ☐4 ☐5 ☐6 ☐7

T.C.

BOĞAZİÇİ ÜNİVERSİTESİ

İnsan Araştırmaları Kurumsal Değerlendirme Alt Kurulu

Sayı: 2017-78

21 Aralık 2017

Selen Balkaya Soyer

İşletme

Sayın Araştırmacı,

"Eğitimde Öğrenme Yönetim Sistemlerin Kullanımı ve Kabulü: Eğlence ve Öz Yönetim Etkisi" başlıklı projeniz ile ilgili olarak yaptığınız SBB-EAK 2017/77 sayılı başvuru İNAREK/SBB Etik Alt Kurulu tarafından 21 Aralık 2017 tarihli toplantıda incelenmiş ve uygun bulunmuştur.

Doç. Dr. Gül Sosay

.....

Doç. Dr. Mehmet Yiğit Gürdal

.....

Doç. Dr. Ebru Kaya

.....

Yrd. Doç. Dr. İnci Ayhan

.....

Yrd. Doç. Dr. Mehmet Nafi Artemel

.....

APPENDIX E

SCALE RELIABILITIES IN THE LMS ADOPTION STUDY

Table E1. Communalities, Extraction Method: Principal Component Analysis

Item	Initial	Extraction
EE1	1	0.741
EE2	1	0.707
EE3	1	0.746
EE4	1	0.744
SI1	1	0.682
SI2	1	0.666
SI3	1	0.694
SI4	1	0.762
PPT1	1	0.612
PPT3	1	0.648
PPT4	1	0.76
PPT5	1	0.781
PPS1	1	0.623
PPS3	1	0.746
PPS4	1	0.828
PPS5	1	0.802
PLO1	1	0.776
PLO2	1	0.804
PLO3	1	0.836
PLO4	1	0.791
PLO5	1	0.72
PLO6	1	0.693
PLO7	1	0.799
PE1	1	0.829
PE2	1	0.725
PE3	1	0.738
SMOL1	1	0.705
SMOL2	1	0.847
SMOL3	1	0.866
SMOL4	1	0.829
SE1	1	0.746
SE2	1	0.772
SE3	1	0.706
SE4	1	0.748
SE5	1	0.746
SE6	1	0.714
SE7	1	0.694
IU1	1	0.747
IU2	1	0.764
IU3	1	0.796

Table E2. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	24.49	61.22	61.22	24.5	61.22	61.22	10.97	27.41	27.41
2	2,417	6,042	67.27	2,417	6,042	67.27	8,719	21.8	49.21
3	1,594	3,984	71.25	1,594	3,984	71.25	6,048	15.12	64.33
4	1,432	3.58	74.83	1,432	3.58	74.83	4.2	10.5	74.83
5	0.892	2,231	77.06						
6	0.829	2,072	79.13						
7	0.735	1,838	80.97						
8	0.62	1,551	82.52						
9	0.592	1,481	84						
10	0.506	1,264	85.27						
11	0.464	1,161	86.43						
12	0.447	1,117	87.55						
13	0.362	0.906	88.45						
14	0.355	0.889	89.34						
15	0.331	0.827	90.17						
16	0.317	0.792	90.96						
17	0.292	0.73	91.69						
18	0.263	0.659	92.35						
19	0.257	0.642	92.99						
20	0.249	0.622	93.61						
21	0.212	0.529	94.14						
22	0.194	0.484	94.63						
23	0.189	0.472	95.1						
24	0.179	0.448	95.55						
25	0.17	0.425	95.97						

26	0.165	0.413	96.38
27	0.16	0.4	96.78
28	0.144	0.36	97.14
29	0.132	0.331	97.47
30	0.121	0.302	97.78
31	0.119	0.297	98.07
32	0.117	0.291	98.36
33	0.112	0.281	98.64
34	0.096	0.241	98.89
35	0.094	0.236	99.12
36	0.087	0.217	99.34
37	0.084	0.209	99.55
38	0.077	0.192	99.74
39	0.065	0.163	99.9
40	0.039	0.097	100

Extraction Method: Principal Component Analysis

Table E3. Constructs' Means

Construct	Mean
Effort Expectancy	2.64
Social Influence	2.86
Perceived Playfulness (Teacher's Perspective)	3.17
Perceived Playfulness (Student's Perspective)	3.09
Perceived Learning Opportunities	2.87
Performance Expectancy	3.29
Self-Management of Learning	3.5
E-Learning Self Efficacy	2.89
Intention to Use	2.76

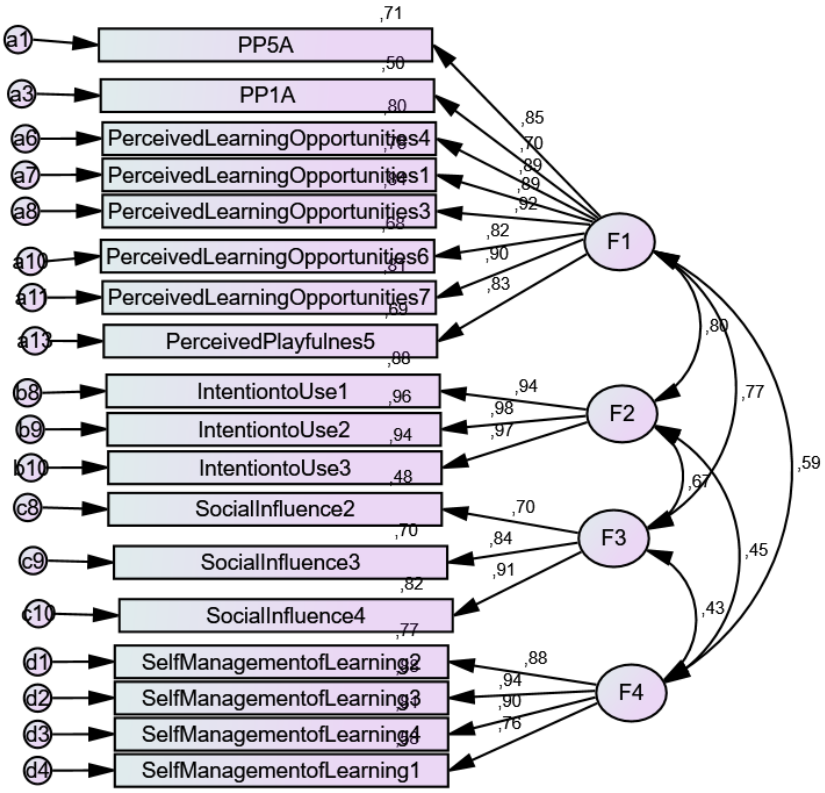

Figure E1. Interconstruct correlations

APPENDIX F

ANOVA ANALYSES FOR MULTI GROUPS DETAILS

Table F1. ANOVA Results for Experience Groups

Dependent Variable	(I) EXPERİENCE	(J) EXPERİENCE	Mean Difference (I-J)	Std Error	Sig	95% Confidence Interval		P
						Lower Bound	Upper Bound	
Effort Expectancy	0-5 Years	6-10 Years	0.12	0.24	0.99	-0.55	0.78	0.14
		11-20 Years	-0.29	0.21	0.65	-0.87	0.29	
		21-30 Years	-0.31	0.24	0.71	-0.97	0.35	
		31 Year and Above	-0.48	0.30	0.51	-1.30	0.35	
	6-10 Years	0-5 Years	-0.12	0.24	0.99	-0.78	0.55	
		11-20 Years	-0.41	0.21	0.31	-1.00	0.18	
		21-30 Years	-0.43	0.24	0.40	-1.09	0.24	
		31 Year and Above	-0.60	0.30	0.28	-1.43	0.23	
	11-20 Years	0-5 Years	0.29	0.21	0.65	-0.29	0.87	
		6-10 Years	0.41	0.21	0.31	-0.18	1.00	
		21-30 Years	-0.02	0.21	1.00	-0.60	0.57	
		31 Year and Above	-0.19	0.28	0.96	-0.95	0.58	
	21-30 Years	0-5 Years	0.31	0.24	0.71	-0.35	0.97	
		6-10 Years	0.43	0.24	0.40	-0.24	1.09	
		11-20 Years	0.02	0.21	1.00	-0.57	0.60	
		31 Year and Above	-0.17	0.30	0.98	-1.00	0.66	
	31 Year and Above	0-5 Years	0.48	0.30	0.51	-0.35	1.30	
		6-10 Years	0.60	0.30	0.28	-0.23	1.43	
		11-20 Years	0.19	0.28	0.96	-0.58	0.95	
		21-30 Years	0.17	0.30	0.98	-0.66	1.00	
Social Influence	0-5 Years	6-10 Years	-0.02	0.24	1.00	-0.69	0.64	0.74
		11-20 Years	-0.04	0.21	1.00	-0.62	0.54	
		21-30 Years	-0.27	0.24	0.80	-0.93	0.39	
		31 Year and Above	-0.23	0.30	0.94	-1.05	0.60	
	6-10 Years	0-5 Years	0.02	0.24	1.00	-0.64	0.69	
		11-20 Years	-0.02	0.21	1.00	-0.60	0.57	
		21-30 Years	-0.25	0.24	0.85	-0.91	0.42	
		31 Year and Above	-0.20	0.30	0.96	-1.03	0.62	
	11-20 Years	0-5 Years	0.04	0.21	1.00	-0.54	0.62	
		6-10 Years	0.02	0.21	1.00	-0.57	0.60	
		21-30 Years	-0.23	0.21	0.82	-0.81	0.36	

		31 Year and Above	-0.19	0.28	0.96	-0.95	0.58	
		0-5 Years	0.27	0.24	0.80	-0.39	0.93	
		6-10 Years	0.25	0.24	0.85	-0.42	0.91	
	21-30 Years	11-20 Years	0.23	0.21	0.82	-0.36	0.81	
		31 Year and Above	0.04	0.30	1.00	-0.78	0.87	
		0-5 Years	0.23	0.30	0.94	-0.60	1.05	
		6-10 Years	0.20	0.30	0.96	-0.62	1.03	
	31 Year and Above	11-20 Years	0.19	0.28	0.96	-0.58	0.95	
		21-30 Years	-0.04	0.30	1.00	-0.87	0.78	
		6-10 Years	0.11	0.24	0.99	-0.53	0.76	
		11-20 Years	0.00	0.21	1.00	-0.57	0.56	
	0-5 Years	21-30 Years	-0.16	0.23	0.96	-0.80	0.48	
		31 Year and Above	-0.16	0.29	0.98	-0.97	0.64	
		0-5 Years	-0.11	0.24	0.99	-0.76	0.53	
		11-20 Years	-0.12	0.21	0.98	-0.69	0.45	
	6-10 Years	21-30 Years	-0.27	0.24	0.77	-0.92	0.37	
		31 Year and Above	-0.28	0.29	0.88	-1.08	0.52	
		0-5 Years	0.00	0.21	1.00	-0.56	0.57	
Perceived Playfulness Teacher's perspective		6-10 Years	0.12	0.21	0.98	-0.45	0.69	0.78
	11-20 Years	21-30 Years	-0.16	0.21	0.94	-0.72	0.41	
		31 Year and Above	-0.16	0.27	0.98	-0.90	0.58	
		0-5 Years	0.16	0.23	0.96	-0.48	0.80	
		6-10 Years	0.27	0.24	0.77	-0.37	0.92	
	21-30 Years	11-20 Years	0.16	0.21	0.94	-0.41	0.72	
		31 Year and Above	-0.01	0.29	1.00	-0.81	0.80	
		0-5 Years	0.16	0.29	0.98	-0.64	0.97	
		6-10 Years	0.28	0.29	0.88	-0.52	1.08	
	31 Year and Above	11-20 Years	0.16	0.27	0.98	-0.58	0.90	
		21-30 Years	0.01	0.29	1.00	-0.80	0.81	
		6-10 Years	0.00	0.24	1.00	-0.65	0.65	
		11-20 Years	-0.05	0.21	1.00	-0.63	0.52	
	0-5 Years	21-30 Years	-0.23	0.24	0.87	-0.88	0.42	
		31 Year and Above	-0.04	0.30	1.00	-0.85	0.76	
		0-5 Years	0.00	0.24	1.00	-0.65	0.65	
		11-20 Years	-0.06	0.21	1.00	-0.63	0.52	
Perceived Playfulness Student's perspective	6-10 Years	21-30 Years	-0.23	0.24	0.87	-0.88	0.42	
		31 Year and Above	-0.05	0.30	1.00	-0.86	0.77	0.86
		0-5 Years	0.05	0.21	1.00	-0.52	0.63	
		6-10 Years	0.06	0.21	1.00	-0.52	0.63	
	11-20 Years	21-30 Years	-0.18	0.21	0.92	-0.75	0.40	
		31 Year and Above	0.01	0.27	1.00	-0.74	0.76	
		0-5 Years	0.23	0.24	0.87	-0.42	0.88	
		6-10 Years	0.23	0.24	0.87	-0.42	0.88	

		11-20 Years	0.18	0.21	0.92	-0.40	0.75	
		31 Year and Above	0.19	0.30	0.97	-0.62	1.00	
		0-5 Years	0.04	0.30	1.00	-0.76	0.85	
	31 Year and Above	6-10 Years	0.05	0.30	1.00	-0.77	0.86	
		11-20 Years	-0.01	0.27	1.00	-0.76	0.74	
		21-30 Years	-0.19	0.30	0.97	-1.00	0.62	
		6-10 Years	0.04	0.23	1.00	-0.59	0.67	
		11-20 Years	-0.02	0.20	1.00	-0.57	0.53	
	0-5 Years	21-30 Years	-0.19	0.23	0.92	-0.82	0.43	
		31 Year and Above	-0.03	0.29	1.00	-0.81	0.76	
		0-5 Years	-0.04	0.23	1.00	-0.67	0.59	
		11-20 Years	-0.06	0.20	1.00	-0.62	0.49	
	6-10 Years	21-30 Years	-0.24	0.23	0.85	-0.87	0.40	
		31 Year and Above	-0.07	0.29	1.00	-0.85	0.72	
		0-5 Years	0.02	0.20	1.00	-0.53	0.57	
Perceived Learning Opportunities		6-10 Years	0.06	0.20	1.00	-0.49	0.62	0.87
	11-20 Years	21-30 Years	-0.17	0.20	0.92	-0.73	0.38	
		31 Year and Above	0.00	0.26	1.00	-0.73	0.72	
		0-5 Years	0.19	0.23	0.92	-0.43	0.82	
		6-10 Years	0.24	0.23	0.85	-0.40	0.87	
	21-30 Years	11-20 Years	0.17	0.20	0.92	-0.38	0.73	
		31 Year and Above	0.17	0.29	0.98	-0.62	0.95	
		0-5 Years	0.03	0.29	1.00	-0.76	0.81	
	31 Year and Above	6-10 Years	0.07	0.29	1.00	-0.72	0.85	
		11-20 Years	0.00	0.26	1.00	-0.72	0.73	
		21-30 Years	-0.17	0.29	0.98	-0.95	0.62	
		6-10 Years	0.12	0.25	0.99	-0.57	0.81	
		11-20 Years	-0.09	0.22	1.00	-0.69	0.52	
	0-5 Years	21-30 Years	-0.19	0.25	0.94	-0.87	0.50	0.79
		31 Year and Above	-0.04	0.31	1.00	-0.89	0.81	
		0-5 Years	-0.12	0.25	0.99	-0.81	0.57	
		11-20 Years	-0.21	0.22	0.88	-0.82	0.40	
	6-10 Years	21-30 Years	-0.31	0.25	0.73	-1.00	0.38	
		31 Year and Above	-0.16	0.31	0.99	-1.02	0.70	
Performance Expectancy		0-5 Years	0.09	0.22	1.00	-0.52	0.69	
		6-10 Years	0.21	0.22	0.88	-0.40	0.82	
	11-20 Years	21-30 Years	-0.10	0.22	0.99	-0.71	0.50	
		31 Year and Above	0.05	0.29	1.00	-0.75	0.84	
		0-5 Years	0.19	0.25	0.94	-0.50	0.87	
		6-10 Years	0.31	0.25	0.73	-0.38	1.00	
	21-30 Years	11-20 Years	0.10	0.22	0.99	-0.50	0.71	
		31 Year and Above	0.15	0.31	0.99	-0.71	1.00	
		0-5 Years	0.04	0.31	1.00	-0.81	0.89	

	31 Year and Above	6-10 Years	0.16	0.31	0.99	-0.70	1.02	
		11-20 Years	-0.05	0.29	1.00	-0.84	0.75	
		21-30 Years	-0.15	0.31	0.99	-1.00	0.71	
	0-5 Years	6-10 Years	-0.02	0.23	1.00	-0.65	0.61	
		11-20 Years	0.12	0.20	0.97	-0.43	0.68	
		21-30 Years	-0.40	0.23	0.41	-1.03	0.23	
		31 Year and Above	-0.36	0.29	0.71	-1.15	0.42	
	6-10 Years	0-5 Years	0.02	0.23	1.00	-0.61	0.65	
		11-20 Years	0.14	0.20	0.96	-0.42	0.70	
		21-30 Years	-0.38	0.23	0.46	-1.02	0.25	
		31 Year and Above	-0.35	0.29	0.75	-1.13	0.44	
Self-Management Of Learning	11-20 Years	0-5 Years	-0.12	0.20	0.97	-0.68	0.43	
		6-10 Years	-0.14	0.20	0.96	-0.70	0.42	0.08
		21-30 Years	-0.52	0.20	0.08	-1.08	0.03	
		31 Year and Above	-0.48	0.27	0.36	-1.21	0.24	
	21-30 Years	0-5 Years	0.40	0.23	0.41	-0.23	1.03	
		6-10 Years	0.38	0.23	0.46	-0.25	1.02	
		11-20 Years	0.52	0.20	0.08	-0.03	1.08	
		31 Year and Above	0.04	0.29	1.00	-0.75	0.83	
	31 Year and Above	0-5 Years	0.36	0.29	0.71	-0.42	1.15	
		6-10 Years	0.35	0.29	0.75	-0.44	1.13	
		11-20 Years	0.48	0.27	0.36	-0.24	1.21	
		21-30 Years	-0.04	0.29	1.00	-0.83	0.75	
	0-5 Years	6-10 Years	0.07	0.22	1.00	-0.54	0.67	
		11-20 Years	-0.05	0.19	1.00	-0.58	0.48	
		21-30 Years	-0.31	0.22	0.62	-0.91	0.29	
		31 Year and Above	-0.25	0.27	0.89	-1.00	0.50	
	6-10 Years	0-5 Years	-0.07	0.22	1.00	-0.67	0.54	
		11-20 Years	-0.12	0.19	0.97	-0.65	0.42	
		21-30 Years	-0.38	0.22	0.43	-0.98	0.23	
		31 Year and Above	-0.32	0.27	0.77	-1.07	0.43	
E-Learning Self Efficacy	11-20 Years	0-5 Years	0.05	0.19	1.00	-0.48	0.58	
		6-10 Years	0.12	0.19	0.97	-0.42	0.65	0.41
		21-30 Years	-0.26	0.19	0.67	-0.79	0.27	
		31 Year and Above	-0.20	0.25	0.93	-0.90	0.49	
	21-30 Years	0-5 Years	0.31	0.22	0.62	-0.29	0.91	
		6-10 Years	0.38	0.22	0.43	-0.23	0.98	
		11-20 Years	0.26	0.19	0.67	-0.27	0.79	
		31 Year and Above	0.06	0.27	1.00	-0.70	0.81	
	31 Year and Above	0-5 Years	0.25	0.27	0.89	-0.50	1.00	
		6-10 Years	0.32	0.27	0.77	-0.43	1.07	
		11-20 Years	0.20	0.25	0.93	-0.49	0.90	
		21-30 Years	-0.06	0.27	1.00	-0.81	0.70	

	0-5 Years	6-10 Years	0.01	0.26	1.00	-0.70	0.73	
		11-20 Years	-0.12	0.23	0.99	-0.74	0.51	
		21-30 Years	-0.37	0.26	0.62	-1.08	0.34	
		31 Year and Above	-0.50	0.32	0.53	-1.39	0.38	
	6-10 Years	0-5 Years	-0.01	0.26	1.00	-0.73	0.70	
		11-20 Years	-0.13	0.23	0.98	-0.76	0.50	
		21-30 Years	-0.38	0.26	0.59	-1.10	0.33	
		31 Year and Above	-0.52	0.33	0.50	-1.41	0.37	
Intention To Use	11-20 Years	0-5 Years	0.12	0.23	0.99	-0.51	0.74	0.32
		6-10 Years	0.13	0.23	0.98	-0.50	0.76	
		21-30 Years	-0.25	0.23	0.81	-0.88	0.38	
		31 Year and Above	-0.39	0.30	0.69	-1.21	0.43	
	21-30 Years	0-5 Years	0.37	0.26	0.62	-0.34	1.08	
		6-10 Years	0.38	0.26	0.59	-0.33	1.10	
		11-20 Years	0.25	0.23	0.81	-0.38	0.88	
		31 Year and Above	-0.14	0.32	0.99	-1.03	0.75	
	31 Year and Above	0-5 Years	0.50	0.32	0.53	-0.38	1.39	
		6-10 Years	0.52	0.33	0.50	-0.37	1.41	
		11-20 Years	0.39	0.30	0.69	-0.43	1.21	
		21-30 Years	0.14	0.32	0.99	-0.75	1.03	

Table F2. ANOVA Results of Age Groups

Dependent Variable	(I) Age	(J) Age_new	Mean Difference (I-J)	Std Error	Sig	95% Confidence Interval		P
						Lower Bound	Upper Bound	
Effort Expectancy	20-30 Age	31-40 Age	0.02	0.20	1.00	-0.49	0.52	0.18
		41-50 Age	-0.29	0.22	0.54	-0.85	0.27	
		51 and Above	-0.39	0.25	0.41	-10358.00	0.26	
	31-40 Age	20-30 Age	-0.02	0.20	1.00	-0.52	0.49	
		41-50 Age	-0.31	0.19	0.39	-0.81	0.19	
		51 and Above	-0.40	0.23	0.30	-1.00	0.19	
	41-50 Age	20-30 Age	0.29	0.22	0.54	-0.27	0.85	
		31-40 Age	0.31	0.19	0.39	-0.19	0.81	
		51 and Above	-0.10	0.25	0.98	-0.74	0.55	
	51 and Above	20-30 Age	0.39	0.25	0.41	-0.26	10358.00	
		31-40 Age	0.40	0.23	0.30	-0.19	1.00	
		41-50 Age	0.10	0.25	0.98	-0.55	0.74	
Social Influence	20-30 Age	31-40 Age	0.11	0.19	0.94	-0.39	0.62	0.68
		41-50 Age	-0.02	0.22	1.00	-0.58	0.54	
		51 and Above	-0.16	0.25	0.92	-0.80	0.49	
	31-40 Age	20-30 Age	-0.11	0.19	0.94	-0.62	0.39	
		41-50 Age	-0.13	0.19	0.90	-0.63	0.37	
		51 and Above	-0.27	0.23	0.64	-0.87	0.32	
	41-50 Age	20-30 Age	0.02	0.22	1.00	-0.54	0.58	
		31-40 Age	0.13	0.19	0.90	-0.37	0.63	
		51 and Above	-0.14	0.25	0.94	-0.79	0.50	
	51 and Above	20-30 Age	0.16	0.25	0.92	-0.49	0.80	
		31-40 Age	0.27	0.23	0.64	-0.32	0.87	
		41-50 Age	0.14	0.25	0.94	-0.50	0.79	
Perceived Playfulness Teacher's perspective	20-30 Age	31-40 Age	0.12	0.19	0.92	-0.37	0.61	0.67
		41-50 Age	-0.08	0.21	0.98	-0.63	0.46	
		51 and Above	-0.09	0.24	0.98	-0.71	0.54	

	31-40 Age	20-30 Age	-0.12	0.19	0.92	-0.61	0.37	
		41-50 Age	-0.20	0.19	0.70	-0.69	0.28	
		51 and Above	-0.21	0.22	0.79	-0.78	0.37	
	41-50 Age	20-30 Age	0.08	0.21	0.98	-0.46	0.63	
		31-40 Age	0.20	0.19	0.70	-0.28	0.69	
		51 and Above	0.00	0.24	1.00	-0.63	0.62	
	51 and Above	20-30 Age	0.09	0.24	0.98	-0.54	0.71	
		31-40 Age	0.21	0.22	0.79	-0.37	0.78	
		41-50 Age	0.00	0.24	1.00	-0.62	0.63	
Perceived Playfulness Student's perspective	20-30 Age	31-40 Age	0.10	0.19	0.96	-0.39	0.59	0.65
		41-50 Age	-0.12	0.21	0.95	-0.66	0.43	
		51 and Above	0.14	0.25	0.95	-0.50	0.77	
	31-40 Age	20-30 Age	-0.10	0.19	0.96	-0.59	0.39	
		41-50 Age	-0.21	0.19	0.67	-0.70	0.28	
		51 and Above	0.04	0.23	1.00	-0.54	0.62	
	41-50 Age	20-30 Age	0.12	0.21	0.95	-0.43	0.66	
		31-40 Age	0.21	0.19	0.67	-0.28	0.70	
		51 and Above	0.25	0.24	0.73	-0.38	0.88	
	51 and Above	20-30 Age	-0.14	0.25	0.95	-0.77	0.50	
		31-40 Age	-0.04	0.23	1.00	-0.62	0.54	
		41-50 Age	-0.25	0.24	0.73	-0.88	0.38	
Perceived Learning Opportunities	20-30 Age	31-40 Age	0.17	0.18	0.79	-0.30	0.65	0.42
		41-50 Age	-0.13	0.21	0.93	-0.66	0.40	
		51 and Above	0.10	0.24	0.97	-0.51	0.72	
	31-40 Age	20-30 Age	-0.17	0.18	0.79	-0.65	0.30	
		41-50 Age	-0.30	0.18	0.36	-0.77	0.17	
		51 and Above	-0.07	0.22	0.99	-0.63	0.50	
	41-50 Age	20-30 Age	0.13	0.21	0.93	-0.40	0.66	
		31-40 Age	0.30	0.18	0.36	-0.17	0.77	
		51 and Above	0.23	0.24	0.76	-0.38	0.84	
		20-30 Age	-0.10	0.24	0.97	-0.72	0.51	

	51 and Above	31-40 Age	0.07	0.22	0.99	-0.50	0.63	
		41-50 Age	-0.23	0.24	0.76	-0.84	0.38	
Performance Expectancy	20-30 Age	31-40 Age	0.03	0.20	1.00	-0.49	0.55	0.73
		41-50 Age	-0.19	0.22	0.84	-0.77	0.39	
		51 and Above	-0.08	0.26	0.99	-0.75	0.58	
	31-40 Age	20-30 Age	-0.03	0.20	1.00	-0.55	0.49	
		41-50 Age	-0.22	0.20	0.70	-0.74	0.30	
		51 and Above	-0.12	0.24	0.96	-0.73	0.50	
	41-50 Age	20-30 Age	0.19	0.22	0.84	-0.39	0.77	
		31-40 Age	0.22	0.20	0.70	-0.30	0.74	
		51 and Above	0.10	0.26	0.98	-0.57	0.77	
	51 and Above	20-30 Age	0.08	0.26	0.99	-0.58	0.75	
		31-40 Age	0.12	0.24	0.96	-0.50	0.73	
		41-50 Age	-0.10	0.26	0.98	-0.77	0.57	
Self-Management Of Learning	20-30 Age	31-40 Age	0.25	0.19	0.55	-0.23	0.72	0.05
		41-50 Age	-0.16	0.21	0.87	-0.69	0.37	
		51 and Above	-0.26	0.24	0.69	-0.88	0.35	
	31-40 Age	20-30 Age	-0.25	0.19	0.55	-0.72	0.23	
		41-50 Age	-0.40	0.18	0.13	-0.88	0.07	
		51 and Above	-0.51	0.22	0.10	-10736.00	0.06	
	41-50 Age	20-30 Age	0.16	0.21	0.87	-0.37	0.69	
		31-40 Age	0.40	0.18	0.13	-0.07	0.88	
		51 and Above	-0.10	0.24	0.97	-0.72	0.51	
	51 and Above	20-30 Age	0.26	0.24	0.69	-0.35	0.88	
		31-40 Age	0.51	0.22	0.10	-0.06	10736.00	
		41-50 Age	0.10	0.24	0.97	-0.51	0.72	
E-Learning Self Efficacy	20-30 Age	31-40 Age	0.19	0.18	0.71	-0.27	0.64	0.24
		41-50 Age	-0.11	0.20	0.94	-0.62	0.39	
		51 and Above	-0.15	0.23	0.92	-0.73	0.44	
	31-40 Age	20-30 Age	-0.19	0.18	0.71	-0.64	0.27	
		41-50 Age	-0.30	0.18	0.32	-0.76	0.15	

		51 and Above	-0.33	0.21	0.39	-0.87	0.21	
	41-50 Age	20-30 Age	0.11	0.20	0.94	-0.39	0.62	
		31-40 Age	0.30	0.18	0.32	-0.15	0.76	
		51 and Above	-0.03	0.23	1.00	-0.62	0.55	
	51 and Above	20-30 Age	0.15	0.23	0.92	-0.44	0.73	
		31-40 Age	0.33	0.21	0.39	-0.21	0.87	
		41-50 Age	0.03	0.23	1.00	-0.55	0.62	
Intention To Use	20-30 Age	31-40 Age	0.17	0.21	0.86	-0.37	0.71	0.24
		41-50 Age	-0.23	0.23	0.76	-0.83	0.37	
		51 and Above	-0.17	0.27	0.92	-0.87	0.52	
	31-40 Age	20-30 Age	-0.17	0.21	0.86	-0.71	0.37	
		41-50 Age	-0.39	0.21	0.24	-0.93	0.14	
		51 and Above	-0.34	0.25	0.52	-0.98	0.30	
	41-50 Age	20-30 Age	0.23	0.23	0.76	-0.37	0.83	
		31-40 Age	0.39	0.21	0.24	-0.14	0.93	
		51 and Above	0.05	0.27	1.00	-0.64	0.75	
	51 and Above	20-30 Age	0.17	0.27	0.92	-0.52	0.87	
		31-40 Age	0.34	0.25	0.52	-0.30	0.98	
		41-50 Age	-0.05	0.27	1.00	-0.75	0.64	

Table F3. ANOVA Results for Course Type Groups

Dependent Variable	(I) Course Type	(J) Course Type	Mean Difference (I-J)	Std Error	Sig	95% Confidence Interval		P
						Lower Bound	Upper Bound	
Effort Expectancy	PT	PT	-0.17	0.23	0.94	-0.80	0.45	0.22
		S&M	-0.39	0.22	0.39	-0.98	0.21	
		FL	0.12	0.25	0.99	-0.57	0.81	
		M,PE & Others	-0.23	0.25	0.90	-0.93	0.47	
	SS	PT	0.17	0.23	0.94	-0.45	0.80	
		S&M	-0.21	0.21	0.86	-0.79	0.37	
		FL	0.30	0.25	0.75	-0.38	0.97	
		M,PE & Others	-0.06	0.25	1.00	-0.74	0.63	
	S&M	PT	0.39	0.22	0.39	-0.21	0.98	
		SS	0.21	0.21	0.86	-0.37	0.79	
		FL	0.51	0.24	0.21	-0.14	11604.00	
		M,PE & Others	0.16	0.24	0.97	-0.50	0.82	
	FL	PT	-0.12	0.25	0.99	-0.81	0.57	
		SS	-0.30	0.25	0.75	-0.97	0.38	
		S&M	-0.51	0.24	0.21	-11604.00	0.14	
		M,PE & Others	-0.35	0.27	0.70	-10987.00	0.40	
	M,PE & Others	PT	0.23	0.25	0.90	-0.47	0.93	
		SS	0.06	0.25	1.00	-0.63	0.74	
		S&M	-0.16	0.24	0.97	-0.82	0.50	
		FL	0.35	0.27	0.70	-0.40	10987.00	
Social Influence	PT	SS	0.02	0.23	1.00	-0.59	0.64	0.16
		S&M	-0.28	0.22	0.70	-0.87	0.31	
		FL	0.17	0.25	0.96	-0.52	0.85	
		M,PE & Others	-0.39	0.25	0.55	-10782.00	0.31	
	SS	PT	-0.02	0.23	1.00	-0.64	0.59	
		S&M	-0.30	0.21	0.61	-0.88	0.28	
		FL	0.14	0.25	0.98	-0.53	0.81	
		M,PE & Others	-0.41	0.25	0.47	-1.09	0.27	
	S&M	PT	0.28	0.22	0.70	-0.31	0.87	
		SS	0.30	0.21	0.61	-0.28	0.88	
		FL	0.44	0.24	0.34	-0.21	10886.00	
		M,PE & Others	-0.11	0.24	0.99	-0.77	0.55	
	FL	PT	-0.17	0.25	0.96	-0.85	0.52	
		SS	-0.14	0.25	0.98	-0.81	0.53	
		S&M	-0.44	0.24	0.34	-10886.00	0.21	
		M,PE & Others	-0.55	0.27	0.25	-12925.00	0.19	
	M,PE & Others	PT	0.39	0.25	0.55	-0.31	10782.00	
		SS	0.41	0.25	0.47	-0.27	1.09	
		S&M	0.11	0.24	0.99	-0.55	0.77	

		FL	0.55	0.27	0.25	-0.19	12925.00	
Perceived Playfulness Teacher's perspective	PT	SS	-0.31	0.22	0.61	-0.91	0.29	0.05
		S&M	-0.43	0.21	0.23	-10051.00	0.14	
		FL	0.15	0.24	0.97	-0.51	0.81	
		M,PE & Others	-0.40	0.24	0.47	-10734.00	0.27	
	SS	PT	0.31	0.22	0.61	-0.29	0.91	
		S&M	-0.12	0.20	0.97	-0.68	0.43	
		FL	0.46	0.24	0.30	-0.19	11083.00	
		M,PE & Others	-0.09	0.24	1.00	-0.75	0.57	
	S&M	PT	0.43	0.21	0.23	-0.14	10051.00	
		SS	0.12	0.20	0.97	-0.43	0.68	
		FL	0.58	0.23	0.08	-0.04	12079.00	
		M,PE & Others	0.03	0.23	1.00	-0.60	0.67	
	FL	PT	-0.15	0.24	0.97	-0.81	0.51	
		SS	-0.46	0.24	0.30	-11083.00	0.19	
		S&M	-0.58	0.23	0.08	-12079.00	0.04	
		M,PE & Others	-0.55	0.26	0.22	-12688.00	0.17	
	M,PE & Others	PT	0.40	0.24	0.47	-0.27	10734.00	
		SS	0.09	0.24	1.00	-0.57	0.75	
		S&M	-0.03	0.23	1.00	-0.67	0.60	
		FL	0.55	0.26	0.22	-0.17	12688.00	
Perceived Playfulness Student's perspective	PT	SS	-0.33	0.22	0.57	-0.93	0.28	0.11
		S&M	-0.43	0.21	0.26	-10029.00	0.15	
		FL	0.04	0.24	1.00	-0.63	0.70	
		M,PE & Others	-0.43	0.25	0.41	-1108.00	0.25	
	SS	PT	0.33	0.22	0.57	-0.28	0.93	
		S&M	-0.10	0.21	0.99	-0.66	0.47	
		FL	0.36	0.24	0.56	-0.29	10198.00	
		M,PE & Others	-0.10	0.24	0.99	-0.77	0.56	
	S&M	PT	0.43	0.21	0.26	-0.15	10029.00	
		SS	0.10	0.21	0.99	-0.47	0.66	
		FL	0.46	0.23	0.27	-0.17	10934.00	
		M,PE & Others	0.00	0.23	1.00	-0.65	0.64	
	FL	PT	-0.04	0.24	1.00	-0.70	0.63	
		SS	-0.36	0.24	0.56	-10198.00	0.29	
		S&M	-0.46	0.23	0.27	-10934.00	0.17	
		M,PE & Others	-0.47	0.26	0.40	-11908.00	0.26	
	M,PE & Others	PT	0.43	0.25	0.41	-0.25	1108.00	
		SS	0.10	0.24	0.99	-0.56	0.77	
		S&M	0.00	0.23	1.00	-0.64	0.65	
		FL	0.47	0.26	0.40	-0.26	11908.00	
Perceived Learning Opportunities	PT	SS	-0.10	0.21	0.99	-0.69	0.48	0.17
		S&M	-0.38	0.20	0.35	-0.93	0.18	
		FL	0.06	0.24	1.00	-0.59	0.71	

		M,PE & Others	-0.35	0.24	0.58	-1009.00	0.30	
		PT	0.10	0.21	0.99	-0.48	0.69	
		S&M	-0.27	0.20	0.64	-0.82	0.27	
	SS	FL	0.16	0.23	0.96	-0.48	0.79	
		M,PE & Others	-0.25	0.24	0.82	-0.90	0.39	
		PT	0.38	0.20	0.35	-0.18	0.93	
		SS	0.27	0.20	0.64	-0.27	0.82	
	S&M	FL	0.43	0.22	0.30	-0.18	10457.00	
		M,PE & Others	0.02	0.23	1.00	-0.60	0.64	
		PT	-0.06	0.24	1.00	-0.71	0.59	
		SS	-0.16	0.23	0.96	-0.79	0.48	
	FL	S&M	-0.43	0.22	0.30	-10457.00	0.18	
		M,PE & Others	-0.41	0.26	0.50	-11127.00	0.29	
		PT	0.35	0.24	0.58	-0.30	1009.00	
	M,PE & Others	SS	0.25	0.24	0.82	-0.39	0.90	
		S&M	-0.02	0.23	1.00	-0.64	0.60	
		FL	0.41	0.26	0.50	-0.29	11127.00	
		SS	-0.15	0.23	0.97	-0.79	0.49	
		S&M	-0.37	0.22	0.47	-0.98	0.24	
	PT	FL	0.09	0.26	1.00	-0.62	0.80	
		M,PE & Others	-0.38	0.26	0.61	-10934.00	0.34	
		PT	0.15	0.23	0.97	-0.49	0.79	
		S&M	-0.22	0.22	0.84	-0.82	0.37	
	SS	F	0.24	0.25	0.89	-0.46	0.93	
		M,PE & Others	-0.23	0.26	0.90	-0.94	0.48	
		PT	0.37	0.22	0.47	-0.24	0.98	
		SS	0.22	0.22	0.84	-0.37	0.82	
Performance Expectancy	S&M	FL	0.46	0.24	0.33	-0.21	11302.00	0.23
		M,PE & Others	-0.01	0.25	1.00	-0.69	0.67	
		PT	-0.09	0.26	1.00	-0.80	0.62	
		SS	-0.24	0.25	0.89	-0.93	0.46	
	FL	S&M	-0.46	0.24	0.33	-11302.00	0.21	
		M,PE & Others	-0.47	0.28	0.46	-12351.00	0.30	
		PT	0.38	0.26	0.61	-0.34	10934.00	
	M,PE & Others	SS	0.23	0.26	0.90	-0.48	0.94	
		S&M	0.01	0.25	1.00	-0.67	0.69	
		FL	0.47	0.28	0.46	-0.30	12351.00	
		SS	-0.29	0.22	0.66	-0.88	0.30	
		S&M	-0.43	0.21	0.23	-0.99	0.14	
	PT	FL	0.12	0.24	0.99	-0.53	0.78	
		M,PE & Others	-0.19	0.24	0.93	-0.85	0.47	
Self-Management Of Learning		PT	0.29	0.22	0.66	-0.30	0.88	0.09
		S&M	-0.14	0.20	0.96	-0.69	0.41	
	SS	F	0.41	0.23	0.40	-0.23	10545.00	
		M,PE & Others	0.10	0.24	0.99	-0.55	0.75	
	S&M	PT	0.43	0.21	0.23	-0.14	0.99	

		SS	0.14	0.20	0.96	-0.41	0.69	
		FL	0.55	0.23	0.11	-0.07	11699.00	
		M,PE & Others	0.24	0.23	0.84	-0.39	0.87	
		PT	-0.12	0.24	0.99	-0.78	0.53	
	FL	SS	-0.41	0.23	0.40	-10545.00	0.23	
		S&M	-0.55	0.23	0.11	-11699.00	0.07	
		M,PE & Others	-0.31	0.26	0.75	-10225.00	0.40	
		PT	0.19	0.24	0.93	-0.47	0.85	
	M,PE & Others	SS	-0.10	0.24	0.99	-0.75	0.55	
		S&M	-0.24	0.23	0.84	-0.87	0.39	
		FL	0.31	0.26	0.75	-0.40	10225.00	
E-Learning Self Efficacy	PT	SS	-0.15	0.21	0.95	-0.71	0.41	0.13
		S&M	-0.23	0.20	0.78	-0.76	0.31	
		FL	0.20	0.23	0.91	-0.43	0.82	
		M,PE & Others	-0.39	0.23	0.44	-10184.00	0.24	
	SS	PT	0.15	0.21	0.95	-0.41	0.71	
		S&M	-0.08	0.19	1.00	-0.60	0.45	
		FL	0.35	0.22	0.53	-0.26	0.96	
		M,PE & Others	-0.24	0.23	0.83	-0.86	0.38	
	S&M	PT	0.23	0.20	0.78	-0.31	0.76	
		SS	0.08	0.19	1.00	-0.45	0.60	
		FL	0.42	0.21	0.28	-0.17	1012.00	
		M,PE & Others	-0.16	0.22	0.95	-0.76	0.44	
	FL	PT	-0.20	0.23	0.91	-0.82	0.43	
		SS	-0.35	0.22	0.53	-0.96	0.26	
		S&M	-0.42	0.21	0.28	-1012.00	0.17	
		M,PE & Others	-0.59	0.25	0.12	-12601.00	0.09	
	M,PE & Others	PT	0.39	0.23	0.44	-0.24	10184.00	
		SS	0.24	0.23	0.83	-0.38	0.86	
		S&M	0.16	0.22	0.95	-0.44	0.76	
		FL	0.59	0.25	0.12	-0.09	12601.00	
Intention To Use	PT	SS	-0.25	0.24	0.85	-0.91	0.42	0.05
		S&M	-0.39	0.23	0.44	-10274.00	0.24	
		FL	0.23	0.27	0.92	-0.51	0.96	
		M,PE & Others	-0.51	0.27	0.34	-12507.00	0.24	
	SS	PT	0.25	0.24	0.85	-0.42	0.91	
		S&M	-0.14	0.23	0.97	-0.76	0.48	
		FL	0.48	0.26	0.37	-0.25	1.20	
		M,PE & Others	-0.26	0.27	0.87	-0.99	0.48	
	S&M	PT	0.39	0.23	0.44	-0.24	10274.00	
		SS	0.14	0.23	0.97	-0.48	0.76	
		FL	0.62	0.25	0.11	-0.08	13167.00	
		M,PE & Others	-0.11	0.26	0.99	-0.82	0.59	
	FL	PT	-0.23	0.27	0.92	-0.96	0.51	
		SS	-0.48	0.26	0.37	-1.20	0.25	

	S&M	-0.62	0.25	0.11	-13167.00	0.08
	M,PE & Others	-0.73	0.29	0.09	-15316.00	0.07
M,PE & Others	PT	0.51	0.27	0.34	-0.24	12507.00
	SS	0.26	0.27	0.87	-0.48	0.99
	S&M	0.11	0.26	0.99	-0.59	0.82
	FL	0.73	0.29	0.09	-0.07	15316.00

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