CONSTRUCTION OF AN EDUCATIONAL TECHNOLOGY ENGAGEMENT MODEL FOR SOCIAL LEARNING PLATFORMS

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ABSTRACT

CONSTRUCTION OF AN EDUCATIONAL TECHNOLOGY ENGAGEMENT MODEL FOR SOCIAL LEARNING PLATFORMS

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The purpose of this study is to propose a technology model, called Educational Technology Engagement Model (ETEM), towards the student adoption of a social learning platform -Edmodo-. The study offers a guideline, which requires a theoretical understanding of underlying motivational processes for technology adoption, to demonstrate how a model can be designed and developed for a particular technology using a process-based approach. This study aims to provide a comprehensive model to address the limitations of traditional adoption models. The sample of the study includes 533 students from 4 Turkish universities taking Introduction to Information Technologies and Applications (IITA) mandatory course where Edmodo is used as the learning environment. Quantitative research methodology is used in the research design. Correlational design is carried out in order to understand the relationship between independent and dependent variables in the model. The developed model, ETEM, is tested through statistical analyses. The results indicate that cognitive engagement and social engagement of students in the online learning platform are significant estimators of student achievement, and perceived usefulness as indicator of extrinsic motivation and attitude towards technology as indicator of intrinsic motivation are significant estimators of both cognitive and social engagement of students. While content quality, system mobile flexibility as indicators of extrinsic motivators are identified to be significant predictors of perceived usefulness, self-regulation, self-efficacy and interaction as indicators of intrinsic motivators are found to be significant predictors of attitude towards technology. Possible implications, future research challenges and limitations of the study are discussed.

Keywords: Technology Adoption, Student Motivation, Student Engagement, Technology Model, Social Learning Platforms

ÖZ

SOSYAL ÖĞRENME PLATFORMLARI İÇİN BİR EĞİTİM TEKNOLOJİSİ BAĞLILIK MODELİ

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Bu çalışmanın amacı, bir sosyal öğrenme platformu olan Edmodo'nun öğrenciler tarafından benimsenmesi ve kabulüne yönelik bir teknoloji modeli ortaya koymaktır. Önerilen model "Eğitim Teknolojisi Bağlılık Modeli" (ETEM) olarak isimlendirilmiştir. Çalışma, teknoloji kabulü için temel motivasyon adımlarının teorik olarak anlaşılmasını gerektiren süreç tabanlı bir yaklaşım benimseyerek spesifik bir teknoloji için kabul modelinin adım adım nasıl tasarlanıp geliştirilebileceğini gösteren bir kılavuz ortaya koymaktadır. Geleneksel modellerin 21. yüzyıl teknolojilerine yönelik kullanıcı motivasyonunu açıklamadaki sınırlılıkları göz önünde bulundurularak bu çalışmada motive edici içsel ve dışsal etkenler, öğrenci motivasyonu, öğrenci bağlılığı ve algılanan başarı arasındaki ilişkiyi resmeden kapsamlı bir model sunmayı amaçlanmaktadır. Çalışmanın örneklemini Edmodo'nun öğrenme ortamı olarak kullanıldığı Bilgi Teknolojileri ve Uygulamalarına Giriş dersini alan Türkiye'deki 4 üniversiteden 533 öğrenci oluşturmaktadır. Araştırma tasarımında nicel araştırma metodolojisi kullanılmıştır. Modeldeki bağımsız ve bağımlı değişkenler arasındaki ilişkiyi anlamak için korelasyonel desen kullanılmıştır. Geliştirilen model, sırasıyla Açıklayıcı Faktör Analizi (EFA), Doğrulayıcı Faktör Analizi (CFA) ve Yapısal Eşitlik Modellemesi (SEM) ile test edilmiştir. Sonuçlar, bilişsel ve sosyal bağlılığın öğrenci başarısını açıklamada önemli yordayıcılar olduklarını; dışsal motivasyonun göstergesi olarak algılanan faydanın ve içsel motivasyonun göstergesi olarak teknolojiye yönelik tutumun öğrencilerin hem bilişsel hem de sosyal bağlılıklarını önemli ölçüde etkilediğini göstermektedir. Dışsal motivasyonu etkileyen faktörlerden içerik kalitesi, sistem özellikleri, öğrenci özellikleri ve mobil esnekliğin, algılanan yararlılığı önemli ölçüde etkilediği tespit edilirken; içsel motivasyonu etkileyen faktörlerden öz düzenleme, öz yeterlik ve etkileşimin teknolojiye yönelik tutumu yordadığı görülmüştür. Geliştirilen modelin muhtemel uygulama ve etki alanları ile çalışmanın kısıtlamaları tartışılmıştır.

Anahtar Kelimeler: Teknoloji Kabul Modeli, Öğrenci Motivasyonu, Öğrenci Bağlılığı, Teknoloji Modeli, Sosyal Öğrenme Platformları

To my Dad…

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INTRODUCTION

This study proposes an educational technology engagement model developed through a process-based model construction approach based on relevant motivation theories. The introduction and background of the study, statement of the problem, purpose of the study, research questions, the significance of the study, and the definition of terms are presented in the current chapter.

1.1. Introduction

The impact of technology on society is growing influentially on every parts of life including communication, working, housing, shopping, education and transportation (Burke, 1985). The impact of society on technology through belief systems and values is growing progressively as well (Dobres & Hoffman, 1999), especially after Web 2.0 technologies being essential and necessary part of daily lives. The mutual and complementary relationship with society has made technology an indispensable component of individual and social lives just as being humans an embodied constituent of technology.

Despite promising characteristics and spectacular properties of Web 2.0 technologies, not all of them – either designed for easing work load of daily life, providing pleasure or helping instruction– can remain standing in the competitive environment of technology market. Researching the underlying motivational factors to illuminate why some technologies are highly accepted and embraced by humans while others struggle to survive has been a serious issue for theorists of motivation and technology adoption model experts and researchers (Davis, 1985; Bagozzi, 2007).

Human motivation required for holding individuals' interest, readiness, concentration, and attachment to technologies has been an attention-grabbing area for 3 decades the way that drives academic research and come up with several technology adoption models based on motivation theories. While these models have been tested several times and found robust, effective, valid and reliable on the identification of motivational factors to elucidate human acceptance and adoption of technology, they remain questionable to clarify user motivation toward 21st century technologies since they have limited concerns on changing dynamics over the relationship between technology and society. While technology was regarded as an instrument adopted for its tools and facilities on utilitarian level without needing for deeper attachment at intellectual or emotional level at 80s and 90s, the interaction with technology has elevated to deeper involvement and engagement at social and cognitive level after 2000s.

Given ever-growing rates on internet access, possession of mobile phones with smart capabilities and social media connectivity, society is far above initial acceptance and adoption that current technology adoption models have assumed and tested accordingly. While they are good at demonstrating on which motivational factors might forecast to make technology an integrated part in working and social lives of humans, they are inadequate to elucidate how people become engaged to, be part of and sustained with technology. Furthermore, behaviorist characteristics of current adoption models concentrating on merely technical elements and neglecting systemic and social elements of technology (Smith et al., 2007) gives scant elucidation of technology acceptance. Therefore, traditional technology adoption models are required to be altered and updated with novel determinant constructs, and upgraded with unconventional motivational beliefs, goals, desires and outcomes to make them sense to changing dynamics of 21st century on the relationship between society and technology.

1.2. Background of the Study

The advancements in technology have reached a point where humans and technology with its tools and media interpenetrate each other to form a larger system. Wellman's

(2002) metaphor "Each person is a switchboard, between ties and networks" (p. 13) is an unambiguous statement to understand this larger system. People are parts of the virtual world of technology as well as technology is being part of their social lives. The relationship with technology is not in a commensal manner anymore where humans take advantage of its facilities as it was used to be, rather it is mutual where both sides benefit from each other. The role of technology is not confined to instrumentality for addressing basic needs as it was in the past, rather humans are motivated to use digital technologies at an individualized and holistic level with their cognitions and emotions.

The use of several forms of technologies including Internet, computers, tablets, smartphones, video/online games etc. is so widespread in daily lives. Since the young people were "born in to" these technologies and utilize their services as part of their daily routines, they are called the "digital natives" (Prensky, 2010) or "Net Geners" (Tapscott, 2009). "Digital in 2018 Report" of We Are Social and Hootsuite (Kemp, 2018) indicates that 4 billion people in the world use the Internet, 5 billion people have a mobile phone of which more than half have smart capabilities enabling internet experience at anywhere-anytime, and more than 3 billion people access to social media almost all through mobile devices (%90). The report also indicates that the average internet user is online almost 6 hours per day and smartphones are the most preferred device for accessing to internet (%52).

The changing dynamics underlying the motivation to adopt and use of technologies as part of daily lives can be grounded on the advent of the Internet and transition from Web 1.0 technologies to Web 2.0. Web 1.0 refers to the early web-based content sharing platform of the Internet where the role of users is limited with access to broadcasted information as passive listeners (Cormode & Krishnamurthy, 2008). Web sites with static pages designed for low bandwidth and slow connection of the Internet identify Web 1.0. The Web 1.0 technologies were comparatively limited in terms of participation and co-creation. With the advent to Web 2.0 technologies at late 90s, the dynamics of Internet has significantly changed. Users became active producers of the content in the digital world. The dynamic capabilities of the Web 2.0 environment allowed a new autonomous and social virtual life. Forming new communities is not restricted to real life presence anymore. People can share their interests, opinions and emotions through virtual communities. Web 2.0 enables people to engage with technologies, and get involved at social, cognitive and hedonic levels as well as at instrumental level.

The advancement in technology not only has had impact on dynamics of humans' daily lives, but it also has been influencing the dynamics of learning and instruction. According to The Pew Internet Research's report (Smith, 2013), 93% of students possess a computer at home, 78% of them own a smartphone, and 95% of them access to Internet regularly. According to a recent study (Villanti et al., 2017), 87% of US young adults possess a smartphone with Internet access, 74% of them have a computer with Internet access and 41% a tablet with Internet access, and 97.5% of them manage at least one social media account in a regular manner. High acceptance of Web 2.0 technology by students have triggered educators to benefit from technology tools and media for instructional purposes. The integration of education technologies into learning environments are no longer confined to entrepreneurial educators nowadays. Communication between students and teachers through e-mail, delivery of course materials via learning management systems, utilization of Office programs to create, edit and present course content and searching the Internet to access information on a specific subject are regarded routinized technology-supported instructional practices for the last 2 decades (Chen, Lambert & Guidry, 2010; Laird & Kuh, 2005).

Along with the opportunities, popularity and high adoption of technologies, students' competence, knowledge and skills to be able to use technology are thought as an educational opportunity of which should be made use in learning environments. The 21st century students are more proficient on how to utilize new technologies than previous generations including their instructors and teachers. This can be in such an extent that they are not required to take any formal training or guidance on using them (Prensky, 2001). Students' capability on handling technology and student expectations and desires for integration of technology to complement face-to-face instruction (Caruso & Salaway, 2008) inspired scholars to research on several dimensions of educational use of technologies. While some focus on their functions, advantages, impact, efficiency, others concern with how they can be part of learning environments, and to what degree students accept and adopt technology as part of instruction through technology adoption models (Robinson & Hullinger, 2008; Laird & Kuh, 2005; Kuh & Hu, 2001).

Traditional technology adoption models have highly been used by researchers to predict the adoption of educational technologies by students. While the robustness and power of current models have been verified several times by researchers, the behaviorist approaches of these models based on the observable actions of individuals like number of logins, number of uses of tools and materials, time spending on the medium etc. to determine adoption is problematic for evaluation of educational technologies since learning is not only made up of observable behaviors but also includes cognitive and social involvement. In other words, the scope of learning does not only address the quantity of efforts at behaviorist level but also meet the quality of efforts at cognitive and social level (Krause & Coates, 2008). Therefore, as Salomon and Perkins (1998) suggested, research related to learning and technology should consider the influence of technologies on cognitive and social aspects of learning as well as behavioral aspects. This requires the adaptation and modification of technology adoption models in a way to cover all aspects of learning thus a comprehensive model can be proposed to be tested.

Consequently, current technology adoption models determine user acceptance and engagement towards a particular technology based on the activities that require lower order thinking skills. However, an effective learning also requires higher order thinking skills that involve cognitive and social processing. Judgmental skills like critical thinking, problem solving and creativity, and social skills like commenting, questioning, discussion and collaboration also matter in educational settings in terms of achieving learning objectives and even gaining abilities to be used in marketplace in the future (Fredricks et al., 2004; Jonassen, 2006; Anderson & Krathwohl, 2001; Cuban, Kirkpatrick, & Peck, 2001). Therefore, determining and identifying to what extent a particular technology addresses social and cognitive aspects of learning is crucial in terms of deciding whether it successfully engages students. However, although several studies offer engagement models, identify types and components of student engagement in traditional educational environments and face-to-face contexts, studies discussing online engagement at a model level and factors predicting engagement in a technology context is scant (Coates, 2006; Beer, Clark & Jones, 2010).

1.3. Statement of the Problem

The growth and advancement of technology is influencing society drastically on every parts of life including communication, business, housing, shopping, education and transportation (Burke, 1985). The influence of society over technology by means of values and belief systems is increasing steadily as well (Dobres & Hoffman, 1999), especially after Web 2.0 technologies became an essential component of daily life. The interdependent relationship between technology and society has turned technology into an integrated component of individual and social lives just as being humans an engaged constituent of technology. Human motivation to be able to keep individuals integrated and attached to technologies has been a critical research issue for 3 decades the way that triggers academicians to suggest several technology adoption models established on motivation theories. In spite of their robustness, effectiveness, validity and reliability for determining motivators to estimate human acceptance of technology, adoption models are inadequate to explain user motivation toward 21st century technologies since they disregard changing dynamics on the relationship between technology and society. While technologies were regarded as instruments adopted for their resources and affordances on utilitarian level at 80s and 90s, the interaction with technology has risen to higher involvement and engagement at social and cognitive level after 2000s.

> TAM has provided us with valuable insights, such as the relevance of designing user friendly interfaces and emphasizing the value of systems in terms of their productivity and applicability… Davis' observation relating the constructs ease of use and usefulness to that of usage behavior was an early valuable observation. It was relevant given the technological progress and diffusion at the time the model was formulated in the mid-1980s. Yet, from the same perspective of normal science, we learned that the major challenges faced by IS researchers and practitioners today may no longer deal with behaviors such as initial acceptance (Silva, 2007, p.264)

The statement quoted above is an appropriate judgement on the current status of traditional adoption models, not just Technology Acceptance Model (TAM). Considering ever-increasingly rates on use of internet, ownership of smart phones and use of Web 2.0 technologies particularly social media, society is far above initial acceptance and adoption. While popular technology adoption models are efficient at analyzing on which motivators might estimate to make technology an integrated part of human lives, they are inadequate on clarifying how people are likely to become engaged to, be attached of and sustained with technology. Furthermore, behaviorist nature of current adoption models regarding mostly technical and normative aspects and ignoring systemic, cognitive and social dimensions of technology (Smith et al., 2007) gives partial explanation of technology acceptance. Consequently, the current study considers traditional technology adoption models should be altered, rearranged and updated with new determinant constructs, and upgraded with new motivational beliefs, goals, desires and outcomes to address limitations.

Educational technology is a special form of technology whose ultimate goal is to improve teaching and learning, empower instructional processes and increase engagement and achievement of students. Addressing and fulfilling these goals requires systematic application of theoretical knowledge from learning-related sciences to educational practices. Educational technologies require special attention in terms of adoption because they are often an indispensable part of educational practice, and the design of the technology is necessarily interwoven with pedagogy and content. Just as student motivation towards learning may vary from intrinsic motivation to several forms of extrinsic motivation, it is likely that motivation towards adoption of educational technologies also lies in a similar continuum. Therefore, it is considered significant and valuable to identify both extrinsic and intrinsic motivators estimating the adoption of technology which supports elaboration of the relationships between motivational constructs.

Despite lots of adoption models offered for utilitarian systems addressing extrinsic motivational factors and extrinsic motivation like TAM, Decomposed Theory of Planned Behavior (DTPB), Unified Theory of Acceptance and Use of Technology (UTAUT) etc., and there are also models recommended for hedonic systems being purely intrinsic like Hedonic-Motivation System Adoption Model (HMSAM) (Lowry et al., 2013), the literature does not present any model addressing both extrinsic and intrinsic motivation constructs comprehensively and thoroughly. Although few studies attempt to separate intrinsic and extrinsic constructs in their models, both definition and measurement items for intrinsic motivators function as extrinsic motivators in effect (Yoo et al., 2012; Abduljalil & Zainuddin, 2015). Moreover, although several studies adopted and tested technology models, especially TAM and UTAUT, for explaining the adoption of various educational technologies including mostly e-learning systems, learning management systems and content management systems, they treat these systems as utilitarian technologies as if they have only extrinsic elements although they host both extrinsic and intrinsic constituents. Therefore, to remedy and address the above-stated deficiencies and limitations, the current study offers an educational technology engagement model by adopting a process-based model construction approach that are to be explained and detailed step-by-step in this study.

1.4. Purpose of the Study

The purpose of current study is to propose a technology adoption model depicting multifaceted and sophisticated relationship between motivational factors, motivational beliefs, different engagement types and perceived achievement of students in terms of learning outcomes in a social learning platform. To be more precise, the current study aims to determine how intrinsic and extrinsic motivational factors predict beliefs and how these beliefs are related to various engagement types such as cognitive and social engagement, and to what extent engagement predicts perceived success of students in a social learning platform.

1.5. Significance and Originality of the Study

Several researchers emphasize that technology is valuable in educational environments when their qualities are used effectively during teaching and learning therefore integration of, adoption of and engagement in technologies respectively by students is more important than mere existence of them as devices or tools in classrooms or schools (Jonassen, 2000; Kim & Reeves, 2007). While there are plenty of studies addressing roles, benefits, acceptance and integration of technologies for instruction and learning, research on adoption and engagement of students toward instructional use of technology along with its determinants -extrinsic and intrinsic motivators- via a technology model is scant. Main motivation of current study is to provide a comprehensive model depicting which and to what extent motivators as critical success factors of technology adoption predict engagement of students with digital technologies.

Defining online engagement and addressing indicators of student engagement with a model is important for both school administrators, instructors and instructional designers when considered the widespread adoption of courses delivered partially or completely online at schools and universities. Through a model study, existing practices in online environments can be improved and efforts to increase student engagement towards online platforms can be tuned (Beer, Clark & Jones, 2010).

Specifically, the prospective model provided in the current study has the potential to guide teachers in understanding how students use online learning platforms, which factors are influencing student behaviors, and what precautions and interventions they can take at necessary points to increase student engagement in online learning environments.

Engagement is a comprehensive term in education that covers implicit/explicit or visible/invisible behaviors of students toward learning (Krause, 2005). The indicators of engagement involve a wide range of behaviors, plus the behaviors exhibited in an online environment differ from traditional learning environments (Beer, Clark & Jones, 2010). Thus, it is challenging to conceptualize a model that sets its framework and boundaries. But it's worth the challenge since such a prospective model along with its measurable components could be very useful. It could be a guide for stakeholders such as school administrators, teachers, instructional designers and students in terms of putting them on an investigated path based on an academic study (Beer, Clark & Jones, 2010).

1.6. Research Questions

While designing the new model the following research questions will be addressed in the study:

1. To what extent do extrinsic motivators contribute to extrinsic motivation of students toward educational technology use?
2. To what extent do intrinsic motivators contribute to intrinsic motivation of students toward educational technology use?
3. To what extent does extrinsic motivation of students toward educational technology use predict intrinsic motivation of students?
4. To what extent does motivation toward educational technology use predict student engagement on a social learning platform?
5. To what extent do student engagement predict perceived achievement of students on a social learning platform?

In accordance with the foregoing research questions, the following hypotheses are formulated:

H_{1a}: There is a significant relationship between system characteristics and perceived usefulness

H_{1b}: There is a significant relationship between content quality and perceived usefulness

H_{1c}: There is a significant relationship between student characteristics and perceived usefulness

H_{1d}: There is a significant relationship between perceived ease of use and perceived usefulness

H_{1e}: There is a significant relationship between mobile flexibility and perceived usefulness

H_{1f}: There is a significant relationship between system characteristics and perceived ease of use

H_{1g}: There is a significant relationship between technology self-efficacy and perceived ease of use

H_{2a}: There is a significant relationship between self-regulation and attitude toward technology

H_{2b}: There is a significant relationship between interaction and attitude toward technology

H_{2c}: There is a significant relationship between technology self-efficacy and attitude toward technology

H_{3}: There is a significant relationship between perceived usefulness and attitude toward technology

H_{4a}: There is a significant relationship between attitude toward technology and social engagement

H_{4b}: There is a significant relationship between attitude toward technology and cognitive engagement

H_{4c}: There is a significant relationship between perceived usefulness and cognitive engagement

H_{4d}: There is a significant relationship between perceived usefulness and social engagement

H_{5a}: There is a significant relationship between cognitive engagement and perceived achievement of students

H_{5b}: There is a significant relationship between social engagement and perceived achievement of students

1.7. Definition of Terms

Main terms used in the study are defined in this part.

Technology Self-Efficacy: Perceived competence to utilize from a particular technology. Self-assurance to use a novel technology and to be able to manage system tools without outside support.

Interaction: The quality of relationship between self, instructor and peers in terms of taking emotional and instructional support and in terms of regulating behaviors and activities being involved

Self-Regulation: One's deliberate and conscious reaction to integrate and regulate intended goal and behaviors in a technology-mediated environment without needing to external forces or stimuli.

Instructor Characteristics: Perceived instructor competency and skills at technical, conceptual and pedagogical level required for technology integration in the learning environment.

Student Characteristics: Impact and social pressures of other students on self to stimulate technology adoption.

System Characteristics: Perceived credibility and safety of system infrastructure, perceived attractiveness of interface design and graphics, availability of customization and personalization, and perceived usability of system.

Content Quality: The judgement on the meaningfulness, significance, brevity, relevance and reasonableness of content shared on the technology-mediated learning environment.

Mobile Flexibility: The evaluation on whether the flexibility and mobility of technology is adequate to allow anytime anywhere independent learning, interaction and cooperation with other students and instructors, and involvement in course-related activities.

Perceived Ease of Use: Personal judgement of whether the technology being involved is easy enough to be able to use effectively.

Perceived Usefulness: Judgement on the usefulness of a particular technology based on the perceived costs and benefits arising from using it.

Attitude Toward Technology: A form of motivational belief emanating from both current and previous technology experiences, knowledge, habits and self-efficacy, and judgement on general technology usefulness and efficacy in terms of meeting academic needs and interests.

Cognitive Engagement: Student mental effort to be able to involve in learning activities and spending reasonable amount of time to complete curricular activities in the technology-mediated learning environment through various mental and cognitive strategies.

Behavioral Engagement: Student participation in curricular activities, individual and group works, class discussions and questioning-answering sessions.

Social Engagement: One's degree of participation and quality of interaction in an online community.

Perceived Achievement: Perceived accomplishment and success of desired instructional objectives and behaviors.

CHAPTER 2

LITERATURE REVIEW

2.1. Introduction

This chapter reviews the studies in the literature covering the background of current study. Academic electronic databases including Educational Resources Information Center (ERIC), ScienceDirect, Taylor & Francis Online Journals, JSTOR, ProQuest Dissertations & Theses Global and Google Scholar as well as prominent journals on technology adoption models were utilized to access these studies.

Several keywords including technology adoption, technology motivation, technology acceptance model, engagement in technology, technology motivators, motivation theories, intrinsic motivation, extrinsic motivation, Web 2.0, e-learning, learning management systems (LMS), blended learning, motivational beliefs, technology attitude, motivational goals and outcomes were used while searching the literature in the electronic databases.

The chapter includes sections respectively Web 2.0 and its derivatives on education, motivation theories, technology adoption models, relationship between engagement, motivation and achievement, motivational constructs as intrinsic and extrinsic adopted in technology adoption models, and engagement toward technology.

2.2. Web 2.0

Web 2.0 is a broad term including various technologies and tools such as blogs, podcasts, forums, wikis, social bookmarking, social network technologies and many others. These technologies and tools are called as second-generation web-based services in today’s world. Web 2.0 technologies allow internet users to create, share and manage information online. Mills (2007) defines web 2.0 as media evolving internet users into “content providers” from “content receivers”, and Web 2.0 enables a collaborative environment to create and disseminate information. Thompson (2008) describes Web 2.0 as turning into a dynamic and changing structure of information and content on the web from a static architecture. According to him, Web 1.0 was a static information source and the users were mostly information consumers. However, Web 2.0 gives opportunities for their users to contribute through adding, changing or sharing new content. Consequently, the dynamic characteristic of web 2.0 technologies has transformed society into active participants on Internet from passive recipients, and this is accepted as online revolution in technology world manifesting itself by influencing daily lives of people as well as affecting several areas including industry, communication, shopping, education, military and transportation (Thompson, 2008).

Annual reports (Kemp, 2018) indicate that Web 2.0 tools are highly accepted and become indispensable parts of daily lives by people. For example, Facebook as a social networking tool has more than 2 billion members, YouTube as a video tool has 1.5 billion members, WhatsApp as a text discussion tool has 1,3 billion, Instagram as an image tool has 800 million members, Tumblr as a blog tool has almost 800 million members etc. throughout the world.

2.3. Web 2.0 in Education

The advancement in technology and its manifestation on Internet environment as Web 2.0 tools not only has influenced the dynamics of daily and working lives, but it also has been influencing the dynamics of learning and instruction. While social media, mobile technologies and handheld devices have been parts of daily lives after 2000s (Chen et al, 2010; Caruso & Salaway, 2008), online education and e-learning through various Web 2.0 tools including information management systems, course management systems, content delivery systems, learning management systems, social learning platforms and educational have been trending technologies in educational lives within this period. These systems have been designed, improved, reviewed, modified and redesigned to create opportunities for both instructors and students. These opportunities include several educational practices like delivery of subject content in various formats, discussion of learning activities outside the classroom and access to learning materials at anytime and anywhere.

Communication between students and instructors via asynchronous and synchronous text tools, delivery and dissemination of course materials and activities via content management systems, use of office applications to create documents and presentations, to manage email and calendars, to create spreadsheets for storing, organizing and manipulating data, searching the Internet to find information on a specific subject are common technology-supported instructional practices for the last 2 decades (Chen, Lambert & Guidry, 2010; Laird & Kuh, 2005). Among Web 2.0 tools the most frequently seen educational applications happen in

- learning management systems supported with social networking tools like Edmodo which allow to create, edit, manage and publish course content,
- online meeting tools,
- online storage and file sharing tools like Google Drive,
- interactive presentation tools like Prezi,
- online surveys,
- concept map and drawing tools,
- animation and video tools,
- and educational games.

These are popular educational Web 2.0 technologies which are intentionally designed and developed for instructional practices, and being involved, adopted and highly utilized by both academics and teachers to make their students engage with learning activities (Elmas & Geban, 2012).

There are also many Web 2.0 technologies including blogs, wikis, forums and social networking, which are not intentionally and consciously designed and developed for educational practices but can be fruitfully utilized for instructional purposes. Among these technologies, social networking technologies have become the most popular ones in recent years because they have the ability to embrace other Web 2.0 tools into themselves.

2.4. Course Delivery Systems

Web-based/online course delivery systems are one of the highly incorporated technologies into educational settings. Main function of these systems is to host various online education types like technology-enhanced courses, flipped courses, hybrid courses, blended programs etc. (Ross & Gage, 2006). The ultimate purpose of these systems is to offer alternative ways for effective instruction and to enhance the quality of instruction through their various Web 2.0 tools. This section briefly introduces and reviews online course delivery systems.

The use of course delivery systems, especially learning management systems, has increased in higher education dramatically in recent years along with the highly adoption of online education and e-learning by instructors to support their instruction (Sclater, 2008). Some face-to-face courses are replaced with online versions and some other courses are offered as blended to decrease the time for face-to-face instruction (Delialioglu & Yildirim, 2007; Delialioglu & Yildirim, 2008). Offering flexibility and convenience for both students and instructors through various Web 2.0 tools, providing more scalable courses and decreasing delivery costs have made course delivery systems an indispensable part of online education. These systems are also highly adopted by instructors since they provide various opportunities for students to become active participant of learning process (Cole, 2009).

Brusilovsky and Miller (2001) identify 4 common instructional components which course delivery systems address as “presentation”, “activities”, “communication” and “administration”. While “presentation” involves functions regarding the distribution and demonstration of course materials, “activities” refer to learning activities which students are actively involved. “Communication” addresses the interaction between instructor and student or among students, while "administration" involves record keeping and tracking progress activities.

Considering course delivery systems have the potential to perform all roles for effective instruction specified by Reigeluth (2012) including record keeping for student learning, personal learning plan, instruction for student learning and assessment of student learning, they are fundamental technologies and ideally suited for online learning. Highly adoption of them by instructors is also an indicator that they are critical components to implement online learning. The following subsections review highly popularized and adopted course delivery system types in recent decades.

2.4.1. Learning Management Systems

Using learning management systems (LMS) has been an important part of technology-integrated education in last decades. Most instructors and teachers adopt, implement and manage LMS for their courses at universities. LMS refer to the software providing necessary tools to manage the course and to deliver instructional materials and activities online. LMS offer course templates which instructors fill with course content. Most professional LMS software provides authoring tools for instructors to design their own courses without the necessity of advanced web programming knowledge. LMS also provides variety of tools including email, threaded discussions, bulletin boards, chat rooms and videoconferencing to make instruction reciprocal and interactive. Assessment tools provide online testing which allows for choosing from various exam types and to randomize test questions for each student, and evaluation tools allows for automatic grading. Most importantly, LMS platforms give instructors opportunity to monitor the progress of students, and to track system log to observe how much time students spend for instructional tasks and activities. Lastly, LMS also offers administrative functions including help desks, student support and faculty support (Watson & Watson, 2007).

While some universities work with vendors and commercial developers to develop and manage LMS, most universities have extensive websites including their own management systems with varying degrees of complexity. Most educational institutions use LMS as parts of blended programs although few institutions use them as part of total online courses. LMS use comprises lots of instructional task and activity including access to lectures, assignments and other online resources, uploading documents and assignments, and communication with students. Despite many advantages, one of the main problems regarding classical LMS is their static structure. In other words, these systems mostly hold learners passively and can't handle social connectivity, which is contrary to active participation paradigm of information-age (Bourne et al., 2005). LMS is also criticized for their poor design and lack of tools restricting social interaction and self-regulated learning resulting in unsatisfying cognitive and social engagement of students (Delialioglu et al. 2010; Delialioglu, 2012).

2.4.2. Social Networking Sites

Social networking sites (SNS) are interactive media platforms mainly targeting communication and collaboration among people by supplying different tools to create personal and group profiles, upload photos, share content and videos, and to express opinion and comments. Interactive and communicative structure, ease of use, rapid sharing and updating tools, and easy share of personalized content result in adoption of SNS by millions of users especially among students in a short time (Mazman & Usluel, 2010).

After social networking sites have become popular in society along with the students spending lots of time on these platforms, educational settings also attempted to incorporate appealing features including content and resource sharing, forming interaction and active participation and collaboration among students which offer opportunities for student engagement and social connectivity. Thus, instructors started to use these sites in such a way that support learning tasks and activities (Ajjan & Hartshorne, 2008). While learning management systems (LMS) offer various features enabling course delivery in a cost effective-manner, the lack or insufficiency of social connectivity tools which hinders interaction and social learning and the lack or insufficiency of personal profiles which hinders autonomy make LMS ineffective and inefficient contrary to expectations (Mazman & Usluel, 2010). Since social networking sites involve features LMS do not possess, they become a good alternative and are preferred by many instructors for course delivery. These sites allow instructors to create course groups, read over everything students share within the group, give feedback, post resources and course materials, and moreover they allow students to review peers' posts and thus build an interactive and collaborative environment among each other (O'Hanlon, 2007). For instance, while Facebook is an informal learning environment, some instructors use the platform to deliver course content, to reinforce and complement what is taught in face-to-face instruction, to provide supplementary resources, and most importantly to create discussion environments through peer interaction (Cheung et al., 2011; Roblyer et al., 2010; Pempek et al., 2009; Tynes, 2007).

Despite appealing features of SNS, they possess some vulnerabilities and disadvantages which distract instructors and prevent the adoption of these sites in educational settings. Those involve mainly safety and security issues harming the credibility of instructors. Moreover, since these sites include too much content apart from ones being shared for educational purposes, these sites are predicted to be likely to disturb the concentration of students and affect engagement of students negatively (Connolly, 2011).

2.4.3. Massive Open Online Course Platforms

Massive Open Online Courses (MOOCs) have become popular social learning environments in recent years. The main motive for these courses is to provide quality instruction to massive community of students at no or low costs via third party platform providers like Coursera, EdX, Udacity etc. MOOC platforms are defined as structured learning environments with sequences of activities within a pre-determined period. The main content delivery method in MOOCs is through short videos. The participants are supported with supplementary materials. Online discussion forums are one of the most important tools in MOOCs in terms of creating sense of community thus student engagement and social connectivity are addressed.

Hollands and Tirthali (2014) identify 6 major goals for institutions delivering MOOCs as: “extending the reach of the institution and access to education”, “building and maintaining brand”, “improving economics by lowering costs or increasing revenues”, “improving educational outcomes for both MOOC participants and on-campus students”, “innovation in teaching and learning”, and “conducting research on teaching and learning” (p. 7). These online environments mainly involve tools for sharing weekly lectures and resources, subject-related short videos, auto graded quizzes and discussion forums. These platforms offer flexibility for students matching with the values of information-age paradigm. There are few studies indicating the effectiveness of MOOCs since they are new but studies indicate that student engagement and participation is of importance on these platforms. Moreover, these online environments have the potential for personalized and adaptive learning (Hollands & Tirthali, 2014).

2.4.4. Educational Social Networking Sites

To overcome the problems SNS have including safety and security issues, and redundancy of trivial and irrelevant content which distract students’ concentration from crucial learning tasks and activities, some commercial developers constructed social learning environments labeled as educational social networking sites (ESNS) to replace the informal structure of SNS with formal and organized structure. While these sites possess social connectivity characteristics of SNS, they also ensure secure environment that instructors and students participate safely. Main tools of these e-learning environments are library or file storage, online assignments and quizzes, commenting, communication tools for synchronous and asynchronous interaction such as chat and e-mail, calendar and sharing tools for links, images, videos and documents (Batsila et al., 2014). Since these environments become popularized in recent years, studies about the effectiveness of ESNS are limited but few studies indicate that these environments encourage both student engagement and active learning (Sanders, 2012).

Consequently, the exploration of the potential of social networking sites (SNS) as a medium to support active learning triggered different corporations to melt the important characteristics and tools of both SNS and LMS in one pot and offered as online social course delivery systems (Batsila et al., 2014). Edmodo is one of these attempts. Edmodo as an online platform enables collaboration between students and instructors using the power of social media. Moreover, it provides various tools for course management to be able to share course content and activities, to assign homework and projects, to make announcements etc. The ultimate goal of Edmodo is to assure active participation of both learners and instructors. The following section reviews Edmodo in detail since it is the platform tested throughout the study.

2.4.5. Edmodo

Today, with the development of technology, alternative tools and media have begun to be sought by instructors to complement or substitute traditional ones with the intention of improving instruction. The search for alternative tools and media is the basis for the emergence of educational social networking sites (ESNS) as an attempt to substitute traditional course delivery systems. Edmodo, as an ESNS, is an educational platform bundling various Web 2.0 technologies and functioning as a course delivery system and content management system. All educational institutions can use Edmodo online for free without any installation process. The purpose of Edmodo is to carry traditional classrooms to online environment thus continuity of social interaction and cognitive involvement of students can be ensured at anytime and anywhere. The rest of the section introduces Edmodo with its tools and reviews educational uses for, benefits and contributions to learning and instructional process.

2.4.5.1. Edmodo Introduction

Social networking sites make it easier for people to communicate and interact with each other and manage to make them meet at a common virtual ground by gathering various forms of Web 2.0 tools together (Balcikanli, 2010). These technologies are mainly planned and designed for people to socialize and as a result, platforms like Facebook have emerged and become popular. The rise of these platforms in social life has taken place through the participation of individuals from every group of ages particularly young generation. Over time, the power of social networking and the popularity of social platforms among the youth inspired and triggered educational technologists to evolve these sites as e-learning environments called Educational Social Networking Sites or Social Learning Networks.

Edmodo is one of these educational social networks gathering students and teachers from every level of education (Durak, Cankaya & Yunkul, 2014). Edmodo was founded in Chicago, Illinois and first announced its name in September, 2008 with the intention of creating a communication network between schools. Today, its centre is in San Mateo, California. Nic Borg, Jeff O'Hara and Crystal Hutter are the creators of Edmodo. As a social networking site, the number of active users has reached to approximately 87 million members. Edmodo’s supporting many languages and hosting diverse groups are important factors underlying the increased number of users from day to day on the platform. Similarity with Facebook to a large extent in terms of both interface design, usability and tools inside has also enabled easy adoption and use of Edmodo by students, teachers and parents and thus placed Edmodo into advantageous position over traditional course delivery systems (Durak, 2017).

Edmodo defines itself as social network, content management system and professional learning platform. Edmodo provides access to instructional content and materials outside the classroom environment. With the various tools embodied on it, teachers and students may maintain and enhance interaction and communication with each other. Besides the classroom environment, knowledge, people and resources could be reached in any subject field or teachers could interact with other colleagues and professionals for knowledge, material or resource exchange or consultation to meet instructional needs from the professional learning platform embedded on Edmodo. Moreover, the platform’s mobile application makes it possible for teachers, students and even parents to have access to Edmodo anytime anywhere (Gitongo et al., 2016).

Edmodo has many features and tools that are developed for being able to simulate the classroom environment in a virtual world. In this way, Edmodo provides an online learning environment for both students, teachers and parents. Teachers can create virtual classroom using "Create Group/Class" tool and then share the code with their students for class participation. Parents can also be included in the classroom by students sharing the class code. Thus, a comprehensive classroom environment can be administered on the system. Teachers can share all kinds of files, links, presentations, images, videos or their own messages via "News Feed" tool. These shares are notified thus can be accessed by both students and parents on their own homepage. Moreover, every content posted could be customized by teachers in terms of visibility by class participants (Durak, Cankaya & Yunkul, 2014).

Edmodo has two distinct tools as "Library" and "Backpack" for file storage. Library is for teachers and backpack is for students. Teachers and students can keep presentations, documents, images, videos and every kind of shares using these tools. Teachers can prepare assignments and quizzes, and save them on their libraries for future use. These assignments and quizzes can be shared and announced on a predetermined date and hour. Deadlines can be set for assignments and quizzes. Teachers can grade these using assessment tools. Teachers can also access to detailed data of students to see their performance on assignments, quizzes and project using "Progress" tool. While preparing quizzes, Edmodo provides various test question types for teachers including True/False, multiple choice, gap-filling, matching, open-ended and short-answer). Teachers can create surveys to take students’ opinions about a particular topic using "Polls" tool. Teachers could create small groups within a class and assign particular homework, debate topics or projects Based on the submission of these assignments, teachers can give particular feedback (Durak, Cankaya & Yunkul, 2014).

"Edmodo Planner" is a tool dedicated for students on the system. Students can arrange work schedules, set timelines for studying and put reminders for future activities using this tool thus they become aware of everything that are to be planned and be notified daily by the system. "Alerts" are what teachers use when they want to make an important announcement. The announcements made here are shown in bold on student page. "Notifications" have similar functionality on other social networks. Students are able to see comments made to them, grades and likes they receive, and other notifications using this tool. Teachers are able to reward their students in Edmodo using "Badges" tool. Teachers either can create their own badges or use pre-prepared badges on Edmodo to reward students' exemplary behaviour or successes thus they can also contribute to improving the motivation of their students. Lastly, Edmodo also has a tool called "Applications". This tool contains an online store with paid or free apps offering different educational content or practices. Teachers either use free applications directly or buy paid applications to be able to benefit from them with their students (Alemdag, 2013).

2.4.5.2. Educational Implications of Edmodo

Edmodo is considered to be one of the best course delivery systems and professional education platforms in the world. Several researches indicate that Edmodo is easy to use, provides numerous advantages both for the teachers and students and can be utilized effectively for instructional purposes. Perceived benefits of Edmodo in terms of students are indicated as higher student attention and concentration toward course activities, increased motivation towards academic achievement, improvement in communication with teachers and classmates, improved self-esteem as results of higher involvement to group activities and participation in debate groups, and advanced higher order thinking skills as results of commenting on discussion topics, giving feedback to postings shared by teachers or peers, and questioning or answering on any subject over the platform (Dere, Yucel & Yalcinalp, 2016). Moreover, Edmodo allows for access to announcements and updated information related to course activities easily, interaction with teachers not bordered with classroom environment, quick access to course content, resources and materials, communication with peers anytime anywhere, preparation for class beforehand, and most importantly an online environment keeping dignity and formality between teacher and students when compared to social networking sites as informal learning platforms (Hamutoglu & Kiyici, 2017).

2.5. The Impact of Web 2.0 Technologies on Education

The transformation of society from industrial-age to information age is an ongoing process fed by several technologies including Web 2.0 tools. This transformation also affects education and leads to significant changes in paradigms to understand and interpret learning and instruction (Reigeluth, 1999). The instructional design theories as the subsystems of learning systems reflect these paradigms. The most obvious pattern in current theories is their focus on learner-centered instruction rather than teacher-centered instruction of industrial-age. The paradigm shift in instructional theories triggers changes in the role of students and teachers. Most of the current instructional theories have tendency to make learners social and active participation of instructional process and aim to help students direct their own learning and acquire self-motivation (Reigeluth, 2005). Moreover, current theories anticipate students to become teachers of other learners and expect from learners to give significant contribution to the instruction in a collaborative way. Reigeluth (2012) summarizes the roles of students as “worker, self-directed learner and teacher” and the roles of teachers as “designer, facilitator and mentor” (p. 11). Since current theories put more responsibility on students, the role of teachers turns into helping students, monitoring learner activities by designing student work, facilitating learning process and guiding on the development of the learners. Consequently, new instructional theories assign to teachers the role of raising lifelong learners rather than the role of subject matter experts. However, when considering the new responsibilities of teachers as well as routine aspects of their profession, it is almost impossible to perform all these responsibilities in a limited time and therefore requires handing over some activities from teachers. The use and integration of Web 2.0 technologies into the learning environments have shown promises to undertake some of these responsibilities until now (Reigeluth, 2012).

Gebre et al. (2014) specify 3 main potential functions of technology to fulfil instructional objectives:

- Technology can be used to deliver course materials, to access knowledge and to present course content.
- It can be used to form in-class activities, to create question and answer sessions, and to generate discussion groups.
- It can be used to motivate students for independent learning, to enhance learning strategies, and to develop self-organized activities and materials.

Reigeluth (2012) states 4 main roles of technology that are likely to be performed through Web 2.0 tools and thus facilitates teachers' responsibilities to bring about. The first role is to "record keeping for student learning". This role helps teachers track the progress of students and guide accordingly. Moreover, this role saves significant amount of time for teachers. The second role is to develop "personal learning plans". While current instructional theories emphasize the importance of customization, it could be very time-consuming for teachers to develop separate learning plans. Technology can help teacher designing students' learning in that respect. Third role of technology is "instruction for student learning". Information-age instructional theories realize that students have different progresses and they learn at different times and pace. Therefore, every student might require different instructional strategies to follow. Technology can facilitate this process by providing instructional tools such as such as simulations, tutorials, learning objects etc. Lastly, "assessment of student learning" is another role of technology. Teachers can determine criterion for students to be successful for each activity or task, and Web 2.0 assessment tools decide whether or not the criterion are addressed on each performance of students. Thus, the burden of formative and summative assessments for teachers can be facilitated by technology.

Thompson (2008) and Churchill (2009) enumerates several opportunities that Web 2.0 technologies offer to make students active learners in collaborative environments rather than becoming passive listeners in educational settings:

- Students can gather instructional content on Internet and then add or edit content using Wikis.
- Students might access web resources shared by their peers on their own school or other students from different schools easily by using social bookmarking sites.
- Students can demonstrate their work online or participate in other works of their peers by using presentation technologies.
- Students can access lecture videos or audios recorded by their teachers and listen or watch these records from their podcast at any time anywhere.
- Students can access course material, post their comments and reflections on instructional materials, publish materials about learning activities, upload assignments, review peer's assignments, and participate and comment other students' works by using blogs.

Consequently, the development of Web 2.0 technologies has become tremendous effects on education in recent decades (Lu et al., 2010). The integration of computers and Web 2.0 technologies into school classrooms as instructional tools is accepted as a revolution in educational settings. The effects of rapid advancement in technologies appeared as changes in learning styles of students and teaching methods of instructors, and resulted in different approaches for the management of instructional content by both instructors and students (Watson, 2001). Instructors and educational institutions try to benefit from the promising features of information and communication technologies (Batsila et al., 2014).

2.5.1. Kozma – Clark Debate over the Impact of Web 2.0 Technologies

While there is a consensus on the impact of Web 2.0 technologies on education in terms of designing instruction and learning environments in a way to integrate them with the aim of facilitating learning process, whether they have significant influence on student learning is a controversial and ongoing debate for 3 decades (Clark, 1994; Kozma, 1994). Clark (1994) claims that media does not influence learning significantly. He states even if media might influence the delivery of instruction in terms of cost or speed, only instructional methods structured and designed appropriately can influence learning because cognitive strategies are essential for learning and only instructional methods can trigger cognitive processes. To prove his arguments, he cites the results of research studies from the literature comparing different media influence on learning. He states that the results show no significant difference between different media due to researchers' using similar instructional methods. If significant differences are observed, these are due to researchers' using different instructional methods. In brief, Clark (1994) claims that instructional methods are necessary for learning and these methods can be conveyed to students through various media with similar achievement results.

On the other hand, Kozma (1994) states that media has 3 main characteristics including their technologies, symbol systems and processing capabilities. He claims that these characteristics of media can influence various aspects of learning. Symbol systems of the media corresponds to mental representations of the mind in the real world. Through processing capabilities of the media, these mental representations can be activated thus required cognitive processing for a behavior can be triggered. In the context of learning, media not only functions as vehicles to deliver instruction, it might be used to manipulate instructional methods to increase their effectiveness. In brief, Kozma (1994) claims that media and methods are inseparable and interrelated unlike Clark (1994) claims therefore the influence of media and method can't be discussed separately. Moreover, the degree of effectiveness of instructional methods might be dependent upon media characteristics therefore instructional methods might benefit from these capabilities of media.

Consequently, both authors have agreement upon on the idea that the media alone is useless in learning process without using methods in other words media on itself can't influence learning. While Clark (1994) claims that media is only be able to function as vehicles to deliver instruction, Kozma (1994) believes that the interrelationship between media and instructional methods might influence learning therefore methods can employ and benefit from the capabilities of media. The current study also aims to contribute to this ongoing debate between media and method since both instructional methods and media characteristics are used as motivators to identify student motivation, engagement and achievement.

2.6. Technology and Motivation

Higher adoption of course delivery systems (CDS) as part of online learning to complement face-to-face instruction (Caruso & Salaway, 2008) evoked scholars to conduct studies on several aspects of effective implementation of CDS. While some of them focus on their functionalities, advantages, effectiveness, how they can be integrated so as to complement face-to-face instruction, and to what extent students adopt them as part of learning (Robinson & Hullinger, 2008; Laird & Kuh, 2005; Kuh & Hu, 2001), a few studies investigate which factors predict and trigger student motivation to adopt, involve and engage in these platforms.

Despite promising features and spectacular characteristics of educational technologies, especially different variants of CDS, not all of them can survive in the competitive environment of instructional technology market. Investigating the underlying motivational factors to enlighten why some technologies are highly adopted and intended to be used by people while some of them fail has been an attention-grabbing concern for motivational theorists and technology adoption model practitioners and specialists for 3 decades (Davis, 1985; Bagozzi, 2007). The current section shortly points out and summarizes leading motivation theories and technology adoption models highly internalized, contextualized and derived from these motivation theories by scholars to elucidate user adoption of technologies.

2.6.1. Motivation Theories

Several motivation theories exist to find out and clarify what triggers individuals to perform goal-oriented behaviors. Motivation theories provide perception and foresight to comprehend underlying dimensions of motivation by determining human needs, beliefs and desires, and how and to what extent these dimensions might ascertain to act in a certain way. The rest of the section reviews the leading motivation theories used as foundation for technology adoption models. Even though some of them are seldomly used as basis for technology models, they are significant since they provide insight and vison to understand underlying dimension of motivation.

2.6.1.1. Expectancy-Value Theory

Expectancy-Value Theory (EVT) hypothesized by Fishbein and Ajzen (1975) has been a significant motivational theory for decades utilized as a core by many technology adoption models (Davis, 1985; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis & Davis, 2003; Chiu & Wang, 2008). Briefly stated, EVT professes that expectations or beliefs toward an activity, task or product together with attributed values or evaluations are the core predictors of attitudes and following behaviors. From a motivational point of view, expectancies address to the motivational belief of whether the desired motivational outcomes can be achieved or not with his/her existing capabilities or skills. Values, then, address to the motivation whether carrying out a task in a specific way is advantageous, significant, pleasurable, sensible or precious enough to attain the intended goals. Eccles (1983) expanded on EVT by identifying 4 types of values:

1. Attainment Value: the perceived significance of the task for selfhood
2. Intrinsic Value: the perceived pleasure or curiosity of the task
3. Utility Value: the perceived usefulness of the task
4. Cost: the perceived exertion and time devotion to carry out the task

EVT theorizes that expectancies and values are components predicting attitude, motivational goals and motivational outcomes. EVT also sets forth that demographics, intrinsic and extrinsic motivational factors such as existing attitudes towards the task, social pressures, environmental factors etc. are indirect estimator of intended outcomes through values and expectancies.

2.6.1.2. Theory of Reasoned Action

Theory of Reasoned Action (TRA) proposed by Ajzen and Fishbein (1988) is an expansion of EVT that attempts to solve its drawbacks and improve its explanatory power. TRA asserts that behavioral intention to carry out an action is the estimator of actual performance while attitude toward behavior forecasts the behavioral intention. Motivational beliefs (equaled to expectancies in EVT) and evaluations (equaled to values in EVT) are predictors of attitude. TRA extends EVT with a motivational constituent denominated as “Subjective Norm” as estimator of behavioral intention, which is predicted by 2 motivators: normative beliefs and motivation to comply. Subjective Norm is a social factor jointed to TRA to meet the criticisms towards EVT in terms of disregarding the explanatory power of psycho-social dynamics on intention to carry out a behavior in a specific way. Subjective Norm points to social pressures causing personal consciousness to act in a determined way (Martin et al., 2008). Normative beliefs address to the evaluations and attitudes of others about how individuals should act under specific circumstances whereas motivation to comply points to individual motivation to behave in a determined way that fits in with social norms.

2.6.1.3. Theory of Planned Behavior

Theory of Planned Behavior (TBR) is a remodeling of TRA by Ajzen (1991) with an expansion of “perceived behavioral control” constituent to strengthen the predictive validity of TRA. Perceived behavioral control corresponds to people’s perception of competency or control to be able to carry out a behavior which is estimated by 2 motivators: control beliefs and perceived facilitation (Chuttur, 2009). Control beliefs correspond to the beliefs about whether required competencies to carry out a behavior are existing in self whereas perceived facilitation points to the beliefs about whether environmental factors such as essential resources or equipment, which might create encouraging or impeding conditions on carrying out a behavior, are obtainable (Martin et al., 2008). The reason behind integrating the constituent "perceived behavioral control" to the theory was disclosed by Azjen (1991) as "if an individual's control which is required to perform a behavior is not present, intention to behave in a certain way cannot be a direct predictor of actual behavior".

2.6.1.4. Social Cognitive Theory

Social Cognitive Theory (SCT) of Bandura (1986) asserts that an individual's behavioral development is a function of bilateral relationship of social interactions, individual experiences and environmental factors. In other saying, personal, behavioral and environmental factors estimate 2 motivational beliefs as outcome expectancies and self-efficacy in which ultimately predict behavior.

2.6.1.5. Cognitive Dissonance Theory

Cognitive Dissonance Theory (CDT) of Festinger (1957) proposes that pre-perceptions of individuals regarding usefulness of an activity might distort after actual involvement with the activity thus result in dissonance leading post-perception about activity. Bhattacherjee (2001) suggests that confirmation, which is the degree of difference between pre and post perceptions, is a determinant of actual use of technology.

2.6.1.6. Expectation Confirmation Theory

Expectation Confirmation Theory (ECT) of Oliver (1980) asserts that expectations toward a task or product are likely to alter or mature perceived performance belief after actual performance with the task or product. Perceived performance together with expectations estimates confirmation or disconfirmation to adopt the task or product being engaged after consideration of original expectations set for the task or product. Finally, confirmation together with ultimate perceived performance predicts gratification over the task or product.

2.6.1.7. Flow Theory

Flow theory of Csikszentmihalyi (1975) introduces the flow as a mental condition to carry out a behavior with complete engagement and pleasure. Flow is a significant theory to understand how intrinsic motivation can enable to behave in a preferred way without impulses of extrinsic factors. According to flow theory, some performances are carried out for their own sake and do not need partible outcomes or distinctive rewards. Csikszentmihalyi (1975) identifies 4 constituents to elaborate flow:

1. Control - agency over the task or activity
2. Attention - intense and focused concentration
3. Curiosity - arousal for the task or activity
4. Intrinsic interest - desire to experience flow

2.6.1.8. Self-Determination Theory

The final motivation theory that is to be reviewed before examining into technology adoption models is Self-Determination Theory (SDT), which has recently grabbed attention of researchers to clarify the adoption of technologies by individuals (Hwang, 2005; Roca & Gagne, 2008; Nikou & Economides, 2014; Abduljalil & Zainuddin, 2015).

SDT (Ryan & Deci, 2000) offers a thorough framework by describing two major motivation types of individuals: intrinsic and extrinsic. Intrinsic motivation refers to natural tendency of self towards acceptance, involvement, adoption and engagement to carry out a specific behavior to attain desired outcomes (Ryan & Deci, 2000a). Inherently motivated people have an innate eagerness towards addressing goals and meeting desired outcomes. Inherently motivated humans are driven by pleasure, aesthetic value, change, innovation, joy, challenge or puzzle rather than by external impulses (e.g., money), community pressures, social norms or environmental conditions.

On the other side, extrinsic motivation refers to the motivation of humans stemmed from, rooted in or nourished by sources outside the context of the task or activity itself. This comprises, but is not limited to, compliments, attention and incentive by social environment, rewards, and even feeling requirement to abide by the rules (Corpus, McClintic-Gilbert & Hayenga, 2009). Ryan and Deci (2000b) describe extrinsic motivation as the outside control to make what is being to be carried out incorporate. Ideally, people are to be expected to possess intrinsic motivation but most of them are not desirous and keen on carrying out tasks or activities in real life. However, they are still involved in performing more or less therefore determining extrinsic motivators plays a significant role to comprehend triggering forces underlying involvement and engagement. External motivation as a concept aims to explain how individual, social and environmental conditions cause individuals to shoulder responsibilities even if they are not interesting tasks. External motivation as a construct concentrates upon "instrumental value" and "separable outcome" of tasks or activities rather than the inherent value and natural outcomes (Ryan & Deci, 2000b).

The authors elaborate extrinsic motivation and identify several forms depending on previous experiences, the outcomes expected to be gained or the impact that contextual factors have on self. Individuals can be motivated to perform a behavior:

- To address an external demand or reach a reward (external regulation)
- To meet pressure of social and environmental conditions or protect their self-worth (introjected regulation)
- Due to the identification of personal importance or value in terms of reaching desired goals (identification)
- Due to adoption and acceptance of instrumental value of that particular behavior to address expected outcomes (integrated regulation).

The extrinsic motivational forms lie in a continuum rather than district points. People can progress, adopt and perform new behaviors at any motivation form along this continuum depending on the impact of contextual factors on self. In other words, the regulation of behavior does not necessitate to progress motivational forms consecutively (Ryan & Deci, 2000a).

Ryan and Deci (2000b) state that the kind of motivation as intrinsic or extrinsic refer to the orientation of motivation. Orientation determines "the underlying attitude and goals" (p. 54) for behavior. In other words, orientation refers to the reasons which eventually lead to act in a specific way. The authors give an example to make orientation clearer: A student can do a homework either due to his curiosity (intrinsic orientation) or due to getting a good grade (extrinsic orientation). Another example might be that a student is engaged in activities in online learning platform because he already has higher self-regulatory skills and consider the online platform as another medium to regulate his learning (intrinsic orientation) or because instructor insists students on using the platform (extrinsic orientation).

SDT postulates 3 "innate psychological needs": perceived competence, sense of autonomy, and feelings of relatedness. These are characterized as fundamental constructs that need to be met to attain intrinsic motivation. When people have higher level of fulfilled needs, they are more internally disposed to perform activities and tasks. Relatedness addresses to the need of individuals for belonging and establishing connection to other people who are valued and appreciated. The other people might include mates, associates, executives and parents. Consenting and internalizing the goals and values embraced by "significant others" is regarded a significant impetus to incorporate behaviors and to be involved in tasks or activities (Ryan, Stiller & Lynch, 1994). Competence refers to perceived self-efficacy of individuals in terms of their competencies to act in a desired way. When individuals feel adequacy, they are predisposed to incorporate behaviors that are predicted to be involved in. Lastly, autonomy points to the strong desire to be a "causal agent," with the skills to accommodate and regulate intended behaviors (note: it does not indicate independence). When individuals grasp the essence, significance and worth of a desired behavior, they become autonomous.

As previously stated, not all activities and tasks are inherently attractive and motivating, however creating and supplying promoting settings and conditions environments, and altering and managing circumstances in a way to meet aforementioned innate needs might lead to incorporated and assimilated behaviors even if they are not inherently motivating for individuals. Consequently, Ryan and Deci (2000a) assert that the analysis of motivational factors, which involves the characteristics, qualities and features of activities, and the circumstantial factors surrounding tasks and being capable of encouraging intrinsic motivation toward intended behavior, is critical to be able to comprehend performed behaviors of individuals.

2.6.2. Technology Adoption Models

Technology adoption models can be described as contextualized frameworks originated from motivation theories to depict the adoption of technologies by users. They try to illustrate the user involvement and engagement based on the demographic and psychological characteristics of target group. Technology adoption models ensure thorough lens by locating what needs to be fulfilled as prior conditions to compose motivational beliefs for adopting technology, and how beliefs and goals toward engaging in technology and technology use behaviors are interconnected. Therefore, it is important to review adoption models to comprehend the concepts, constituents and factors situated beneath the motivation to adopt technology. The rest of the section specifically concentrates on Technology Acceptance Model (TAM) of Davis (1985) since it is the most reviewed, referred, quoted and adopted technology model in the literature. Other technology adoption models which mostly function as extensions and expansions of TAM are also overviewed shortly in this section. Although many adoption models have been offered to improve and extend TAM, they are not as popular as TAM. Even so, they are significant enough to be reviewed since they provide insight regarding various constructs and mediators being not referred on TAM and being likely to estimate technology adoption. Drawbacks of technology models and, criticisms articulated by researchers and speculated by experts towards them are summarized at the end of the section.

2.6.2.1. Technology Acceptance Model

Technology Acceptance Model (TAM) by Davis (1985) is the most outstanding, contextualized, investigated, altered, expanded, attractive and criticized causal technology adoption model in the literature theorizing that when individuals are subjected to interact with a new technology, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as 2 motivational beliefs estimate and specify their judgement to adopt it. PU is defined as the perceived advantages emanating from using a specific technology (Cole, 2009). PU is regarded in technology adoption models as a motivational belief resulting in enthusiasm to benefit from a particular technology thus signifying approval of the value or utility of it. PEOU is defined as personal judgement of whether the technology is straightforward enough to be able to use effectively.

Essentially, TAM is partial investigation of Expectancy-Value Theory in technology adoption context in which PU corresponds to “Utility Value” which points to determine the perceived usefulness of the tasks and activities being engaged whereas PEOU corresponds to “Cost” which is the perceived physical and mental exertion and time devotion to perform the tasks and activities being taken part in. The model estimates that extrinsic determinants as independent variables have effects upon motivational beliefs which are PU and PEOU in the model. While PEOU has a direct effect on PU, both PU and PEOU are predictors of intention to use which is determined as a goal to estimate acceptance, adoption and actual use of technology. In spite of several determinants recommended by EVT, TRA and TBT to interpret user adoption of technology, TAM chose a parsimonious framework including merely PU and PEOU as estimators of motivation to make it easily adjustable and flexible for various contexts and quickly understandable by researchers and system designers. The parsimonious framework made it a popular model to clarify and estimate user motivation to adopt technology. It has been replicated, adapted, adjusted, modified and tested several times for various technologies such as e-mail, e-commerce systems, Office programs, database systems, decision and expert support systems, and its strength, durability and validity have been confirmed and documented again and again (Chuttur, 2009). However, the parsimony of the model has also been scrutinized and criticized several times causing attempts for modifying, adjusting and expanding to make it more illuminating.

2.6.2.2. TAM2

TAM2 was presented by Venkatesh and Davis (2000) to determine the sources estimating perceived usefulness thus make original TAM more descriptive. They defined subjective norm and image as social motives, and job relevance, output quality and result demonstrability as mental instrumental mechanisms which all of them together comprise extrinsic factors underlying PU (Bradley, 2009). They also defined experience and voluntariness as moderator constructs influencing technology adoption. Venkatesh (2000) also described factors predicting PEOU in original TAM as computer self-efficacy, perceptions of external control, computer anxiety, computer playfulness, perceived enjoyment and objective usability.

2.6.2.3. Task-Technology Fit Model

Task-technology Fit model proposed by Goodhue and Thompson (1995) identifies task and technology characteristics as independent constructs mediated by task-technology fit to determine individual performance and system use as dependent variables. Technology characteristics correspond to competences and affordances of technology while task characteristics address to the qualities of the activities being engaged. Task-technology fit refers to the needs anticipated to be fulfilled in technology supported contexts. Quality, locatability, authorization, compatibility, ease of use/training, production timeliness, systems reliability and relationship with users are the motivators comprising task-technology fit constituent. Task-technology fit can be regarded as expanded usefulness perception in TAM in which the constructs lie behind the perceived usefulness belief.

2.6.2.4. Decomposed Theory of Planned Behavior

Decomposed Theory of Planned Behavior (DTPB) is a decomposition of Theory of Planned Behavior proposed by Taylor and Todd (1995). The purpose of the proposal is the contextualization of the theory as a technology model to make TBP more comprehensible and accommodating in technology-supported settings. Accordingly, the authors decomposed 3 belief constituents proposed in the theory which are perceived behavioral control, attitude and subjective norm. Attitude is elaborated with 3 factors involving perceived usefulness, ease of use and compatibility. Subjective Norm is addressed with peer influence and superior influence. Perceived behavioral control is defined with self-efficacy, resource facilitating conditions and technology facilitating conditions (Bradley, 2009). DTPB is an ideal illustration of contextualization of a motivational theory revealed in the form of a technology model.

2.6.2.5. Unified Theory of Acceptance and Use of Technology

Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh, Morris, Davis and Davis (2003) is a consolidated and united model arisen from aforementioned motivation theories and adoption models. UTAUT describes 4 motivational factors as performance expectancy, effort expectancy, social influence and facilitating conditions and 4 moderator variables as gender, age, experience and voluntariness of use to estimate and determine user technology adoption.

2.6.2.6. Hedonic-Motivation System Adoption Model

Hedonic-motivation system adoption model (HMSAM) is proposed by Lowry and his colleagues (2013) to analyze the adoption of hedonic systems including games, online shopping, virtual worlds etc. developed for entirely pleasing intrinsic motivation of individuals. HMSAM elaborated TAM with independent internal motivational factors derived from Flow Theory of Csikszentmihalyi (1975), namely Curiosity, Joy and Control along with the Perceived Usefulness of TAM. HMSAM also defines Immersion as a dependent variable along with the Behavioral Intention to use variable in TAM to determine motivational goal towards accepting and engaging in hedonic systems. HMSAM is an ideal illustration of a context-specific system adoption model.

2.6.3. Criticisms about Technology Adoption Models

In spite of the fact that robustness, validity and credibility of technology adoption models has been challenged, tested and approved in several studies, they are exposed to several criticisms, particularly directing towards TAM since it is the most favorite and most utilized one in adoption studies, from researchers and experts for a variety of reasons. These can be outlined as:

a. **Theoretical Framework Issue:** Early on 90s, TRA and TBR-based adoption models, and specifically TAM served as theoretical frameworks intending to seek one-size-fits-all solution to describe user motivation to adopt different technologies. Most successive acceptance studies have utilized these models as basis and adapted accordingly. However, with the development of technology over time, discrete technologies, which have mainly utilitarian functions facilitating the life at instrumental level, evolved to complex technology bundles incorporating and embedding various tools, containing and supporting many activities (Smith et al., 2007), and more importantly referring and satisfying various cognitive, social and hedonic instinctual needs of humans. As a consequence, keeping the situation in mind that contemporary technologies being distinctive, have their own typical features, enable various contexts and include specific circumstances, existing adoption studies are forced to modify core models by inserting new core factors into original determinants or removing existing ones to make it adjusted and contextualized for specific conditions of utilized technology. The situation casts doubt on whether TRA and TBR-based adoption models and TAM are suitable to be accepted and grounded as one-size-fits-all solution theoretical frameworks to develop further adoption models.

b. **Theory vs Science:** On one hand, the inconstancy of extrinsic constructs in technology adoption models are exposed to critiques, on the other hand the fixedness of core constituents - namely perceived usefulness, intention to use and actual use – are widely criticized in the way that connections among these constituents illustrate natural development, which can be understood through senses rather than logic or interpretation, making impossible to contradict with them (Silva, 2007). To make it clear, the relationship between core constituents symbolizes natural connection without requiring to create causal relationships via theoretical frameworks since naturally actions (technology use) are comprised of reasons (beliefs – perceived usefulness, perceived ease of use etc.) and desires (goals – intention to use) in which both give essence and values to actions. Therefore, adoption models could not move beyond rephrasing the apparent by conceptualizing constituents in a natural order with no practical value. The situation casts doubt on whether adoption models are theoretical frameworks or merely normal science. Silva (2007) claims that a theory should be disprovable through robust experiments to make it stronger. Ironically, findings and inferences of many studies for being TAM and other models' strength and strong empirical validity, which also make them appealing for future studies, literally brings their theoretical robustness into the question. As a consequence, Silva verbalizes it this way: "TAM as a typical example of normal science, as it offers a complete puzzle-solving apparatus that is easily transferable and verifiable, so it gradually became a legitimate way of conducting research in IS (Information System)" (p. 264).

c. **Theoretical Grounding:** Although technology models seek to illustrate underlying motivators for technology adoption, they are inadequately based and unsatisfactorily founded onto a motivation theory. For instance, TAM is a partial contextualization of Expectancy Value Theory into which it only accommodates extrinsic constituents that is to say Utility Value and Cost, and cuts and disregards intrinsic motivational dimensions of the theory namely Attainment and Intrinsic Value. Furthermore, since the patches to recover shortcomings of the models grasp no or little theoretical concern, it causes an excessive increase of models with no theoretical insight and high number of constituents come up with result of theoretical chaos.

d. **Appropriateness of Identified Variables and Hypothesized Relationships**: Weak theoretical base of adoption models lead to badly identified variables and incorrect formulation illustrating connections among motivational needs, beliefs, goals and outcomes. Bagozzi (2007) harshly criticizes determining actual use of technology as ultimate goal in nearly every technology adoption model and recommends that it should be evaluated as a behavioral motivational goal mediating to more essential goal rather than being considered as ultimate outcome. Bagozzi (2007) also judges theorized estimator of “intention to use” constituent as a motivational goal to determine actual use behavior because intention can merely be signal of introductory acceptance stage and time interval between intention and adoption is extremely high that contemplation and judgement over active use and other factors might alter the orientation of the motivation for the final decision to adopt a technology. Furthermore, the study of Burton-Jones and Hubona (2006, as cited in Chuttur, 2009) points out that PU and PEOU might not be reliable and adequate mediators to aggregate influences of extrinsic variables, and other motivational beliefs and moderators like age and level of education might have direct influences on technology acceptance.

e. **Cutting Corners:** TAM’s framework based on the regression of merely two belief factors, perceived usefulness and perceived ease of use, to estimate adoption of technology has been criticized for cutting corners and disregarding real underlying factors that are more likely to attempt to solve technology adoption problems (Lee, Kozar & Larsen, 2003). Even if TAM enabled easy and practical method and caused to be carried out many easy and quick research and get reliable, strong and guaranteed results, they do not have helpful and manageable value in reality because they offer few or zero solutions to adoption problems. The findings and discussion of many TAM-based conducted studies could not move beyond confessing “TAM really did work!”.

f. **Lack of Intrinsic Motivators and Beliefs:** Major drawback of technology models is the absence of internal motivators and disregarding of intrinsic beliefs. The exclusion of intrinsic factors especially limits the clarification of adoption of hedonic systems which are plainly intrinsic. Bagozzi (2007) suggests that technology models should consider the functionality of social dynamics and aspects of technology, and human agency (corresponds to self-regulation), which is one’s deliberate reaction to accommodate and engage desired goals and behaviors without any necessity for extrinsic impulses or incentives, on people adoption of technology.

g. **Voluntary vs Mandatory Settings:** Most TAM-based studies and other technology adoption related studies were conducted in voluntary contexts rather than mandatory (Chuttur, 2009) therefore different factors that might function more predictive under mandatory settings such as intrinsic motivators were excluded and could not be subject to research. Moreover, the hypothetical relationships between variables might also change in mandatory settings. For example, Brown, Massey, Montoya-Weiss and Burkman (2002) conducted TAM in a mandatory setting and found perceived ease of use is more predictive than perceived usefulness on system acceptance (as cited in Chuttur, 2009).

h. **Generalizability:** Many studies target specific participants, mostly students, for financial issues which does not allow generalizability for whole population (Hernandez et al., 2008). Considering students might have different motivation to be participant like getting rewards, good grades etc. as well as involvement in non-mandatory settings make the reliability of results questionable (Chuttur, 2009).

2.7. Motivation, Engagement and Achievement

The investigation of the relationship between motivators and motivational outcomes regarding to the adoption of educational technologies, particularly course delivery systems (CDS), in the light of technology adoption models derived from motivation theories has been a routinized approach by researchers for 2 decades. Basically, technology adoption models work in the way that various external factors and motivational beliefs are determined to represent motivators, motivational desires and goals are decided to address motivational outcomes and thereby the relationship between motivators and outcomes are measured and tested. Although motivators might vary depending on the context of the technology implemented in different studies, the only thing that doesn't change in any adoption studies is the determination of "intention to use" as motivational goal and "actual use of technology" as ultimate outcome. However, considering increasing rates on use of internet, ownership of smart handheld devices and intense participation towards social media, society is far above intention, initial acceptance and actual use of technology at behavioral level. While technology was regarded as an instrument adopted for its resources and affordances on utilitarian level at 80s and 90s, the interaction with technology has risen to higher involvement and engagement at social and cognitive level after 2000s. Therefore, current technology adoption models are incapable in terms of determining user motivation toward 21st century technologies, particularly educational technologies since they disregard changing dynamics on relationship between technology and society. While they function well on identifying which motivators might estimate to make technology an integrated part of society, they are inadequate to describe how people are engaged to, be part of and sustained with technology. As a result, the current study takes criticisms of Bagozzi (2007) into consideration about the appropriateness of the utilization of "actual use of technology" as ultimate outcome and thus identifies "perceived achievement" as more constitutive goal to be treated as final outcome in a technology-mediated learning environment. Moreover, the current study also takes criticisms of Bagozzi (2007) into consideration about the appropriateness of the utilization of "intention to use" as a motivational goal in terms of predicting actual use of technology and thus identifies "student engagement" as more essential goal to be addressed in a technology-supported educational context.

Consequently, the rest of the section describes student engagement, reviews different types of engagement, examines how motivation, engagement and achievement are interrelated and overviews motivational factors identified in educational technology literature.

2.7.1. Student Engagement

Various definitions, terms and phrases have been used by authors to refer to engagement or to determine what is intended by engagement in educational context, and to identify the characteristics of engaged students. Student engagement is defined as devotion of students to instructional activities by putting behavioral and cognitive effort to make their quality of learning better thus instructional desired outcomes like high grades, pleasure and persistence can be achieved (Krause & Coates, 2008; Chen, Gonyea & Kuh, 2000). Student engagement can be described as the degree of involvement to academic and social activities taking place both inside and outside the classroom/school with the aim of reaching learning outcomes (Günüç & Kuzu, 2014). Engagement can also be defined implicit or explicit behavioral reactions to individual or environmental factors (Saeed & Zyngier, 2012). Fredricks, Blumenfeld and Paris (2004) define engagement as a construct which has flexible, interactive and responsive structure with contextual and environmental factors.

While involvement, commitment and enthusiasm to instructional activities, physical and mental investment and effort to instructional tasks are some keywords to refer to engagement; concentration for learning tasks, exploration of inherent value, meaning and benefits of instructional tasks, belongingness, acceptance and participation for school, classroom and group activities, collaboration and cooperation with their peers, having good relationships with their instructor are some keywords to identify engaged students (Saeed & Zyngier, 2012; Fredricks et al., 2004; Willms, 2003; Alvarez, 2002; Newmann, 1996).

Newmann (1992) defines engagement as “psychological investment” of students into learning. Engaged students are characterized to be motivated not only to attain behavioural outcomes of learning such as grades, but also to assimilate what is taught inside the classroom through cognitive processes and to accommodate them into real life through socialization (Newmann, 1992). Moreover, engaged students are also determined to achieve desired instructional outcomes even if they are difficult and challenging (Schlechty, 2001). Other skills that engaged students possess is to cooperate with other students, to find creative solutions to problems and to trigger their curiosity to reach academic success (Saeed & Zyngier, 2012).

Laird and Kuh (2005) prefer “involvement” to address engagement. The participation level, which is an indicator of student engagement, do not address only behavioral reactions to inputs in learning platforms, it also covers cognitive and emotional reactions which are difficult to observe during learning process (Kuh, Kinzie, Buckley, Bridges and Hayek, 2007).

Student engagement is considered as motivational manifestation of students since it unites several behaviors in itself including, but not limited to, active participation in individual and collaborative activities, higher interaction with instructors and students as well as course content (Coates, 2007). Engagement is also a crucial construct since it is related to various outcome factors like academic achievement, instructional gains, cognitive development, learning commitment, school enjoyment and social attachment (Dunleavy & Milton, 2009; Furlong & Christenson, 2008; Kuh & Hu, 2001). Low level of engagement of students results in undesirable student behaviors, lower academic grades and eventually early dropout from the school (Harris, 2008).

The concept of engagement goes back a long way. While the scope of engagement was limited to observable behaviors like “time on task” and “quantity of efforts” at the beginning of 21st century, the scope has been expanded in the course of time so as to involve cognitive and sociological variables like “social involvement”, “academic involvement” and “emotional involvement” (Astin, 1984; Tinto, 1993; Laird & Kuh, 2005).

The dominant learning theories underlying engagement has been social constructivism since the paradigm posits that learning is active construction of knowledge and understanding through experiences in individual and social lives and reactions to those experiences in authentic and collaborative environments (Gebre et al., 2014, Lin & Hsieh, 2001; Ertmer & Newby, 1993). Comprehensive structure of the philosophy which refers to behavioral (experiences), cognitive (active use and construction of knowledge, problem solving) and social (sharing and reflection of understandings in collaborative environments, cooperation and teamwork for learning) aspects of learning make constructivism an ideal base for engagement research (Alavi, 1994).

Constructivism paradigm considers contextual factors to have significant influence on learning process. For instance, Lin & Hsieh (2001) mention that if optimal conditions are met, participation and involvement of students to learning process will increase. Therefore, engagement studies also place special emphasis on critical factors predicting student engagement (Gebre et al., 2014).

Based on the literature, the current study defines student engagement as the combination of qualitative efforts of students in terms of cognitive/mental and emotional/social investment to attach to and to be involved in learning processes inside/outside the classroom which eventually leads to quantitative efforts, which are behavioral reactions, and thereby makes it a measurable concept. The current study also defines “engagement with technology” term as cognitive, social and behavioral attachment and involvement to digital technologies for instructional purposes in a learning context that embraces everyday use both inside and outside the classroom/school. While the definition of engagement can be broadened so as to cover non-academic dimensions of school experience like extracurricular activities (Gebre et al., 2014), the scope of the study is limited to the investigation of academic aspects of engagement at individual and classroom level. Therefore, the engagement definition of Hu and Kuh (2002), as intentional and conscious efforts devoted by students to fulfill desired outcomes of academic activities, will guide the rest of the study in terms of the scope of engagement.

2.7.2. Student Engagement Types

Several researchers identify different types of student engagement towards learning. Günüc and Kuzu (2014) identify two types of student engagement as campus engagement and class engagement in their study based on face-to-face interviews and written compositions with 45 student teachers. Campus engagement has 2 dimensions as "campus environment and facilities" which includes concepts such as safety, student groups and orientation, and "school-student interaction" including concepts like physical area, facilities, activity and administration. Class engagement has 3 dimensions as "faculty member interaction" including concepts such as communication, competency, motivation and teaching methods, "course/classroom structure" including concepts like course benefit and physical conditions of the classroom, and "student characteristics" including concepts such as relationship with friends and motivation. The researchers conclude that technology integration is considered important in terms of both contributing to and increasing student engagement. Günüc and Kuzu (2014) also define "engagement with technology" as a separate type of engagement since technology is considered to have influence on both campus engagement and class engagement. The study reports 2 dimensions of technology engagement as "technological infrastructure" which include concepts like technical support etc., and "effective technology integration" including concepts such as instructor's competency and instructor use of technology. The study of Günüc and Kuzu (2014) conclude that behavioral engagement (with the authors' wording "school/class attendance") and cognitive engagement (with the authors' wording "investment on students' own learning") are the major elements of student engagement.

Laird and Kuh (2005) identify 5 different types of engagement based on NSSE: “academic challenge” refers to time devotion and performance of students for academic activities; “active and collaborative learning” refers to the observable participation level on individual and collective learning activities; “student faculty interaction” addresses the frequency of interaction between student and instructor; “enriching educational experiences” refers to the measurement of student participation for various useful educational activities, and “supportive campus environment” addresses to what extent school/campus environment supports academic and social needs of students.

Gebre et al. (2014) identify 3 major objectives of effective teaching based on the characteristics of teachers and instructors as to transmit knowledge through effective instruction, to enable student interaction by “creating dynamic environment”, and to develop self-regulatory abilities of students. These beliefs respectively target 3 types of student engagement: behavioral, social and cognitive engagement. Sheard et al. (2010) also identify “behavioral”, “cognitive” and “affective” as dimensions of student engagement in their study.

Fredricks et al. (2004) define engagement as a “multifaceted construct” and describe 3 engagement types as behavioral, emotional and cognitive. Behavioral engagement is observable participation of students on academic and social activities to attain desired instructional outcomes. Emotional engagement refers to motivation of students to be a part of group by interacting with a social group consisting of instructors, peers, parents and school itself. Lastly, cognitive engagement refers to exertion of higher order thinking skills to understand complex learning tasks and master skills required for real life. Fredricks et al. (2004) also mentions that these types of engagement have been being studied as concepts for a long time with different wordings. For example, ‘student conduct’ and ‘on-task behavior’ for behavioral engagement, ‘attitude’, ‘student interest’ and ‘value’ for emotional engagement, and ‘self-regulated learning’ for cognitive engagement (Fredricks et al., 2004, p. 60).

Several dimensions of student engagement in technology integrated classrooms have also been proposed by different authors. Gebre et al. (2014) identified 4 dimensions as “cognitive and applied”, “social”, “reflective” engagement and “goal clarity” based on the results of principal component analysis collected from 332 students in technology rich classrooms. The authors report cognitive and social engagement as significant dimensions in terms of teaching.

Howland, Jonassen and Marra (2012) mentions that effective engagement of students in a technology-mediated environment necessitates that instructional activities should be constructive and authentic so as to cover cognitive aspects of learning, and active and cooperative aspects of learning. Cognitive engagement in a technology context refers to student involvement in intellectual activities using technology, reflection and self-evaluation about their learning experience and then conscious intervention with the aid of tools and facilities provided in technology context based on these metacognitive evaluations by students (Gebre et al., 2014, Richardson & Newby, 2006). Opportunities of Web 2.0 technologies such as creating and sharing educational content and knowledge, reflecting and evaluating ideas, supporting group communication and discussion, building communities of practice, progressive construction of instructional materials together with teachers and students, are considered social aspects of learning that allows students to be socially engaged in learning (Sigala, 2007).

2.7.3. Engagement Types Adopted in Current Study

The current study adopts 2 engagement types as cognitive and social engagement since several authors point out these dimensions as significant in both face-to-face and technology-mediated contexts even if some authors use different wording to refer to these types.

Cognitive engagement is defined as student mental effort to be able to participate in learning activities. It requires various mental and cognitive strategies to deal with challenging tasks, and to spend reasonable amount of time to complete curricular activities (Saeed & Zyngier, 2012). Cognitive engagement also involves assessment of learning task if the learning task is valuable enough and student is competent enough to put effort for instructional activities (Schlechty, 2001). Gebre et al. (2014) defines social engagement as the quality, intensity and frequency of interaction between student, teachers and peers using communication tools.

2.7.4. The Relationship between Motivation, Engagement and Achievement

Motivation of students, which is considered as the prior condition of student engagement towards learning, is seen a crucial element to address learning outcomes in educational environments (Sternberg, 2005; Schlechty, 2001). A driving force is required to get desired acts or behaviors from students. Motivation fulfils this role with its various kinds and levels in educational contexts. Motivational factors are assumed to have triggering role to activate behaviors of students that reveal in the form of student engagement (Huitt, 2001). While motivation is predictor of engagement, academic achievement is predicted by student engagement (Saeed & Zyngier, 2012; Ryan & Deci, 2009). From this point of view, a strong relationship can be inferred between motivation, engagement and academic outcomes.

Despite many theories and models depicting the relationship between motivation and engagement, Self-Determination Theory (SDT) of Ryan and Deci (2000a) provides a comprehensive framework. SDT identifies two major motivation types of students as intrinsic and extrinsic. Intrinsic motivation in a learning context is defined as inherent predisposition of students towards involvement in learning activities, learning tasks, learning processes -in short learning itself-, and eventually achieving instructional outcomes (Corpus, McClintic-Gilbert & Hayenga, 2009). Ryan and Deci (2000a) define intrinsic motivation as natural disposition of human beings to accommodate and assimilate what is being taught. Intrinsically motivated students have a natural enthusiasm towards learning and achievement. The keywords for an intrinsically motivated students are satisfaction, aesthetic value, novelty, fun or challenge rather than external impetus, environmental pressures or rewards.

On the other hand, extrinsic motivation is defined as the motivation of student derived from and fed by outside factors that are directly and indirectly related to learning process including, but not limited to, compliments and encouragement by teachers, rewards and even feeling necessity to obey rules (Corpus, McClintic-Gilbert & Hayenga, 2009). Ryan and Deci (2000a) define extrinsic motivation as the external control to make what is being taught internalize. Ideally, students are desired to have intrinsic motivation but most students are not enthusiastic and interested in instructional activities in real life. However, they are still engaged in learning more or less therefore identifying motivational factors have an important role to understand driving forces underlying engagement. External motivation as a concept aims to explain how individual, social and environmental conditions cause individuals to shoulder responsibilities even if they are not interesting tasks. External motivation as a construct focus on "instrumental value" and "separable outcome" of activities rather than the inherent value and outcome (Ryan & Deci, 2000a).

Ryan and Deci (2000b) identify 3 "innate psychological needs" (perceived competence, sense of autonomy and relatedness) as indispensable part of intrinsic motivation that are required to be fulfilled to ensure intrinsically motivated engagement with learning. In other words, when students have higher level of satisfied needs, they are more intrinsically inclined to engage in instructional activities. Relatedness refers to the need of students for belonging and connecting to others who are valued and respected. The others might include teachers, peers and family. Accepting the goals and values adopted by "significant others" is considered an important motive to internalize behaviors and to be engaged in learning (Ryan, Stiller & Lynch, 1994). Competence refers to perceived self-efficacy of students in terms of their skills to behave in a desired way. When students feel sufficiency, they are likely to internalize behaviors that are expected to be engaged in. Autonomy refers to self-determination of students to integrate and regulate desired behaviors in a learning environment. When students assimilate the meaning and value of a desired behavior, they become autonomous without need for external impetus.

As mentioned above, not all activities are intrinsically motivating however designing and providing supporting environments, and modifying and controlling contexts in a way to satisfy these innate needs might result in internalized and integrated behaviors even if they are not intrinsically motivated for students. As a result, Ryan and Deci (2000b) state that the investigation of extrinsic motivational factors, which includes the characteristics and properties of instructional activities and content, and the contextual factors surrounding instructional tasks, is crucial to enhance motivation and engagement. Moreover, the characteristics and contexts of instructional activities being engaged are capable of stimulating intrinsic interest toward learning and can fulfil innate psychological needs in progress of time therefore there is a structural relationship between extrinsic motivation, intrinsic motivation and engagement. To be more precise, for instance, considering the current study context, existing motivational factors such as self-regulation (sense of autonomy) or motivational beliefs such as technology attitude which are inherent dispositions at a certain motivated level might affect one's level of engagement to instructional activities and tasks in the online learning platform. On the other hand, instructional activities and tasks being engaged during the instructional term, which are mediated and supported by extrinsic motivational factors, can also affect intrinsic motivational level, and can shape and modify satisfaction level of these "innate psychological needs".

Consequently, the current study adopts the framework of Self-Determination theory proposed by Deci and Ryan (1985) to identify motivational factors and investigate how they are related to engagement because it is useful to address individual, social and environmental factors that stimulate or inhibit engagement of students. Identifying intrinsic motivation is important in terms of social and cognitive engagement of students because natural tendency and interest towards learning result in conscious acts to expand and reflect knowledge and skills in real life (Ryan & Deci, 2000a). Identifying extrinsic motivational factors is also crucial because contextual factors and environmental conditions can stimulate, diminish or change the orientation of motivation (Ryan & Stiller, 1991).

2.7.5. Motivational Factors

Deci and Ryan (1985) state that students do not find instructional activities, classroom environment and learning in general interesting therefore it is not easy to motivate students to engage in. The authors offer "internalization" and "integration" processes to enable students to value and regulate their learning. Internalization is the adoption of values and regulations inside instructional activities and contexts. Integration is the assimilation of values and regulations inside learning as if they are one's own regulation (self-regulation) and values. The quality of engagement along with higher commitment is better when internalization and integration are increased (Ryan & Deci, 2000a).

The question about how to increase internalization still remains. Deci and Ryan (1985) emphasize the importance of motivational and contextual factors to reinforce or hamper internalization and integration towards learning. Different authors identify various motivational factors for students to be engaged in learning process. They are highly engaged when they value instructional content, instructional tasks and learning environments (Ryan, 1995); when they feel adequacy to be able to use instructional materials and media, and to complete instructional activities and when they have attitude and belief that instructional content and contexts can result in expected outcomes (Deci & Ryan, 1985).

The current study adopts Ryan and Deci's (2000a) framework to identify motivational factors and divides them into 2 categories as intrinsic factors and extrinsic factors. The study benefits from technology adoption models especially from studies of which main concerns are technology-mediated learning contexts to identify motivators of engagement.

Consequently, the current study aims to identify related motivational factors in technology-integrated context therefore review and identification of technology-related factors as well as individual and social factors are required. To address these aims, the study benefits from technology adoption models, which depict the relationship between actual use of technology by users and critical success factors predicting actual use of technology, especially Technology Acceptance Model (TAM) by Davis (1985) and Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003).

2.7.5.1. Intrinsic Motivators and Beliefs

Intrinsic motivators and beliefs are determined based on whether they address one of 3 “innate psychological needs” (perceived competence, sense of autonomy and relatedness) proposed by Ryan and Deci (2000b) or whether they are inherent value, dispositions independent from context or general attitudinal belief. Considering these criteria, 4 intrinsic motivators and beliefs are identified as student-instructor interaction, self-efficacy, self-regulation and general technology attitude.

Student-Instructor Interaction

Student-instructor interaction is considered as a significant predictor of student engagement and achievement (Bernard et al, 2009). Günüc and Kuzu (2014) identify the interaction between students and instructors are one of the basic factors affecting student engagement and state that instructors who fail to interact with students successfully cause lower engagement of students. Creating a collaborative environment with increased interaction are assumed to result in increased student engagement with instructional content, improvement on critical thinking and problem-solving skills and thus better achievement scores (Alavi, 1994).

Instructor interaction involves a wide range of properties like valuing students, positive attitudes, motivation and respect as well as efficacy on subject area and teaching course content, effective use of instructional materials and technologies, and competence on instructional methods and techniques (Günüc & Kuzu, 2014). Students develop positive relationships with their instructors and thus become more engaged when their instructors encourage them to be active participant of the course and classes (Günüc & Kuzu, 2014). A longitudinal study by Williams and Deci (1996) indicated when instructors supported students in a way to increase their autonomy and competence, students were more engaged in their learning.

Coates (2007) mentions that active involvement of instructors on online platforms are perceived by students as more collaborative environment and results in a high sense of learning community in terms of relatedness and in turn affects engagement. Beer et al. (2010) state based on a study with 45,424 online education participants that students whose teachers are active participants in online learning environments such as being involved in discussion forums and posting instructional content regularly had higher number of clicks on the environment than students whose teachers are passive.

Students utilize the potential of social networking sites for increased interaction between students and teachers (Veira et al., 2014). Effective use of social networking platforms like Facebook and Twitter increases student engagement because these platforms provide several interaction opportunities like communication between instructor and students, instant messaging, rapid access to instructional materials, discussion of learning activities and commenting on ideas (Günüc & Kuzu, 2014).

Several researches indicate that the quality of relationship between teacher and student predicts social engagement of students (Saeed & Zyngier, 2012, Fredricks et al., 2004). Chen et al. (2010) states that both formal and informal interaction among students and instructors are important in terms of receiving assistance thus student engagement increases.

Instructor guidance for students to be able to interact with the environment and to use tools and media effectively is also considered an important motivational factor to increase confidence of students and in turn student engagement (Douglas & Alemanne, 2007). Some student might have technical difficulties or self-efficacy issues towards using and adopting technology. To resolve these problems is also responsibilities of instructors. Teachers who provide tutoring, prepare guidelines or create instructional handouts to address these problems can help students to be more engaged in online environments (Cole, 2009).

The time being spent by instructors on online platforms is an important factor for student engagement. When students realize that their instructors spend considerable time on these platforms, their relatedness increases thus they become more engaged in online activities. Teachers' reluctance to spend time and put effort for preparing online course content and other instructional materials, or participating in online activities might hinder and inhibit anticipated effectiveness on the engagement of students (Veira et al., 2014). In other words, teachers' enthusiasm and willingness to provide relatedness on these platforms are considered important to influence student motivation to engage in.

Consequently, instructor interaction is seen one of the most influential factors when compared to other motivators. Ertmer (1999) asserts that teaching perceptions and beliefs regarding interaction with students through technology use is more influential factor in terms of the adoption of technology than system-related or environmental factors. Instructor adoption of online learning platform revealed in the form of interaction and relatedness is one of the most essential factors to reveal the educational value of them to students rather than system characteristics of these platforms (Coates, 2006; Ehrmann, 2004).

Self-Efficacy

Self-efficacy is one of the intrinsic motivators that refers to perceived ability to use a particular technology. Low level of self-efficacy as a personal constraint is one of the barriers to use and adopt a technology. Self-efficacy towards using technology mostly refers in technology adoption models to confidence to use an unfamiliar technology and to be able to utilize system tools and facilities without outside support including instructions and guidelines provided by the system, and aids by instructors and students (Holden & Karsh, 2010).

Cole (2009) identify student lack of self-confidence as one of the reasons for low level of involvement towards using Wiki technology. The lack of self-confidence shows itself as desiring others to use technology first or not wishing to be seen as incompetent by contributing to online environment. It is interesting to note that while 21st century students are highly familiar with Web technologies, their unfamiliarity to online learning environments causes lower self-confidence to be involved into them (Cole, 2009).

Self-regulation

Self-regulation refers to motivation of students to control and regulate their own learning process. Students can use online learning platforms for self-regulatory aspects of their learning. They can address individual learning needs and course-related goals. Moreover, since these platforms provide various tools for instructional activities, students can determine the frequency of use based on their technological habits and interests. Another important self-regulatory aspect of adopting social learning platforms is that they allow students to adjust their pace and progress according to their learning capabilities, speed and style (Gurung & Rutledge, 2014). Easy access and manageable aspects of shared content delivered by instructors on Web platforms also motivate students to control and regulate their own learning process (Veira et al., 2014).

Technology Attitude

Past studies indicate that apart from attitude toward a specific technology, perception and attitude, which arise from previous technology experiences, knowledge, habits and competencies, toward general technology usefulness and efficacy on addressing academic needs and interests have influence on student involvement and engagement to a particular educational technology (Gurung & Rutledge, 2014; Lee, Brescia, & Sissinger, 2009; Barron et al., 2002). Attitude towards technology takes the form as a belief after several progressive evaluations whether or to what extent technology is effective on the regulation of daily and school lives of individuals. Since the evaluation process is internalized and assimilated in self as a belief over time, the attitude towards technology is categorized under the intrinsic motivational factors.

Technology attitude and perception based on the previous experience with technology is reported by several authors as a factor predicting student engagement in online courses (Vrasidas & McIsaac, 1999). Based on the interviews with five students, Gurung and Rutledge (2014) report that digital habits, which are acquired after exposure to daily use of technology on a regular basis, like text messaging, listening and watching, access to social networking sites and other Web 2.0 tools influence the perception of students on the use of technology for instructional purposes in a negative or positive way. One of the emergent attitudes based on the past experiences is student lack of interest toward using technology for instructional purposes. For instance, Cole (2009) presents student lack of interest as the reason why students were not attached to Wiki technology in his study.

Consequently, several studies conclude that the gained perception after several exposures to various technologies results in attitude toward instructional technology which ultimately influences student involvement to digital learning platforms and student engagement to learning in a technology context (Cole, 2009).

2.7.5.2. Extrinsic Motivators and Beliefs

Extrinsic motivators and beliefs are individual, environmental, social and technology-related factors which are highly dependent on the context in which the particular technology is implemented and integrated. Technology adoption models offer several extrinsic motivators and beliefs that are likely to influence students to be engaged in online learning platforms. Those that are adapted in the current study are elaborated in the rest of the section.

Peer and Instructor Characteristics

Instructor characteristics, peer attitudes and behaviors functioning as social norms towards technology adoption are listed as important factors predicting student engagement indirectly (Günüc & Kuzu, 2014). Learning styles of students which determine strategies and tendencies toward learning and teaching characteristics of instructors which motive teaching styles is an important factor in terms of student engagement since the design of learning environments supported with integration of technologies is influenced by these characteristics (Kember & Kwan, 2000; Cuban, 1993).

Instructors and students are two fundamental stakeholders of technology integration and adoption in classroom and school environment since integration process can't be completed if instructors have lack of confidence due to insufficient knowledge or students have lack of confidence due to lack of competence on technology use for instructional purposes. Unsuccessful attempts of technology integration into learning process might cause loss of time, attention deficiency or lack of confidence thereby student disengagement. (Schlechty, 2001).

Günüc and Kuzu (2014) report that teacher incompetence on skills which are necessary to integrate technology has negative effects on student engagement. Since individual and social factors are as important as technology-related factors in a technology mediated learning environment, developing student engagement at behavioral, cognitive and social level in a technology context requires not only technology competence of instructors but also competence at conceptual and pedagogical level and their interrelationship with technology (Mishra & Koehler, 2006). Moreover, even if they have confidence and expertise, adequate devotion of time and effort to prepare online activities, to participate in online platform and to motivate students to engage in is of high importance for successful integration of technologies (Veira et al., 2014). Consequently, technology competence and sufficient time devotion for technology use are important factors determining instructor characteristics in the eyes of students. Students wish teachers to avoid technology use if not used professionally inside and outside the classroom (Günüc & Kuzu, 2014).

Another important characteristic for successful integration of technology is instructors' openness to innovations and peers' enthusiasm for instructional use of technology. When teachers are eager to try new technologies and peers encourage each other for attempting to use technology, students' adoption of instructional technologies becomes easier (Fullan, 2007).

Perceived Content Quality/Benefit

Perceived content quality and benefit refers to the efficacy and effectiveness of content shared on the online platform. Perceived Content Quality is identified by several scholars as one of the most essential factors impacting student engagement (Günüc & Kuzu, 2014). A study reports that since the quality of content posted in an online learning environment is found trivial by some students, they did not contribute and participate in the environment at significant levels (Cole, 2009).

Several researches conclude that perceived content quality and efficacy make students more active to be involved in the learning process, to attend the classes, to complete assignments, to meet the requirements of the course and to learn the basics of the course thus course/content quality make students more engaged (Dastorani & Khoshneshin, 2017; Trakulmaykee et al., 2016; Calisir et al., 2014).

System Characteristics

System characteristics have been reported as an important factor in most of the technology adoption model studies (Al-Busaidi & Al-Shihi, 2010; Nanayakkara, 2007; Pituch & Lee, 2006). A solid foundation of system infrastructure is considered to be the first step for technology acceptance. A safe and secure technological infrastructure on school and classroom environment contributes to student engagement (Günüc & Kuzu, 2014). Based on the findings, it can be rationalized that a reliable, secure and safe system along with the technical support on learning platforms has important effect on student engagement.

The appearance and design of system interface are other important system characteristics to draw attention of students and engage in those platforms. The presentation of online materials in an appealing way like eye-pleasing graphics, attractive interfaces and easily accessible tools is important for students. For example, Veira et al. (2014) report that students prefer Facebook over Google groups since Facebook has a more appealing interface. Customization and personalization of learning systems are also reported by students to have significant contribution to high engagement (Gurung & Rutledge, 2014).

Easy navigation and useful guidelines are also components of system characteristics. A study conducted by Cole (2009) reports difficult navigation and lack of guidelines about how to use system were some of the excuses for student disengagement in an online learning environment.

Perceived Ease of Use

Perceived ease of use (PEOU) is one of the motivational belief constructs adapted in almost all of the technology adoption models particularly studies conducted for course delivery systems (Alharbi & Drew, 2014; Schoonenboom, 2014; Shroff, Deneen & Ng, 2011; Park, 2009). It refers to personal judgement of whether the technology being involved is easy enough to be able to use effectively. PEOU mostly functions in adoption studies as predictor of perceived usefulness and mediator of extrinsic motivators such as system characteristics. Some authors also utilize PEOU as directly predicting motivational outcomes. For example, Cole (2009) reports perceived difficulty to use the system as one of the reasons why most of the students were not engaged in posting to Wiki. Even if PEOU mostly mediate extrinsic motivators, some authors draw high relationship between PEOU and self-efficacy which is an intrinsic motivator. For instance, Fullan (2007) reports that if students do not feel confident on how to control technological tools and features effectively, they believe they are difficult to use thus reluctant to use instructional technologies. In other words, their motivation and eagerness depend on self-confidence on easy use of technology. Therefore, a positive relationship can be hypothesized between perceived ease of use and self-efficacy.

Mobile Flexibility

Use of digital technologies for instructional purposes is not restricted anymore to school or classroom environment nowadays since rapid development of Internet technologies allows students to make every place a learning ecology (Gurung & Rutledge, 2014). Moreover, rapid prevalence of mobile technologies like smartphones and tablets enables anytime anywhere learning which is called "ubiquitous learning" or "mobile learning", and also allows for collaborative learning through easy access to social media and Web 2.0 tools (Gurung & Rutledge, 2014). Cloud computing services along with other affordances like hosting internet and social networking, and easy and fast access to content, materials and resources make handheld devices compact and ideal to be used for instructional purposes (Trucano, 2005).

Widespread adoption of mobile devices by students has also drawn attention of researchers studying engagement. Since students are already enthusiastic to use these devices in daily life and they are also highly engaged in activities taken place in those devices, they have become candidates as invaluable instructional technologies for educators to integrate into school life in recent years. The reaction of some innovative educators to highly adoption of portable devices in society including their students has been their various attempts to integrate them into teaching in a way to take advantages of the affordances provided by those devices like easy communication, rapid access to tools, easy access to resources etc. (Veira, et al., 2014).

Rapid and easy access to Internet services through hand-held devices is the most appealing feature that draws attention of educators since delivery of content and dissemination of instructional materials and resources through websites and online databases are now easily accessible by students anytime and anywhere via mobile devices. Moreover, mobile applications of online learning platforms and course delivery systems allow students to edit, take notes, comment and discuss on the content and instructional resources posted by teachers (McMullin, 2005; Gilbert & Dabbagh, 2005). Therefore, mobile flexibility in terms of time, place and accessibility can be used so as to provide learning flexibility thus it might cause students to adopt and regulate their own learning process, and increase participation and involvement over learning activities (Veira et al., 2014).

The use of mobile devices for learning activities at anytime and anywhere, the design of instructional practices which are compatible for mobile devices, the adaptation of instructional materials and tools so as to be used in these devices are hypothesized by authors to arouse interest of students, motivate them and increase engagement to their learning now and in the future. For instance, the study of Veira et al. (2014) reports that students spoke highly of the usefulness of mobile flexibility of technologies in terms of interaction, independent learning, and sharing and cooperation with other students and instructors. They also benefited from easy access of instructional materials through mobile devices at any time. To sum up, when instructional needs of students were addressed, they were more motivated to use online learning platforms.

While there are several studies about the potentials of mobile technologies through mobile flexibility on engagement of students, the number of studies predicting whether mobile flexibility significantly effects directly on the belief regarding the usefulness of the technology being conducted and furthermore estimate engagement of students is none. Considering the points aforementioned above regarding the potential of mobile flexibility over engagement and learning, the current study presents mobile flexibility as a new motivational belief construct estimating directly perceived usefulness of particular technology and indirectly various types of student engagement. The current study defines perceived mobile flexibility as the evaluation and belief on whether the flexibility and mobility of technology is usable and useful enough to allow anytime anywhere independent learning, interaction and cooperation with other students and instructors, and involvement in course-related activities.

Perceived Usefulness

Perceived Usefulness (PU) refers to the assessment of costs (time devotion) and benefits (perceived improved learning) arising from using a particular technology (Cole, 2009). The evaluation of whether a particular technology would enhance performance or not based on the motivators determines usefulness perception of individuals. PU is accepted in technology adoption models as a motivational belief revealed in the form of a specific attitude of eagerness to use a particular technology indicating acceptance of the value or utility of that technology.

Several studies indicate that when students perceive that higher benefit and profit can be gained from using a particular technology, they devote significant time (Al-Gahtani, 2016; Juhary, 2014; Al-Busaidi & Al-Shihi, 2010; Park, 2009; Nanayakkara, 2007). Therefore, student must feel that it is really worth being engaged in online learning environment to invest sufficient time (Cole, 2009). Moreover, motivators such as quality of instructional activities and content or system characteristics should address students' expectations to get desired behaviors from students since PU is estimated by external motivators (Taylor & Todd, 1995).

Although perceived usefulness can be thought to be placed under intrinsic motivational factors since it is about valuing and accepting an instructional context to be useful; internalization, adoption and regulation of a belief requires significant amount of time (Chandler & Connell, 1987). Since online learning platform tested in the study is a new technology for students and the amount of student interaction time with the platform is short, it is considered as an extrinsic motivational belief which reflects personal value to reach desired goals (identification) or acceptance of instrumental value (integration). Therefore, it is reviewed under extrinsic motivational factors.

2.8. Theoretical Model of the Study

Proposing a general technology adoption model or a theoretical framework addressing the wide variety of technologies is not within the scope of the current study, nor considered even a feasible goal. Along with the advancements on technology, Information Systems evolved from discrete technologies implementing one or few functions to technology bundles enabling various functionalities with various components and tools to address many tasks, processes and activities. Moreover, current Web 2.0 technologies provide distinctive features through systemic, social and technical elements addressing different sensation, feelings and perception of humans thus these distinctive features make them unique. Therefore, suggesting specialized and unique context-dependent technology adoption models through process-based analysis, as recommended by Smith et al. (2007), based on one or more motivation theories is more applicable rather than directly offering one more expanded and redundant model with no theoretical power or with trivial justification, motive or rationale such as "X model is adopted and adapted because of its robustness". However, to be able to address the concern for determining a common framework to be grounded, the current study recommends that the process to offer a prospective model should start with designing and developing a conceptual framework to be relying on a motivational perspective rather than a fixed and predetermined theoretical framework because considering the complex state of technology with changing dynamics and a diverse range of technologies addressing several needs, cognitions and senses of humans, attempts to clarify user adoption based upon only one theory is oversimplification. For instance, while hedonic systems such as digital games or entertainment technologies which are purely intrinsic might be better clarified by flow theory of Csikszentmihalyi (1975), utilitarian technologies such as decision support systems which are generally estimated by technical variables and external motivators can be better illuminated through the lens of Expectation Confirmation Theory, and educational technologies on which both intrinsic and extrinsic motivation play an essential role over student engagement can be better explained by Self-Determination Theory. Furthermore, systems bundling a wide variety of tools and technologies might fulfil both social, cognitive, utilitarian and hedonic dimensions of motivation therefore a blend of theories might function better to clarify adoption of such systems. For example, social networking systems can be utilized both for entertainment, socialization, business and even for education, therefore a synthesis of constructs on Expectancy-Value Theory and Social Cognitive Theory might be optimal to explain user acceptance of these systems.

To design and develop a general conceptual framework and thus start an adoption study, motivation theories and adoption models in the literature are examined. Then motivational concepts are extracted, and by identifying and analyzing similar patterns among concepts, relationships between them are drawn as can be seen in Figure 2.1. Motivational needs or shortly motivators can be characterized as prerequisites that need to be addressed and fulfilled to be able to generate general beliefs and attitudes. Motivational beliefs point to expectations, attitudes and values handling orientation and moving towards to satisfy motivational goals and desires. Motivational goals refer to anticipated mental and emotional states, and motivational objectives in which stakeholders assume and expect intended population to reach. For instance, technology vendors anticipate users' intention to use their goods, an instructor who integrates an educational technology into classroom expects students' persistence and engagement toward using the technology, a game programmer might anticipate gamers' immersion into the game, administrator of a social networking system expect users' interest etc. Lastly, all the way to the right of Figure 2.1, ultimate outcome refers to the specific behavior being expected to be performed by intended population. For example, performance expectations might involve actual use of technology by users for vendors, achievement by students for teachers, flow or joy by gamers for game programmers and active participation or involvement by social media users for administrator of a social networking system. Consequently, motivational needs are estimators of motivational beliefs in turn they are predictors of motivational goals and finally in turn they are determinants of ultimate outcomes. All together constitutes user adoption of task, activity, product or in short technology.

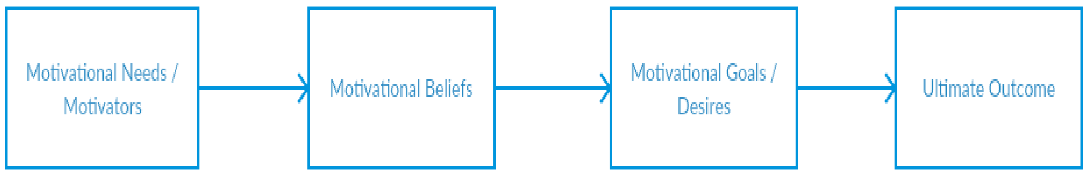

Figure 2.1. Conceptual Framework

Considering the limitations, redundancy and trivial justifications to generate technology adoption models in the literature, the current study also suggests a process-based model construction approach based on the recommendation of Smith et al. (2007), which requires theoretical understanding of relevant motivational processes and step-by-step elaboration, to design and develop a technology adoption model rather than directly implementing and expanding current models.

Accordingly, a technology adoption model can be initiated by grounding on and elaborating the conceptual framework offered in previous section. The first step involves identification and decision of motivational theory (or theories) together with its constructs that are found most suitable to interpret user motivation to adopt the technology by taking its idiosyncratic structure and the context into consideration in which it is being implemented, and then embedding and adapting the theory into the conceptual framework thus turning the conceptual framework into theorized conceptual framework. The second step involves elaboration of the constructs decided in the first step with appropriate factors to make it relevant and feasible at technology context thus converting the theorized framework into conceptual model. Finally, the last step requires transformation of conceptual model into technology adoption model by drawing hypothetical relationships among determined factors.

Consequently, the current study offers an educational technology engagement model by adopting the conceptual framework and following the steps mentioned above as follows:

1. At first step, 3 motivational theories are identified and decided to combine for explaining educational technology engagement namely Expectancy-Value Theory (EVT), Theory of Planned Behavior (TPB) and Self-Determination Theory (SDT). While theories focused on values and expectancies such as EVT provide comprehensive frameworks to identify motivational beliefs, they do not supply a systematic perspective why individuals are intrinsically or extrinsically involved in various tasks and activities (Eccles & Wigfield,

2002). Therefore, the theories focused on the reasons for adoption, engagement are also examined thus TPB was selected to determine extrinsic motivators, and SDT for intrinsic motivators. As a result, the conceptual framework is transformed into a theorized conceptual framework (see Figure 2.2).

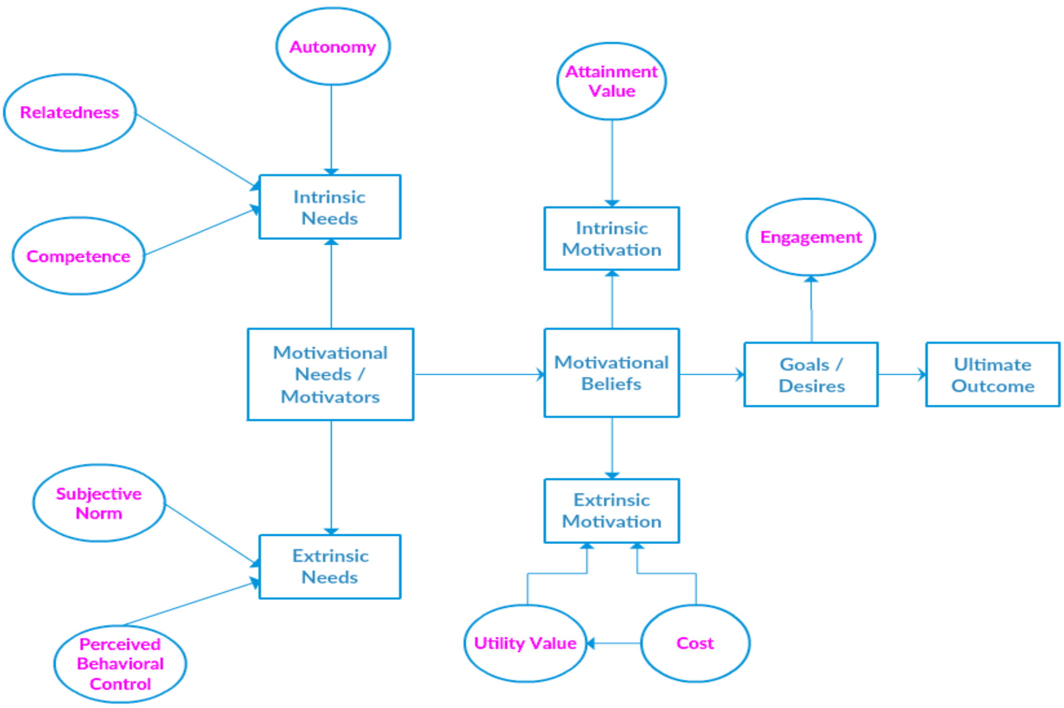

Figure 2.2. Theorized Conceptual Framework for Educational Technologies

2. At second step, the theoretical constructs are elaborated with relevant factors at educational technology context as depicted in Figure 2.3. Thus, theorized conceptual framework is transformed into a conceptual model.

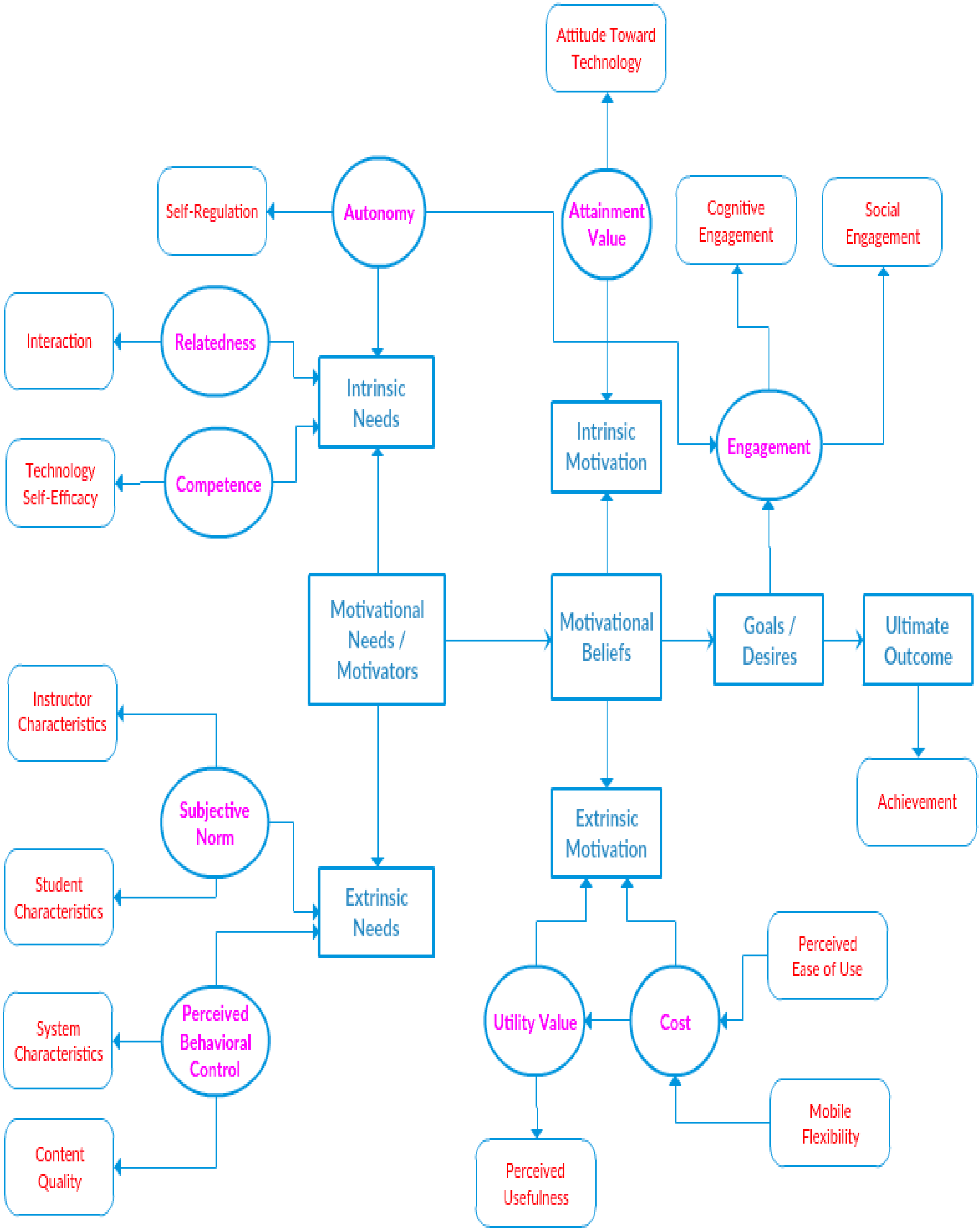

Figure 2.3. Conceptual Model for Educational Technologies

3. At the final step, the conceptual model turned into technology adoption model by drawing hypothetical relationships among determined factors (see Figure 2.4). The definition and explanation of constructs can be found below.

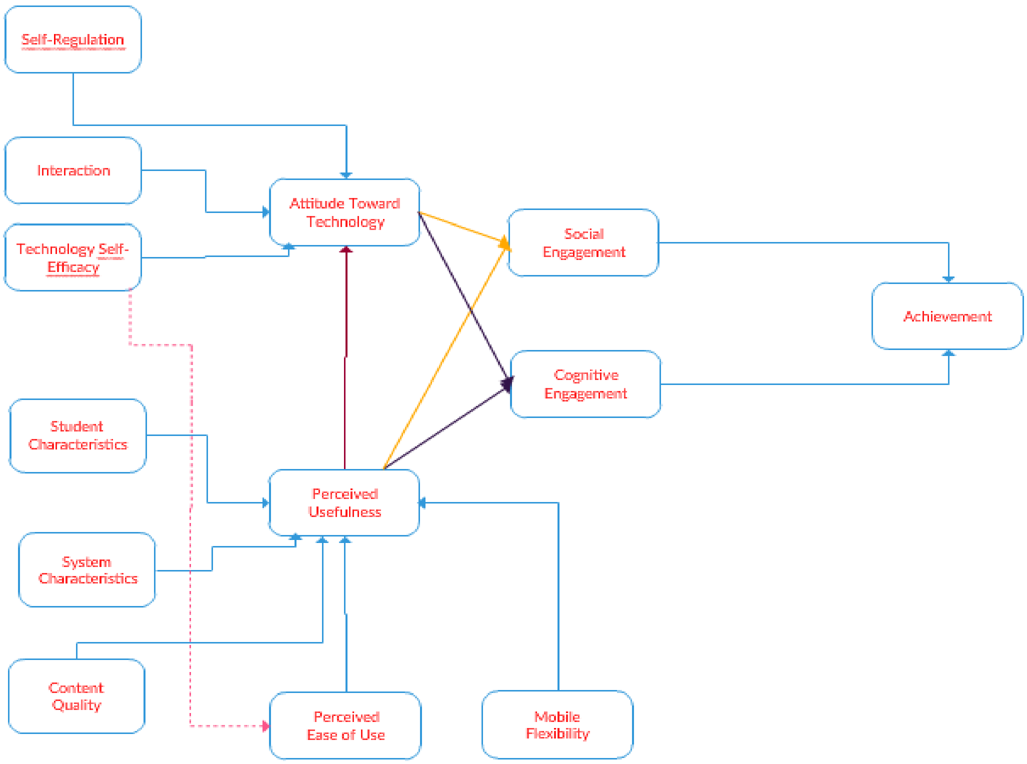

Figure 2.4. Educational Technology Engagement Model (ETEM)

Self-Efficacy: Perceived ability to use a particular technology. Confidence to use an unfamiliar technology and to be able to utilize system tools and facilities without outside support

Interaction: The quality of relationship between self, teacher and other students in terms of receiving emotional and instructional support and regulating behaviors and activities being involved

Self-Regulation: One's intentional response to integrate and regulate desired goal and behaviors in a technology-supported learning environment without need for external forces or stimuli

Student Characteristics: Influence and social pressures of other students on self to drive technology adoption

System Characteristics: Perceived reliability and safety of system infrastructure, perceived appealing of interface design and graphics, availability of customization and personalization, and perceived usability of system

Content Quality: The evaluation of self on the meaningfulness, conciseness, relevance and understandability of online content shared on the Web platform

Mobile Flexibility: The judgement on whether the flexibility and mobility of technology is sufficient to enable anytime anywhere independent learning, interaction, and sharing and cooperation with other students and instructors

Perceived Ease of Use: Personal evaluation of whether the technology is easy enough to be able to use

Perceived Usefulness: Assessment of costs and benefits arising from using a particular technology

Attitude Toward Technology: General attitude toward technology as a form of belief arising from both current and previous technology experiences, knowledge, habits and competencies of self, and judgement on general technology usefulness and efficacy in terms of addressing academic needs and interests

Cognitive Engagement: Student mental effort to be able to participate in learning activities and spending reasonable amount of time to complete curricular activities in the technology-supported learning environment through various mental and cognitive strategies

Social Engagement: Student participation in group works, class discussions and questioning-answering sessions, and interaction with other students and instructors using communication tools

Perceived Achievement: Perceived success and attainment of desired instructional behaviors and goals

2.9. Summary and Conclusion

Technology has gained an important role on the design of learning environments since it has been an indispensable part of 21st century students for 2 decades (Prensky, 2001). Technology is not only a medium for students to address their needs or problems but it is also a life style because they are hooked up with it since they were born (Günüc & Kuzu, 2014). The routinized use of technology in daily life also affects the learning preferences and styles of students since the high exposure of technology shapes their cognition, interests and perception (Prensky, 2001). Since engagement is a highly important factor to achieve desirable educational outcomes, it is crucial to design, manipulate and modify learning environments so as to increase engagement (Gunuc & Kuzu, 2014).

Instructional technologies are generally perceived and treated as utilitarian instruments in adoption studies providing opportunities, resources and affordances to increase student engagement at behavioral level at 80s and 90s. However, along with the advancement of Web technologies thereby instructional technologies, recent studies explored that interaction with and use of technology might also result in facilitating and increasing various engagement types including at social and cognitive level (Laird & Kuh, 2005) as well as it involves a separate form of behavioral engagement at observable level (Gunuc and Kuzu, 2014). Kennedy (2000) use "vehicle" metaphor for technology to imply that technology is not only a medium in which students take the driver chair and engage with different tools and instruments but it is also capable of carrying different forms of engagement in itself and helping students increase their various engagement types with instructional practices. The possible roles of technology over student engagement stimulated Laird and Kuh (2005) to conduct a study to decide whether interaction with technology is only restricted to behavioral engagement of students through use of tools or instruments at utilitarian level or it is also likely to facilitate and enhance other well-known engagement types. The authors conclude on the purpose of the study by giving an example on possible roles of information technology over student engagement: "e-mailing faculty about academic matters has been treated as a way that students use information technology for educationally relevant purposes. However, from another perspective, we could conceptualize use of e-mail as a way for students to create more opportunities for interacting with their instructors" (p.6). The current study aims to contribute Laird and Kuh's study (2005) from a different perspective by conducting a correlational research testing, unlike other technology adoption models restricting motivational outcome with behavioral use of technology, whether intrinsic and extrinsic motivators estimate cognitive and social engagement of students.

Consequently, the role of technology over engagement is to be examined differently than most previous adoption studies did. Instructional technologies, specifically course delivery systems in the context of the current study, are neither treated nor evaluated as a part of school/classroom context facilitating student engagement along with other traditional methods and tools. Rather, it is assumed in this study to be an idiosyncratic context which involves its own practices, methods and tools thus enables engagement to be manifested in various forms. This study aims to be a response to Laird and Kuh's call (2005) on a scale development which measure engagement dimensions and other factors influencing student engagement in a technology-mediated environment as well as examining the relationship between these dimensions and factors from technical, social and individual perspectives.

CHAPTER 3

METHODOLOGY

This chapter presents research procedure of the study including research design, research questions, population and participants, conceptual framework, data collection procedure, instruments, data analysis procedures, assumptions of the study, delimitations and limitations of the study.

3.1. Research Design

The Developmental Research method described by Richey and Klein (2005) was adopted as the scientific method for the study. Developmental Research (DR) aims to generate useful knowledge by grounding and processing the data systematically gathered from practice. It allows to test and validate conceptual and theoretical frameworks being hypothesized as well as establishing new approaches and model for specific cases. DR allows to examine tools, product and technologies systematically and propose models which are related to real word practice. It supplies valuable and trustworthy information to practitioners, scholars and theorists that they can use. It has a cyclical and reciprocal relationship with practice in terms of informing and feeding each other. Since it has a unique focus on the evaluation of instructional technologies and products through models, DR was found most appropriate research method for this study (Richey & Klein, 2005).

Richey and Klein (2005) identifies 2 categories of DR. While Type 1 DR allows for producing generalizable conclusions, Type 2 DR allows for producing context-specific knowledge. The current study has the typical characteristics of Type 2 developmental research. The Type 2 studies focus on building and justifying specific design models together with the guidelines indicating under which circumstances these models might be implemented. The current study follows the guidelines described by Richey and Klein (2005) to conduct Developmental Research. Firstly, the research problem was defined with its authentic limitations and circumstances that is considered currently critical to the technology adoption and acceptance model practitioners' and researchers' profession. Previous technology adoption models are identified and described with their strengths and weaknesses in the literature review. Moreover, the factors affecting the adoption of a technology are identified in the literature part. Then, by focusing and keeping the problem on mind, a model was designed and constructed to be implemented, tested and validated after reviewing the literature and synthesizing motivation theories and previous technology adoption models to be able to base the conceptual and theoretical background of the study. Then, the constructed model was revised and modified based on the recommendations of the experts from Instructional Technology field. Then, the model was tested and validated through statistical analyses with the data gathered via Survey method. Lastly, since the research is context-specific, limitations and unique conditions were identified to be able to generalize the results of the study with caution (Richey & Klein, 2005).

Quantitative research design was implemented in this study to test the prospective model and to investigate the hypothesized relationships offered in the model. Quantitative research provides objective and standard methods through accurate set of rules and processes thus allows for researchers to obtain valid and reliable results. Quantitative research is the standard method of most scientific studies. Quantitative design allows researchers to propose hypotheses to be validated or invalidated. The hypotheses are tested through statistical means. It deals with high number of numerical data obtained from a large sample representing population. It uses traditional methods to collect data, and utilizes statistical approaches and tools to measure and analyze data accurately and obtain reliable results. After analyzing data, comprehensive, generalizable and results can be deducted through legitimate discussions. It allows for other researchers to replicate the design, repeat the process and obtain similar results (Mertens, 2014; Creswell, 2013; Leedy & Omrod, 2005). Consequently, quantitative research was adopted for the current study due to its deductive nature which means it allows to test hypotheses, theoretical and conceptual models, obtain deductive results and make generalizations supporting the theory or theories being grounded.

Both descriptive and correlational design approaches of quantitative research were used in the study. Descriptive design allows to identify the current status of a variable or phenomenon. Correlational design allows to investigate and identify relationships among variables using statistical analyses (Bernard & Bernard, 2012). Descriptive research design was used in this study to collect demographics data and to identify needs, attitudes, beliefs, goals and behaviors of participants toward the adoption of a course delivery system. Correlational research design was also used since it allows model-testing designs on which the current study is established. Through model-testing design, the degree of the relationships between identified variables were determined using statistical analysis in the current study.

Survey technique was determined to gather descriptive research data. Surveys allow for self-reporting of participants regarding their demographics, perceptions, attitudes, opinions, emotions, beliefs, intentions and behaviors (Fraenkel et al., 2011). Since this information are required to be able to conduct the current study, survey research design was found to most appropriate method to use.

Surveys are the most common tool to conduct descriptive studies on a large scale. Survey method is the easiest approach to gather large amount of data at low expense and in a short span of time (Rubin & Babbie, 1997). Self-administered questionnaire is a survey method without requiring the researcher personally to be in the environment where the survey is administered. Participants of the study complete the questionnaire on their own and at their pace. Questionnaires can be distributed either in paper or electronic format (Fraenkel et al., 2011). Self-administered questionnaire was found to be appropriate survey tool for the current study. A self-administered questionnaire was developed on an online platform and distributed electronically to collect required data for the study.

3.2. The Purpose of the Study and Research Questions

The purpose of current study is to develop and design a technology adoption model based on a process-based model construction approach illustrating multifaceted and sophisticated relationship between motivational factors, motivational beliefs / attitudes, different engagement types as motivational goals/desires and perceived achievement of students in terms of motivational outcomes in a technology-mediated environment. In other words, the current study aims to determine how intrinsic and extrinsic motivational factors estimate beliefs and then how beliefs estimate various engagement types including cognitive and social, and to what extent engagement estimate perceived success of students in a technology-mediated learning environment. Based on the prospective model constructed above, 5 research questions are formulated as follows:

1. To what extent do extrinsic motivators contribute to extrinsic motivation of students toward educational technology use?
2. To what extent do intrinsic motivators contribute to intrinsic motivation of students toward educational technology use?
3. To what extent does extrinsic motivation of students toward educational technology use predict intrinsic motivation of students?
4. To what extent does motivation toward educational technology use predict student engagement on a social learning platform?
5. To what extent do student engagement predict perceived achievement of students on a social learning platform?

Based on the research questions, 17 hypotheses are elaborated as follows:

H_{1a}: There is a significant relationship between system characteristics and perceived usefulness

H_{1b}: There is a significant relationship between content quality and perceived usefulness

H_{1c}: There is a significant relationship between student characteristics and perceived usefulness

H_{1d}: There is a significant relationship between perceived ease of use and perceived usefulness

H_{1e}: There is a significant relationship between mobile flexibility and perceived usefulness

H_{1f}: There is a significant relationship between system characteristics and perceived ease of use

H_{1g}: There is a significant relationship between technology self-efficacy and perceived ease of use

H_{2a}: There is a significant relationship between self-regulation and attitude toward technology

H_{2b}: There is a significant relationship between interaction and attitude toward technology

H_{2c}: There is a significant relationship between technology self-efficacy and attitude toward technology

H_{3}: There is a significant relationship between perceived usefulness and attitude toward technology

H_{4a}: There is a significant relationship between attitude toward technology and social engagement

H_{4b}: There is a significant relationship between attitude toward technology and cognitive engagement

H_{4c}: There is a significant relationship between perceived usefulness and cognitive engagement

H_{4d}: There is a significant relationship between perceived usefulness and social engagement

H_{5a}: There is a significant relationship between cognitive engagement and perceived achievement of students

H_{5b}: There is a significant relationship between social engagement and perceived achievement of students

3.3. The Population and the Selection of the Participants

The population of the study is undergraduate students at Turkey universities whom their instructors implements Edmodo as a course delivery system and actively use it as part of their instruction. Since Edmodo is a third-party application which their management completely depend on the instructor, there is no inclusively implementation of Edmodo at university level. Moreover, there is no official record for how many students and instructors are currently using Edmodo at national level. Internet traffic tools indicate that 0,6% of internet traffic share towards Edmodo routes from Turkey (Alexa, 2018; Semrush, 2018; SimilarWeb, 2018). Given approximately 90 million registered users (Smith, 2018), roughly 540 thousands of Turkish students and instructors are active participants of Edmodo at all educational levels. Considering 5% of active users are routed from universities (Smith, 2018), approximately 27 thousand students and instructors who actively use Edmodo at higher institutions level can be estimated in Turkey. However, it was not cost-effective for the researcher in terms of time devotion and location accessibility to contact all of the students in these universities who use Edmodo. Moreover, since Edmodo does not allow students to share their e-mail addresses on their accounts, it was not even possible to deliver the survey electronically. Therefore, an accessible population was identified considering the theoretical background of the study.

Introduction to Information Technologies and Applications (IITA) is a mandatory course taught throughout Turkish universities. This course requires significant amount of time and energy to be engaged in technology. This aligns with the purpose of the study because the current study seeks and regards technology functioning as a self-contained educational environment through its tools and equipment rather than being an alternative or complementary instrument facilitating instruction and learning. This course allows almost every part of instruction to take place on online environment without requiring face-to-face classroom meetings and more importantly requires students to be highly involved and engaged in technology. Consequently, IITA was found more appropriate in terms of the theoretical design of the study when compared to other courses in which Edmodo is mostly utilized for complementary instructional purposes.

As the sampling method, convenience sampling procedure was conducted for the pilot study. For the pilot study, it was not possible to access all of the students for sampling in the target population therefore convenience sampling which allows to reach nearest and available participant group was chosen for the pilot study (Crossman, 2012). Moreover, since convenience sampling was mostly found appropriate for pilot studies before conducting main studies through which researchers can improve and make clear the framework of the main study (Crossman, 2012), convenience sampling method was determined for the pilot study. Accordingly, 1 instructor from Amasya University in Turkey who use Edmodo to instruct IITA was connected by the researcher. After the instructor's confirmation to participate in the study, his 520 undergraduate students who take IITA course from several faculties and departments at Amasya University became conclusive participants of the pilot study.

Purposive sampling method was conducted for the main study. This method allows researchers to select samples based on the purpose of the study and determined characteristics of the population, and also allows to reach participants quickly (Crossman, 2012). Among many types of purposive sampling method, Maximum Variation/Heterogeneous purposive sampling method was adopted since this type of sampling allows researchers to reach a wide variety of participants with different backgrounds and characteristics. This type of sampling provides variety and adds comprehensive perspective to the phenomenon of the study being examined (Crossman, 2012). Since the current study is a model study which aims to provide a comprehensive evaluation of social learning platforms and construct a robust view of the phenomenon, identifying and reaching samples with diverse characteristics is critical therefore Variation/Heterogeneous purposive sampling was selected for the study.

Accordingly, 4 universities and 9 instructors that can be easily accessible were identified benefiting from Edmodo to instruct IITA. The researcher connected with these 9 instructors through Edmodo and asked whether they and their students were utilizing the tools and affordances thoroughly that Edmodo offers including library (backpack), sharing files and links, commenting, assignment and feedback, quiz, pool, calendar, announcement and direct message. 5 instructors stated only one or few tools are used for complementary functions of the system such as announcing important events or grades, assigning homework, uploading assignments etc. It was understood that these 5 instructors mostly utilize Edmodo for traditional LMS-like purposes and do not use it as an essential component of instruction. The remaining 4 instructors indicated they use Edmodo extensively for instructional purposes by using every tools and affordances at least one time. The researcher asked these instructors to be participants of the current study. After their agreement, 4 instructors from 4 public universities including Middle East Technical University, Amasya University, Harran University and Ege University, and their students are selected as conclusive participants of the study. Thus, 533 undergraduate students from different departments who take IITA course became conclusive participants of the main study.

3.4. Data Collection Procedure

The study took place in 2 phases. At first phase, the online version of scales developed by the researcher to identify and measure user needs, beliefs, attitudes and goals towards the adoption of technology was shared with instructors to make them distribute to their students for pilot testing before the end of 2016-2017 Fall semesters of selected universities. The instructors shared the survey with students through Edmodo. After one week, instructors sent a reminder to students to fill in the scales. After 2 weeks, instructors sent one more reminder and made sure that every student completed the survey. In the end, 520 students from 4 universities filled out the scales for pilot test. After the validity and reliability of scales were verified through Exploratory Factor Analysis and Reliability Analysis, pilot test phase ended.

At the second phase, the online version of Edmodo Social Learning Platform User Experience Survey, which consists of the demographics and technology behaviors of students along with the scales verified at the end of the first phase, developed by the researcher was shared with instructors and asked for delivery to students electronically. The instructors shared the survey before the end of 2016-2017 Spring semester. Instructors sent reminders twice to make students fill in the scales and made sure every student completed. In the end, 533 students from 4 universities filled out the survey for the main study. After necessary statistical analysis were conducted, the second phase of the study ended.

3.5. Instruments

Several items from various scales in technology adoption literature developed and suggested by researchers were adapted in the context of current study. Scale items are modified so as to measure students' perceptions and beliefs about learning experience on Edmodo platform and factors affecting these experiences. The items in the questionnaire adapted from relevant scales in previous studies can be found in Appendix A along with their sources. The items in the questionnaire were extracted from previous studies in a way to identify students' cognitive and social engagement levels as well as motivators as critical success factors being involved to see the relationship with engagement types.

The draft of the survey was pilot tested with 3 experts in Instructional Technology field whom one of them is professor, one of them is associate professor and the other is assistant professor. Their iterative feedback related to content validity and ease of use guided item construction process and put the survey into final form. Before investigating the relationship between user needs, beliefs, attitudes and goals towards the user adoption of technology through a prospective model, designated items were subjected to measurement of internal validity and internal consistency within a pilot study. Moreover, it was tested through Exploratory Factor Analysis (EFA) within the pilot study whether prospective factors are extracted to be able to process with the main study.

The language of instruction in 3 universities is Turkish. Moreover, the mother language of the participants is Turkish therefore the survey was prepared and distributed to participants in Turkish. The process started with translation of the scales from English to Turkish by the researcher. Then personnel of Academic Writing Center at the Middle East Technical University (METU) checked and approved the translation. Two lecturers at METU English Preparatory School then made back to back translations to ensure the accuracy of the scales. The survey was put into the final form after reviewed and confirmed by the thesis advisor of the study.

The items in the instrument are on a 5-Point Likert type scale in which 5 corresponds to “Strongly Agree”, 1 corresponds to “Strongly Disagree” and 3 corresponds to “Undecided” as midpoint. Consequently, the questionnaire for the pilot study includes 13 constructs, namely, System Quality (10 items), Content Quality (6 items), Peer Characteristics (3 items), Self-efficacy (4 items), Self-regulation (6 items), Interaction (6 items), Mobile Flexibility (7 Items), Perceived Ease of Use (4 items), Perceived Usefulness (6 items), Attitude toward Technology (7 Items), Social Engagement (9 items), Cognitive Engagement (9 items), and Perceived Achievement (7 items).

After data was collected for pilot study, they were tested through Exploratory Factor Analysis (EFA) and Reliability Tests to confirm whether the items are statistically valid and extract factors appropriately, and sufficiently reliable to be able to measure prospective factors. Based on the results of the statistical analyses, several items were removed from scales thus they were put into final form for the main study.

Edmodo Social Learning Platform Usage Questionnaire was developed for the main study. It was comprised of 2 sections. The first section involves 3 parts. The first part involves the regarding the demographics of participants including gender, age, education level, grade level and department. The second part involves general technology behaviors of students including the technological devices being used, time duration spending on Internet, the purposes of Internet usage, devices to connect to Internet, and Social Networking Sites being used. The third part of the first section involves the questions specific to Edmodo usage behavior. These questions include the usage frequency of Edmodo via Web and mobile application, purposes of Edmodo use and the frequency of Edmodo tools usage such as backpack, sharing, comment, assignment, quiz, pool, calendar and direct message. The second section of the questionnaire, named as Edmodo Social Learning Platform User Experience Survey, are comprised of the scales which were previously tested in terms of validity and reliability through pilot study. The final state of the questionnaire can be seen in Appendix B.

3.6. Data Analysis

Exploratory Factor Analysis (EFA) was conducted to analyze the pilot study of the research and to be able to proceed with main study. EFA was used to indicate whether prospective factors are appropriately extracted and the instrument satisfy the conditions with regard to validity and reliability. Data analysis was conducted through IBM SPSS 24 (Statistical Package for Social Sciences) program.

The aim of pilot study was to find out common underlying factors regarding the user needs, beliefs, attitudes and goals towards the adoption of technology by collecting and analyzing data gathered from participants through scales adapted from relevant studies. Although principal component analysis is commonly used in the literature to extract factors from data set, EFA is preferred for the current study because it gives more reliable and meaningful factors and enables more sensitive analysis on data for the studies in social sciences when compared to principal component analysis (Costello & Osborne, 2005).

520 students from 4 universities participated to the pilot study. The survey instrument consisting of scales with 84 items in total was used to collect data to be able to identify needs, beliefs, attitudes and goals towards the adoption of technology. Responses were on a 5-point scale, ranging from “Strongly Disagree” to “Strongly Agree”. Exploratory

factor analysis (EFA) was used to identify the unknown factors that result in the observed variation among manifest variables. Data analysis procedure was planned to be conducted in several steps. Initially, assumptions of EFA were checked to ensure whether requirements to run EFA was met. To do this, outliers were detected via box-plots and z-scores. Univariate normality was checked through histograms and skewness-kurtosis values. Multivariate normality was checked through Mardia's test. Linear relationships among measured variables were checked through the investigation of scatterplots. Several sources were reviewed and referenced to indicate whether sample size is adequate to safely proceed with EFA. Correlation matrix was examined to anticipate the underlying factorial structure and display the relationships between individual variables. Moreover, sphericity was checked through Bartlett's test and sampling adequacy was checked through Kaiser-Meyer-Olkin (KMO) Measure to determine the appropriateness of the participant data for factor analysis (Williams et al., 2010). Thus, decision was made based on these preliminary tests whether it is appropriate to use and proceed with EFA.

After validating data for EFA, to be able to identify the factors, firstly extraction method was determined. Thus, common factor analysis method was determined to be used instead of principal component analysis (PCA) because PCA method makes no discrimination between shared and unique variance (Costello & Osborne, 2005). Moreover, PCA is less reliable and accurate in terms of examining the structure of data (Kim, 2008). Then, rotation method was determined to simplify the factor structure thus oblique rotation method was used to enhance the interpretability of underlying factors. After running EFA, number of factors was identified by examining several tools including scree plot, eigenvalues and percentage of total variance. Then, factors were named and interpreted. Finally, internal consistency of factors was checked through Reliability Analysis.

Demographic data in the main study are examined through descriptive analyses and reported using means, standard deviations and frequency distributions. To be able to answer research questions, firstly, Confirmatory Factor Analysis (CFA) was conducted to data gathered for the main study. Since the factors in the scales instrument were to be used in subsequent Structural Equation Modelling (SEM) analysis, CFA was initially conducted to provide evidence to what extent the prospective model fits the observed variables and to report the consistency of the model with the observed data. After satisfying necessary conditions to proceed, SEM was conducted to analyze structural relationships among factors thus research questions were answered appropriately. SPSS AMOS 21 software was used for both CFA and SEM analyses.

Confirmatory Factor Analysis is generally administered to test and confirm latent variables as part of the hypothesis. The items extracted on EFA are expected to be loaded specifically on a predetermined factor through CFA thus a hypothesized factor structure in the data can be validated (Tabachnick & Fidell, 2012). CFA allows the researcher to reduce the items and revise the theoretical model for the last time thus an amplified and statistically stronger model can be recommended for further studies. The final model offers the most trustworthy observed variables in terms of reliability and validity depicting the strongest relationship among the latent variables. Consequently, CFA was administered to test the latent variables and the correlations between those variables in the “Edmodo Social Learning Platform User Experience Survey”.

While traditional item-based approach is commonly used to administer CFA, this study adopts item parceling method due to its psychometric and modeling-related benefits for the research in social studies dealing with high number of items. Parceling refers to combining single items into one or more parcels and administering these parcels as the underlying latent construct while running CFA or Structural Equational Modeling (SEM) (Kishton & Widaman, 1994).

Bandalos and Finney (2001) report that researchers generally adopts item parceling due to 3 reasons:

1. To boost the stability of the parameter estimates

2. To increase the ratio of the variable to sample size
3. To fix the small sample size problems in terms of statistical analysis

Researchers address several benefits in favor of item parceling including the remedy of non-normal data and increased model fit (Thompson & Melancon, 1996), improved reliability, continuity, validity and normality (Nasser & Takahashi, 2003), improved communality through indicators, prevented counterfeit correlations due to estimation of large number of items, increased sharing of variance that is non-relevant of research interest thus reduction of random error, enhanced common-to-unique ratio for each indicator and thus better parameter estimates, higher fit indices and more stabilized solutions (Little, Cunningham, Shahar & Widaman, 2002), and less parameter bias and less Type 1 errors in case of non-normality (Bandalos, 2002). Consequently, item parceling provides low number of parameters that is to be estimated therefore more stable parameter estimates and more appropriate model fit solutions can be attained. Moreover, in case of severe non-normality, item parceling remedies the normality and continuity of the indicators (Holt, 2004)

Research in social sciences mostly require high number of variables to be examined and analyzed. However, when the observed variables are numerous, traditional item-based approach to administer CFA and SEM gives both unreliable results regarding estimators in terms of parameters and fit indices and also inefficient solutions in terms of prospective relationships among factors. The traditional method to address this high dimension problem is to remove marginal variables with lower loadings on the related factor. However, removed variables might still hold important and useful information in terms of predicting the structural model among factors. Therefore, the current study adopts item parceling method rather than removing variables for the sake of keeping valuable information that is likely to be extracted from variables.

Two common approaches are utilized in item parceling method which "subset-item-parcel approach" combines items to form several parcel subsets while "latent-composite approach" combines all items into one parcel and uses this parcel as the indicator of the target construct (Matsunaga, 2008). Since determination of a latent construct through one indicator causes under-identification and thus under-identified models results in computation problem in SEM analysis, the recommendation of Matsunaga (2008) to form “three parcels per factor by the random algorithm” (p. 289) was adopted for the current study.

After conducting CFA, the construct validity of the model with the observed data was checked through convergent validity and discriminant validity. Construct validity can be defined as a way for testing the validity of a scale to demonstrate to what extent the scale is actually measuring the construct as it is supposed to measure. Construct reliability is a general term to estimate the reliability of a measure through checking the consistency of the responses to the items within the scale (Dimitrov & Rumrill, 2003). Two common methods to test the construct validity through CFA is convergent validity and discriminant validity. Convergent validity test indicates whether the constructs that are supposedly to be related are explicitly related or not. Discriminant validity test indicates that whether the constructs that are supposedly to be non-related shows no sign of relationship. If a scale is demonstrated to possess both types of validity, it is considered to have good construct validity (Campbell & Fiske, 1959).

The construct reliability of the model with the observed data is tested through composite reliability (CR) alias rho. While Cronbach’s Alpha is the most common test to check reliability, the study prefers CR since it gives more accurate and less biased reliability scores than Cronbach’s alpha given CR considers the varying factor loadings of the items while Cronbach’s Alpha assumes loadings or error terms to be equal for all items (Chin, Marcolin, & Newsted, 2003).

Finally, Structural Equation Modeling (SEM) statistical method was conducted by using SPSS AMOS 21 statistical program in order to analyze the data in terms of structural relationships among constructs. Structural equation models are regarded as the principal method by researchers where there are multiple relationships between dependent and independent variables (Bayram, 2010; Simsek, 2007). The main goal of structural equation models is to test a theory-driven hypothetical model statistically with the obtained data and to decide to what extent the prospective model and statistical findings match (Hair et al., 2010).

3.7. Assumptions of the Study

- The questionnaire was completed by the participants rightly and accurately.
- The participants who answered the questionnaire represent the rest of the population and have similar characteristics.
- The instrument and the scales in the questionnaire are reliable and valid.

3.8. Delimitation of the Study

- 4 public universities in Turkey were selected to represent the universities in which Edmodo functions as a course delivery system and actively used by instructors as part of their instruction.

3.9. Limitations of the Study

- The generalizability of quantitative part is restricted with the Introduction to Information Technologies and Applications course.

CHAPTER 4

RESULTS

This chapter is comprised of two sections. The first section presents the results of the pilot study including Exploratory Factor Analysis (EFA) results based on the responses to scales developed by the researcher to identify and measure user needs, beliefs, attitudes and goals towards the adoption of technology. The second section presents the results of main study seeking to address research questions based on the data gathered from Edmodo Social Learning Platform User Experience Survey developed by the researcher consisting of the demographics and technology behaviors of students along with the scales used in the pilot study.

4.1. Pilot Study

Initially, outliers and missing data were examined to prepare data for further analysis. Box-plots and z-scores were examined to detect outliers. 42 data points whose standardized scores are above 3.29 and that are located outside the fences of the boxplots were determined as outliers. The factorial structure was examined both with and without outliers. The results indicated that outliers do not have significant effect on the factorial structure and do not require further examination therefore 42 cases were removed from the analysis. Furthermore, there was no missing data in the data set. Thus, assumptions were checked based on the data including the measurement of 84 scale items gathered from 478 samples.

84 items were examined to make preliminary judgments about the factorial structure. It was observed based on the correlation matrix that all of the items correlated (> .30) with at least one other item therefore a reasonable factorial structure can be suggested (Hair, Black, Babin, Anderson, & Tatham, 2010). As shown in Table 4.1, the Kaiser-Meyer-Olkin value was .96, above the recommended value of .60, and Bartlett's test

of sphericity was significant (p < .05). These indicators suggest that some underlying factorial structure does exist and it is appropriate to use factor analysis on the data. With regard to Hair et al. (2010), sample size of 478 and total item number of 84 satisfies the amount of data for factor analysis with over 5 cases per variable (N/p > 5). Linearity among measured variables were checked through the investigation of scatterplots. Some pairwise combinations of variables were spot-checked through scatterplots. Since there was no evidence of true curvilinearity, it was decided that it is safe to proceed with analysis. Metric variables were used and each variable in the model was measured at the continuous level. Univariate normality assumption was checked by looking at descriptive statistics of the variables and through statistical kurtosis and skewness values of the variables. They were found between required interval (-3/3) that is the indicator of univariate normality (Tabachnick & Fidell, 2012). Multivariate normality assumption was checked via Mardia's test and the resulting value of .00 is found to be significant (p < .05) which indicates that multivariate normality assumption failed.

Table 4.1. *KMO and Bartlett's Test*

Test	*Detail*	*Value*
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	-	.96
Bartlett's Test of Sphericity	Approx. Chi-Square	31463.38
	df	3486
	Sig.	.00

In terms of data extraction technique, since multivariate normality assumption is violated, principal axis factoring is used instead of maximum likelihood (Fabrigar, Wegener, MacCallum & Strahan, 1999). The initial eigenvalues showed that 13-

factors solution was appropriate to adopt since first 13 factors have eigenvalues greater than 1.0 and they explained 67.37% of total variance which is above the recommended value of 60% in social sciences (Hair et al., 2010) (See Table 4.2). Scree test also indicates that the first 13 factors above break point at which the curve begins to straighten have significant amounts of common variance.

The oblique rotation method was used in the analysis instead of orthogonal rotation method because correlation among factors is generally expected in social sciences and orthogonal rotation method assumes that factors are uncorrelated (Costello & Osborne, 2005). Pattern matrix was analyzed to observe factor loadings and it showed that all of the items contribute to one of the 13 factors and it was also observed that there is no significant correlation between factors. Summary of factor loadings and factor correlations can be seen in Appendix C. Since 13 factors are uncorrelated, orthogonal rotation could also be used for this data set. However, because oblique rotation also produces orthogonal solution, the analysis can be carried on with oblique rotation (Costello & Osborne, 2005). The minimum value of .30 was adopted to decide whether the item load sufficiently to the related factor (Tabachnick & Fidell, 2012). Based on the criteria of the sufficient minimum value of .30, 6 items were interpreted to be loaded on the factor named as Perceived Usefulness, 4 items on Self-efficacy, 7 items on Cognitive Engagement, 7 items on Perceived Achievement, 3 items on Student Characteristics, 6 items on Interaction, 6 items on Content Quality, 7 items on Technology Attitude, 4 items on Perceived Ease of Use, 8 items on System Characteristics, 7 items on Mobile Flexibility, 6 items on Self-regulation, and 8 items on Social Engagement. According to EFA outputs, 5 items including coen1, coen6, coen9, sys3 and soen9, were removed from the scale.

Table 4.2. *Eigenvalues, Percentages of Variance and Cumulative Percentage*

Factor	*Eigenvalue*	*% of variance*	*Cum. %*
1	30.38	36.17	36.17
2	4.14	4.93	41.10

3	3.39	4.04	45.14
4	3.08	3.67	48.81
5	2.89	3.44	52.24
6	2.35	2.80	55.05
7	2.05	2.43	57.48
8	1.82	2.17	59.65
9	1.54	1.84	61.49
10	1.47	1.75	63.23
11	1.22	1.45	64.68
12	1.13	1.35	66.03
13	1.13	1.34	67.37

4.1.1. Reliability of the Pilot Study

Reliability Analysis was conducted to decide whether every scale in the questionnaire works properly and be consistent internally therefore Cronbach alpha score was calculated for each factor and internal consistency of each retained factor was examined using Cronbach's alpha value. The acceptable range for Cronbach alpha test of reliability is .70 or above, and .80 or greater is preferred (Cortina, 1993). The Cronbach's alpha values were calculated as .92 for Perceived Usefulness, .82 for Self-efficacy, .93 for Cognitive Engagement, .89 for Perceived Achievement, .92 for Student Characteristics, .92 for Interaction, .88 for Content Quality, .90 for Technology Attitude, .93 for Perceived Ease of Use, .87 for System Characteristics, .92 for Mobile Flexibility, .89 for Self-regulation, and .90 for Social Engagement. Cronbach's Alpha Values for each factor can be seen in Table 4.3. It was observed that the alpha values are high for every factor. It was also checked that whether the alpha scores would increase significantly if any of the items were deleted. Significant increases in alpha values for 4 separate factors were observed by deleting 4 items respectively (see Appendix D). The items sys2, pach1, inter1 and pta2 were found to be noncontributing to related factors since Cronbach's alpha values for the factors do not decrease when the items are deleted. These 4 items were also dropped from the scales along with the 5 items which were removed based on EFA outputs. Consequently, 9 items were removed from the questionnaire and 75 items remained for further analysis.

Table 4.3. *Cronbach's Alpha Values*

Factor	*Cronbach's Alpha*
Perceived Usefulness	.92
Self-efficacy	.82
Cognitive Engagement	.93
Perceived Achievement	.89
Student Characteristics	.92
Interaction	.92
Content Quality	.88
Technology Attitude	.90
Perceived Ease of Use	.93
System Characteristics	.87
Mobile Flexibility	.92
Self-regulation	.89
Social Engagement	.90

4.2. Main Study

The current section presents the results of main study aiming to answer research questions based on the data collected from Edmodo Social Learning Platform User Experience Survey developed, revised and modified by the researcher consisting of the scales used in the pilot study along with the demographics and technology behaviors of students.

Firstly, demographics and technology behaviors of the students were summarized. Then, to be able to address research questions, data gathered for the main study were analyzed through Confirmatory Factor Analysis (CFA) statistical procedure. Since the items and factors in the scales instrument were to be used in subsequent Structural Equation Modelling (SEM) analysis, the Confirmatory Factor Analysis (CFA) was formerly administered to provide evidence to what extent the prospective model fits the observed variables and to report the consistency of the model with the observed data. After meeting required conditions to proceed, SEM was conducted to analyze structural relationships among factors thus research questions were answered appropriately.

4.2.1. Demographics

Out of 533 respondents, 67% of them were females and 33% of them were males. The average age of the respondents was 20.41 with a Standard Deviation (SD) of 1.78. All of the respondents were undergraduate students from several departments at Educational Faculties in 4 universities including Computer Education and Instructional Technologies (N=250), Elementary Math Education (N=37), Elementary Science Education (N=45), Foreign Language Education (N=74), Guidance and Psychological Counseling (N=40), Primary School Teaching (N=31), Social Sciences Teaching (N=40) and Turkish Language Education (N=16). %37 of students were freshman, %28 was sophomore, %19 was junior and %15 was senior.

Regarding the use of technological devices, 30% of the participants reported to use family computer (desktop or laptop), 84% of them use mobile devices, 53% of them use computers at university computer labs, 76% of them use their own devices and %15 of students use Tablet PCs.

Regarding the daily use of Internet by participants, 13% of the them access to Internet up to 1 hour, 43% of them access 1 to 3 hours, and 44% of the students have access to Internet more than 3 hours per day. Regarding the Internet use purpose of participants, 68% of the students reported that they use Internet for search and research purposes, 69% of them for studying and doing homework, 72% of them for communication purposes (e-mail, chat etc.), 10% of them for business purposes, 84% of them for using social media (Facebook, Twitter, Instagram etc.), and 79% of the participants for spare time activities (watching videos, listening music etc.).

In terms of internet connection devices of participants, 79% of them access to Internet via Laptop computers, 26% of them via Desktop computers, 14% of them via Tablet PCs, and 87% of them access to Internet via their mobile devices. Among commonly used operating systems, participants mostly prefer Windows operating system (84%), followed by Android (78%), iOS (7%), Windows Phone (5%), MacOS (2%) and Linux (2%). Google Chrome was the most popular web browser (83%) among participants, followed by Internet Explorer (7%), Mozilla Firefox (5%), Safari (%2) and others (2%) like Opera and Yandex.

Facebook was the most popular social networking site among others (88%), followed by Instagram (56%), Twitter (49%) and other social networking sites (11%) like Google+, Blogger, Tumblr, Pinterest, Skype, Periscope, Snapchat, YouTube, WhatsApp and Swarm. 5% of the participants reported that they do not use any social networking sites.

The demographics part of the questionnaire also questioned Edmodo-related instructional activities carried out by participants. Firstly, Students' Edmodo Use Purposes were questioned. Students reported that they used Edmodo during the term for downloading course materials (71%), viewing lecture notes (73%), communicating with other students (13%), sharing files and Internet links (27%), following announcements (71%), reading comments (27%), viewing upcoming events and activities, joining discussions (8%), communicating with instructors (33%), accessing to resources (41%), and uploading homework or presentations (77%). Secondly, Edmodo use frequency of students were questioned including Edmodo Web, Edmodo Mobile Application and Several Edmodo tools. The percentages of Edmodo use frequency can be seen in Table 4.4.

Table 4.4. *Edmodo Use Frequency*

	Usually	*Often*	*Sometimes*	*Seldom*	*Never*
Edmodo Web	5%	28%	48%	18%	1%
Edmodo Mobile	5%	20%	36%	17%	21%
Sharing (file, link etc.)	7%	24%	30%	21%	18%
Comment	6%	12%	29%	25%	28%
Homework	30%	34%	25%	8%	4%
Direct Message	7%	13%	26%	22%	32%

4.2.2. Results of Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) was conducted to test the validity of the measurement, to show evidence about to what extent the proposed model fits the observed variables, and to validate the stabilization of the model in terms of item parceling since the parcels were to be used in subsequent analyses in the study. SPSS AMOS 21 software was utilized for the analysis. In CFA, the observed variables are named as endogenous variables and the factors indicated named as latent variables. Since item parceling approach is utilized in the study, every 3 parcel subsets to indicate the relevant factor are called endogenous variables.

First of all, the data were prepared to check for the assumptions of CFA in terms of appropriateness of the data to move on with CFA. Outliers were checked through box-plots. They indicated that outliers do not have significant effects requiring to remove any data. Gathered data set involves no missing data. Data was gathered and measured at the continuous level. The sample size for the main study was 533 which considerably meets the minimum sample size requirement of 100 cases according to Kline (2011) to proceed with CFA. Lastly, normality was checked to decide whether the observed variables were normally distributed. It was observed through histograms and skewness-kurtosis values that although raw data seems to be right-skewed, they approximated to normality after parceling items and creating parcel sets which is an expected benefit of item parceling approach (Nasser & Takahashi, 2003). Thus, the normality requirement for each variable was achieved to proceed with CFA.

Latent variables and the correlations among those variables in the questionnaire was checked through CFA. The questionnaire involves 13 latent variables (factors) namely Perceived Usefulness coded in Figure 4.1 as Usefulness, Self-efficacy as SelfEfficacy, Cognitive Engagement as Cognitive, Perceived Achievement as Achievement, Student Characteristics as Student, Interaction as Interaction, Content Quality as Content, Technology Attitude as Attitude, Perceived Ease of Use as EaseofUse, System Characteristics as System, Mobile Flexibility as Mobile Flexibility, Self-regulation as Regulation and Social Engagement as Social. The ellipses in the standardized path diagram in Figure 4.1 symbolize latent variables. Observed variables affecting the latent variables are symbolized as rectangle shapes. As mentioned above, latent variables are composed of 3 item parcels being made up of average scores of factor-related single items in the questionnaire combined randomly in which every parcel indicates the related factor in the end. Observed variables which loads on the latent variable were coded as coenP1 to coenP3 for Cognitive Engagement, soenP1 to soenP3 for Social Engagement, interP1 to interP3 for Interaction, moflexP1 to moflexP3 for Mobile Flexibility, ptaP1 to ptaP3 for Technology Attitude, sysP1 to sysP3 for System Characteristics, sregP1 to sregP3 for Self-regulation, sefcP1 to sefcP3 for Self-efficacy, puP1 to puP3 for Perceived Usefulness, peouP1 to peouP3 for Perceived Ease of Use, cntP1 to cntP3 for Content Quality, pachP1 to pachP3 for Perceived Achievement, and stuP1 to stuP3 for Student Characteristics. Small ellipses labeled e1 to e39 represent measurement errors and it is hypothesized that no correlation exists between observed variables and measurement errors.

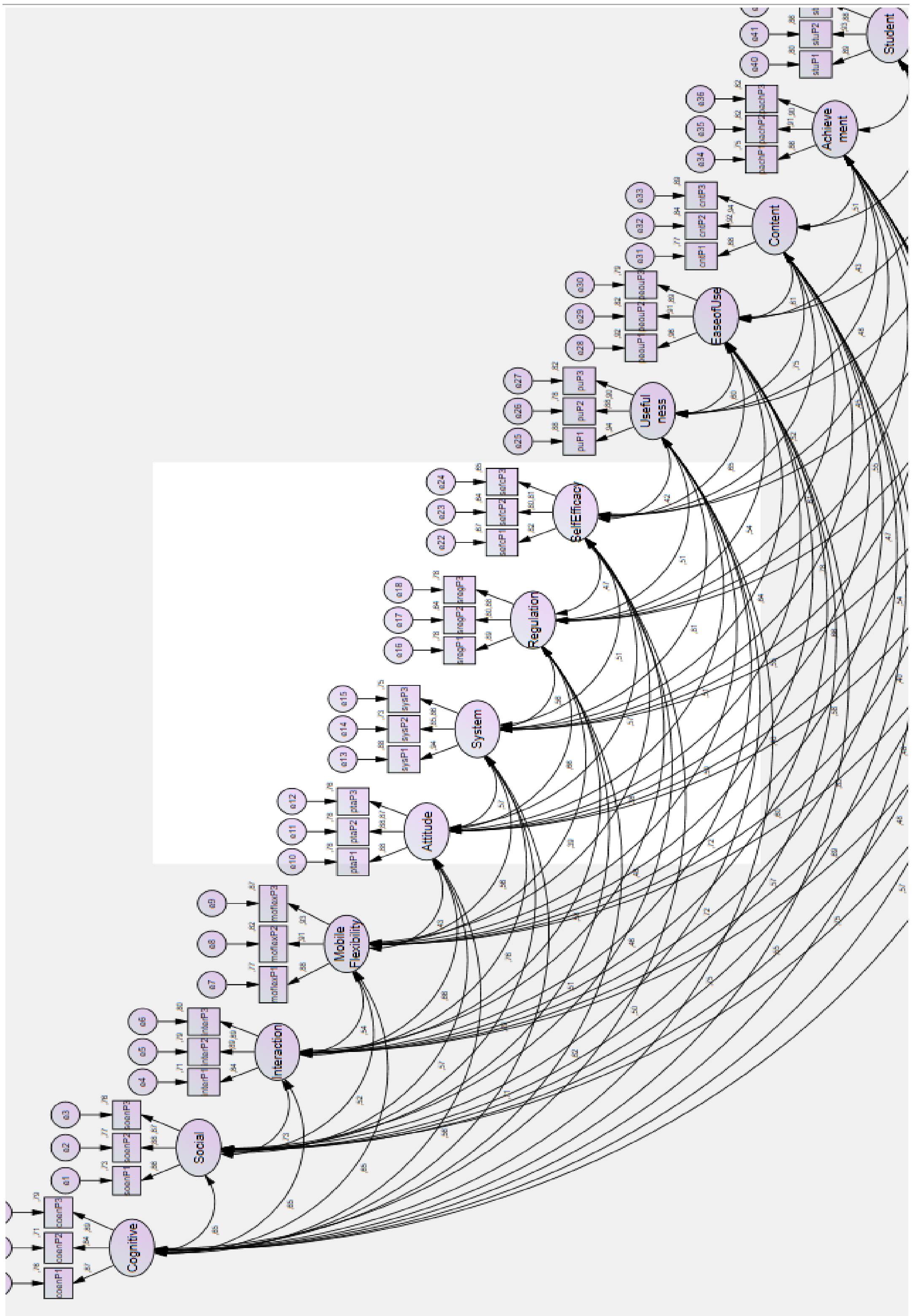

Figure 4.1. The Standardized Path Diagram

The linear relationship between the latent variables and the observed variables are represented via one-way arrows in Figure 4.1. The values on the one-way arrows denotes the factor loadings -contribution of each parcel in the questionnaire onto the related factor-. Acceptable threshold value of factor loadings is recommended as .40 by Stevens (2012) no matter what the sample size is. As can be seen in Table 4.5, all the loadings are above .80 which denote that latent variables are strong indicators of observed variables.

Table 4.5. *Standardized Regression Weights*

Parcel / Observed Variable	*Latent Variable*	*Estimate / Factor Loadings*
soenP1	Social Engagement	.86
soenP2	Social Engagement	.88
soenP3	Social Engagement	.87
interP1	Interaction	.84
interP2	Interaction	.89
interP3	Interaction	.89
moflexP1	Mobile Flexibility	.88
moflexP2	Mobile Flexibility	.91
moflexP3	Mobile Flexibility	.93
ptaP1	Attitude	.88
ptaP2	Attitude	.88
ptaP3	Attitude	.87
sysP1	System Quality	.94
sysP2	System Quality	.85
sysP3	System Quality	.86
sregP1	Self-Regulation	.89

Parcel / Observed Variable	*Latent Variable*	*Estimate / Factor Loadings*
sregP2	Self-Regulation	.80
sregP3	Self-Regulation	.88
sefcP1	Self-Efficacy	.82
sefcP2	Self-Efficacy	.80
sefcP3	Self-Efficacy	.81
puP1	Usefulness	.94
puP2	Usefulness	.89
puP3	Usefulness	.90
peouP1	Ease of Use	.96
peouP2	Ease of Use	.91
peouP3	Ease of Use	.89
cntP1	Content Quality	.88
cntP2	Content Quality	.92
cntP3	Content Quality	.94
pachP1	Perceived Achievement	.86
pachP2	Perceived Achievement	.91
pachP3	Perceived Achievement	.90
coenP1	Cognitive Engagement	.87
coenP2	Cognitive Engagement	.84
coenP3	Cognitive Engagement	.89
stuP1	Student Characteristics	.89
stuP2	Student Characteristics	.93
stuP3	Student Characteristics	.88

4.2.3. Validity and Reliability of the Model

After conducting CFA, the construct validity of the model with the observed data was checked through convergent validity and discriminant validity. As the preliminary step for the construct validity of the scale, the fit indices that the proposed model produces were checked to see whether the values are within the acceptable range. Firstly, the chi-square value was checked to validate the overall model fit. Chi-square value was found .00 which is significant at .05 level of significance; $\chi 2$ (624) = 1480,895. The result indicates a lack of fit between the observed variables and the proposed model. Therefore, several other fit indices were examined to check if the chi-square value can be falsified in terms of unfitting the data with the proposed model and to indicate evidence to what extent the proposed model fits the data obtained (Hooper, Coughlan & Mullen, 2008).

Several indices and acceptable range of these indices are recommended to assess the degree of fitness of the model from different aspects. The current study adopts the criteria for acceptable range adopted by Meydan and Sesen (2011). The fit indices of the scale and the criteria for acceptable range can be seen in Table 4.6. The results demonstrate that the $\chi 2$ statistic with Degrees of Freedom (df) for model fit ($\chi 2/df$) is 2.37 which is less than 3 indicating a perfect model fit with the observed data. Root Mean Square Error of Approximation (RMSEA) is .051 indicating a good model fit with data since it is between the recommended values of .05 and .08. The value of Comparative Fit Index (CFI) index is .96 indicating a good model fit since it is greater than .95 which is acceptable threshold for CFI. Lastly, Goodness of Fit Index (GFI) value is .88 indicating an acceptable score for a good model fit since it is between the acceptable range of .85 and .89 (Meydan & Sesen, 2011). Consequently, all fit indices of the scale are within the acceptable ranges indicating the model fits the data well despite the chi-square value therefore it is safe to proceed with convergent validity and discriminant validity to test construct validity of the scale.

Table 4.6. *Fit Indices of the Scale and Acceptance Criteria*

	$\chi 2$	*df*	$\chi 2/df$	*GFI*	*CFI*	*RMSEA*
Survey Scale	1480.89	624	2.37	.88	.96	.05
Perfect Fit Indices			≤ 3	≥ .90	≥ .97	≤ .05
Acceptable Fit Indices			≤ 4-5	.89-.85	≥ .95	.06-.08

$p<.05$, $\chi 2$=Chi-Square; df=Degree of Freedom; GFI=Goodness of Fit Index; CFI=Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation.

Convergent and discriminant validity in CFA analyze the degree of shared variance of a latent variable with their indicators and the degree of differences with other latent variables (Alarcón, Sánchez, & De Olavide, 2015). The criterion of Fornell-Larcker (1981) is a common approach used to determine the shared variance among latent variables. Accordingly, Average Variance Extracted (AVE) can determine convergent validity of the model by measuring variance level a latent variable possess against measurement error level. While values of AVE above 0.7 are considered at good level, 0.5 is acceptable threshold (Hair et al., 2010). Fornell-Larcker (1981) testing system also proposes a method to determine discriminant validity. Accordingly, comparison of the variance possessed by the latent variable with shared variance of other latent variables determines discriminant validity through calculating the square roots of the AVE for each latent variable. If the value of each variable is higher than the correlation among other constructs, it is considered that discriminant validity is successfully met (Alarcón, Sánchez, & De Olavide, 2015).

The values of AVE and square root of AVE for each construct can be seen in Table 4.7. AVE values for each construct are at good level since they exceed 0.7 except Self-Efficacy which is at acceptable level. Moreover, the values of square roots of AVE is higher than any inter-construct correlations. These results indicate that the model met the criterion of both convergent and discriminant validity therefore there is no validity concern in terms of construct validity of the scale.

Lastly, the construct reliability is tested through composite reliability (CR) alias rho. The acceptable threshold for CR is 0.7 (Fornell & Larcker, 1981). As can be seen in Table 4.7, CR values for each construct are higher than 0.85 indicating perfect scores for reliability of the construct. Therefore, it can be concluded that the scale has no reliability concern.

Table 4.7. *AVE, Square Root of AVE and CR Scores*

			Constructs												
F	*CR*	*AVE*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
1	.90	.75	**.87**												
2	.90	.75	.65	**.87**											
3	.91	.77	.65	.73	**.88**										
4	.93	.82	.65	.52	.54	**.91**									
5	.91	.77	.56	.57	.66	.43	**.88**								
6	.92	.79	.71	.79	.77	.57	.58	**.89**							
7	.89	.73	.62	.51	.58	.39	.66	.56	**.86**						
8	.85	.66	.50	.46	.48	.38	.57	.51	.47	**.81**					
9	.93	.82	.75	.72	.72	.60	.51	.81	.51	.42	**.91**				
10	.94	.85	.55	.57	.60	.46	.55	.64	.54	.65	.60	**.92**			
11	.94	.83	.75	.69	.83	.58	.66	.78	.61	.52	.75	.61	**.91**		
12	.92	.79	.57	.48	.48	.40	.54	.47	.55	.46	.48	.43	.51	**.89**	
13	.93	.81	.64	.58	.68	.57	.52	.66	.42	.43	.65	.55	.64	.38	**.90**

Note. Square root of AVE on the diagonal

4.2.4. Results of Structural Equation Modeling (SEM)

In order to analyze the data, Structural Equation Modeling (SEM) statistical method was conducted by using SPSS AMOS 21 statistical program. The structural equation model developed to test the hypotheses of the study is shown in Figure 4.2. Since some fit indices of the prospective model like GFI and CFI are not within the acceptable range, some modifications are suggested by statistical program AMOS 21 on drawing additional relationships between constructs to increase the model fit. These modifications include relationships between System Characteristics and Mobile Flexibility, and Ease of Use and Mobile Flexibility. Since suggested modifications are theoretically plausible, they were accepted and applied by the researcher. The modified version of the model is shown in Figure 4.3.

After the modification, it was observed that the fit indices of the model are within the acceptable ranges and sufficient evidence is provided that the model is structurally appropriate. Model fit indices are shown in Table 4.8. The results demonstrate that the $\chi2$ statistic with Degrees of Freedom (df) for model fit ($\chi2$/df) is 2.65 which is less than 3 indicating a perfect model fit with the observed data. Root Mean Square Error of Approximation (RMSEA) is .056 indicating a good model fit with data since it is between the recommended values of .05 and .08. The value of Comparative Fit Index (CFI) index is .95 indicating an acceptable model fit. Lastly, Goodness of Fit Index (GFI) value is .86 indicating an acceptable value for a good model fit since it is between the acceptable range of .85 and .89 (Meydan & Sesen, 2011). The only exception for overall model fit measures to be acceptable is $\chi2$. Since $\chi2$ statistics are highly sensitive to sample size, it is difficult to accept null hypothesis with large sample size, despite well-fitting of the with the collected data (Kelloway, 1998). Consequently, almost all fit indices of the model are within the acceptable ranges indicating the model fits the data well therefore it is safe to proceed with analyzing structural relationships between constructs.

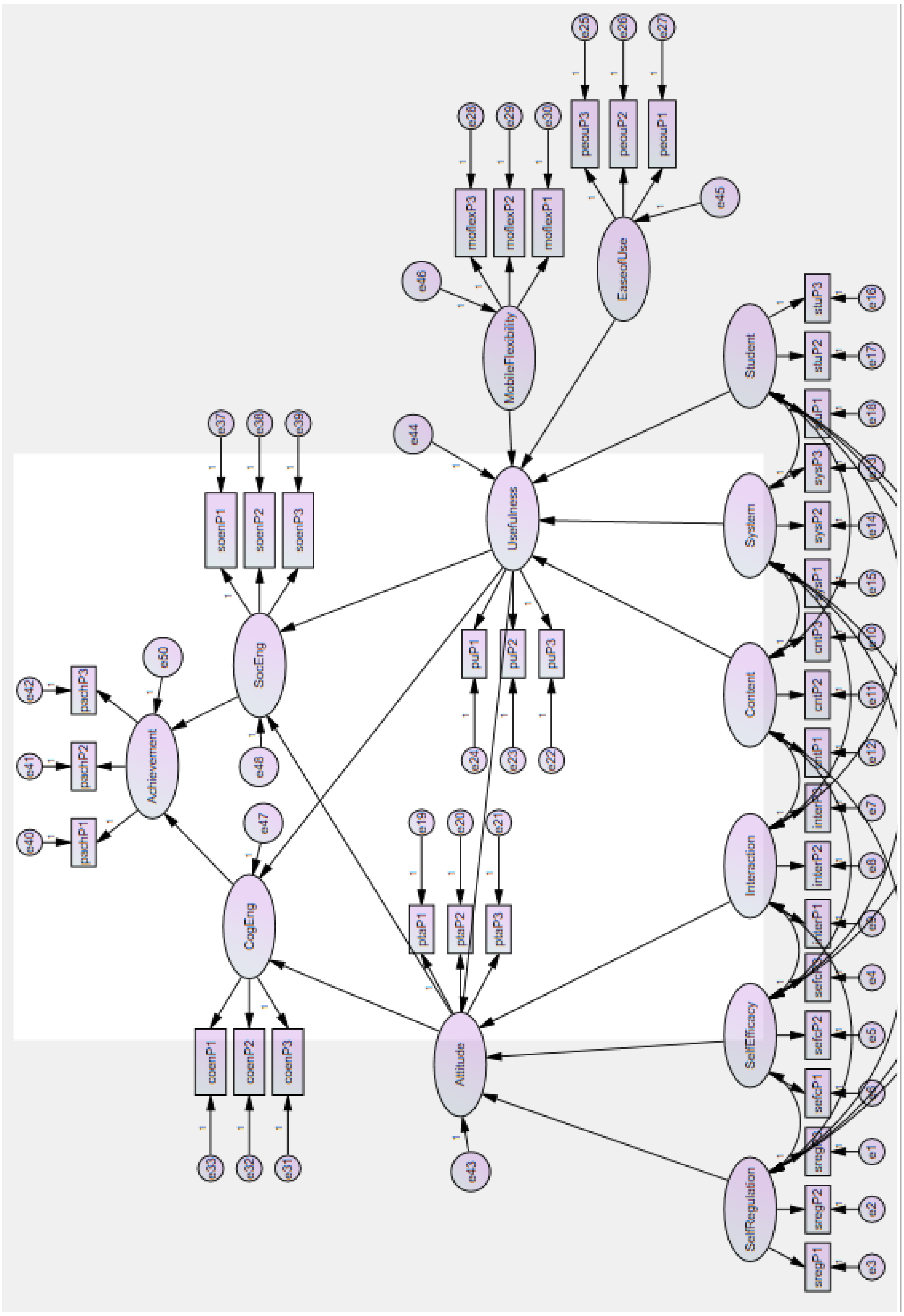

Figure 4.2. Structural Equation Model

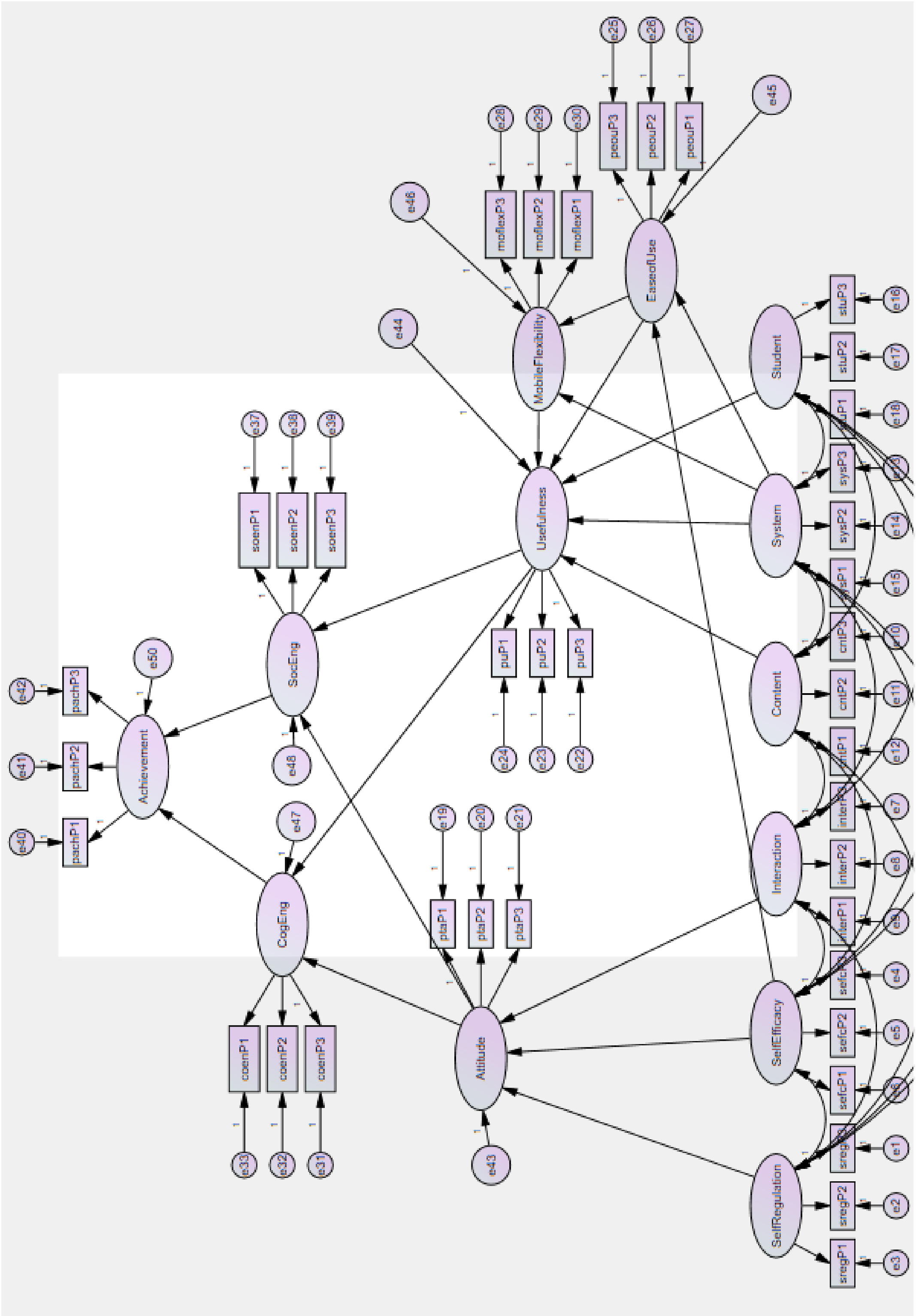

Figure 4.3. Modified Model

Table 4.8. *Fit Indices of the Model and Acceptance Criteria*

	χ2	*df*	*χ2/df*	*GFI*	*CFI*	*RMSEA*
Survey Scale	1764.4	666	2.65	.86	.95	.06
Perfect Fit Indices			≤ 3	≥ .90	≥ .97	≤ .05
Acceptable Fit Indices			≤ 4-5	.89-.85	≥ .95	.06-.08

$p<.05$, χ2=Chi-Square; df=Degree of Freedom; GFI=Goodness of Fit Index; CFI=Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation.

Hypotheses in the research design are checked by confirming whether a statistically significant relationship exists in the prospective direction for each hypothesis. As far as perceived achievement is concerned, cognitive engagement and social engagement are identified to be significant. In terms of both cognitive engagement and social engagement, both perceived usefulness and attitude towards technology turn out to be significant. System characteristics and self-efficacy have significant effects on perceived ease of use. Perceived ease of use and system characteristics have significant relationships with mobile flexibility. In terms of perceived usefulness, content quality, system characteristics, student characteristics and mobile flexibility are identified to be significant estimators. However, perceived ease of use does not predict perceived usefulness significantly. As far as attitude towards technology is concerned, self-regulation, self-efficacy and interaction are significant predictors. However, perceived usefulness does not estimate attitude towards technology significantly. Parameter estimates of the structural model, p and R2 values among the variables, and results of hypotheses are shown in Table 4.9. Figure 4.4 also graphically indicates standardized parameter estimates, loadings and residuals along with the relationships between constructs. Considering these results, 15 out of 17 hypotheses in the research design are supported in the study.

Table 4.9. *Parameter estimates, Results of Hypotheses and Squared Multiple Correlations*

Hypothesized Path	*Standardized Estimate*	*p*	*Result of Hypotheses*	R^2
Content → Usefulness (H_{1a})	.20	***	Supported	
System → Usefulness (H_{1c})	.53	***	Supported	
Student → Usefulness (H_{1d})	.11	.002	Supported	.75
Mobile Flexibility → Usefulness (H_{1e})	.10	***	Supported	
Ease of Use → Usefulness (H_{1f})	.04	.17	Not Supported	
Self-Regulation → Attitude (H_{2a})	.40	***	Supported	
Interaction → Attitude (H_{2b})	.36	***	Supported	
Self-Efficacy → Attitude (H_{2c})	.22	***	Supported	.61
Usefulness → Attitude (H_{3a})	-.06	.23	Not Supported	
Attitude → Cognitive Engagement (H_{4b})	.30	***	Supported	.65
Usefulness → Cognitive Engagement (H_{4c})	.67	***	Supported	
Attitude → Social Engagement (H_{4a})	.26	***	Supported	.61
Usefulness → Social Engagement (H_{4d})	.53	***	Supported	
Cognitive Engagement → Achievement (H_{5a})	.41	***	Supported	.36
Social Engagement → Achievement (H_{5b})	.22	***	Supported	

System → Ease of Use (H_{1b})	.51	***	Supported	.57
Self-Efficacy → Ease of Use (H_{1g})	.48	***	Supported	
Ease of Use → Mobile Flexibility	.30	.01		.34
System → Mobile Flexibility	.53	***		

The magnitude of the bivariate relationships proposed by the model constitutes several trends. While some relationships between variables are strong, the others present weak and moderate relationships. The magnitudes of the relationships are evaluated based on the criteria of Cohen (1988) in which the correlation values around .50 are considered strong, around .30 considered moderate and .10 considered weak. In the context of perceived achievement, cognitive engagement ($\beta=0,41$; $p<0,05$) is a stronger predictor with a strong correlation than social engagement with a moderate correlation ($\beta=0,22$; $p<0,05$). In the context of cognitive engagement, perceived usefulness ($\beta=0,67$; $p<0,05$) has a stronger effect than attitude towards technology ($\beta=0,30$; $p<0,05$). Likewise, perceived usefulness ($\beta=0,53$; $p<0,05$) has a stronger effect on social engagement than attitude towards technology ($\beta=0,26$; $p<0,05$). In the context of perceived usefulness, all the relationships among the constructs were significant except perceived ease of use. The strongest magnitude was found in a relationship between system characteristics ($\beta=0,53$; $p<0,05$) and perceived usefulness, followed by content quality ($\beta=0,20$; $p<0,05$), student characteristics ($\beta=0,11$; $p<0,05$) and mobile flexibility ($\beta=0,10$; $p<0,05$). Both self-regulation, self-efficacy and interaction are significant predictors for attitude towards technology. While both self-regulation ($\beta=0,40$; $p<0,05$) and interaction ($\beta=0,36$; $p<0,05$) has a strong relationship, self-efficacy has a moderate magnitude on attitude towards technology ($\beta=0,22$; $p<0,05$). However, perceived usefulness is found to be non-significant on attitude toward technology. Both system characteristics ($\beta=0,51$;

p<0,05) and self-efficacy (β=0,48; p<0,05) have strong effects on perceived ease of use. Lastly, the model also indicates that both perceived ease of use (β=0,30; p<0,05) and system characteristics (β=0,53; p<0,05) have strong relationships between mobile flexibility.

When Squared Multiple Correlations (R2) values of the model are examined, it is seen that 36% of the perceived achievement is explained with cognitive and social engagement. 65% of the cognitive engagement and 61% of the social engagement is explained with attitude toward technology and perceived usefulness. 61% of the attitude toward technology is explained with self-regulation, self-efficacy and interaction. 75% of the perceived usefulness is explained with system characteristics, content quality, student characteristics, perceived ease of use and mobile flexibility. 34% of the mobile flexibility is explained with perceived ease of use and system characteristics. Lastly, 57% of the perceived ease of use is explained with self-efficacy and system characteristics.

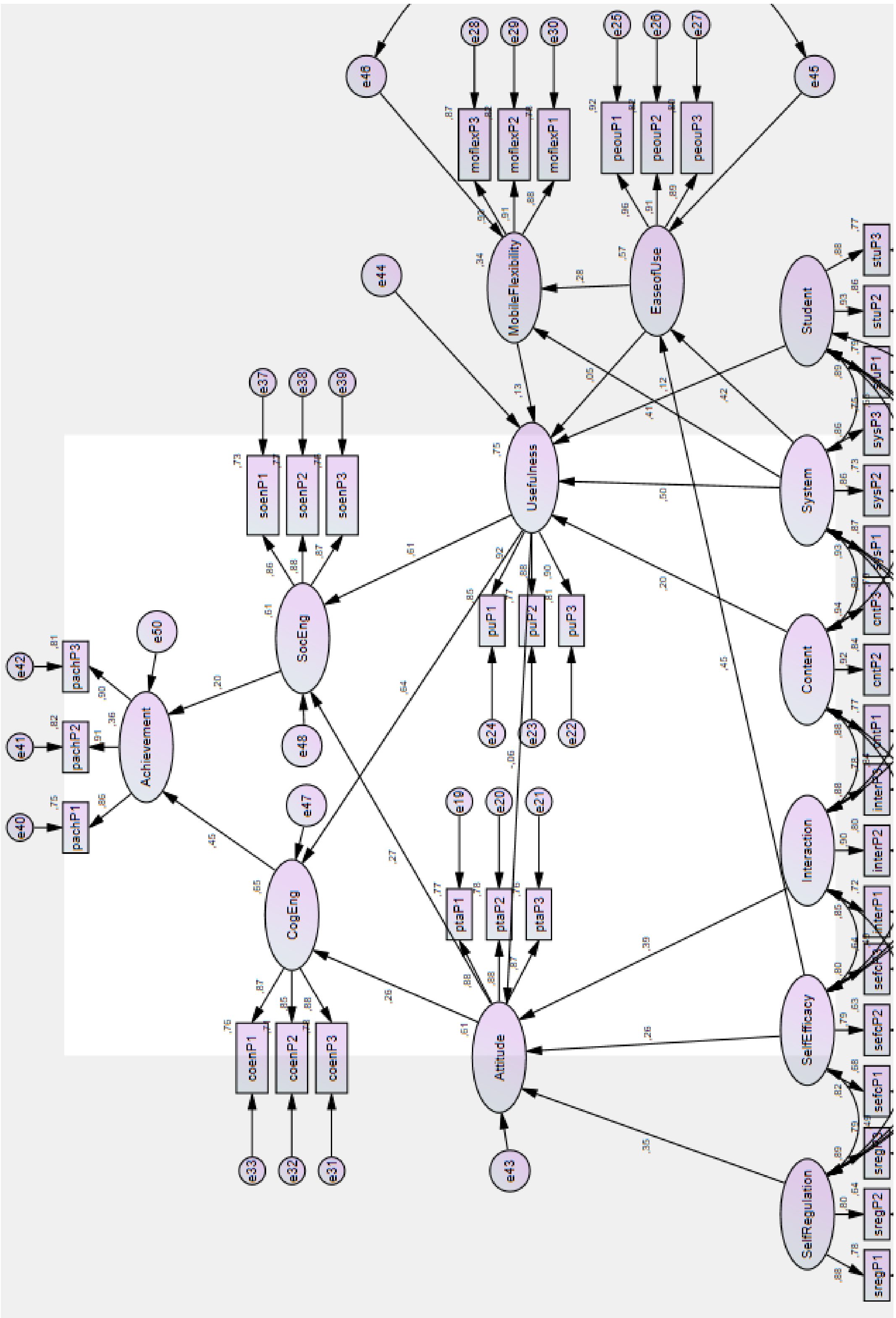

Figure 4.4. Standardized Parameter Estimates of the Structural Model

CHAPTER 5

DISCUSSION AND CONCLUSION

This chapter reintroduces the study before going into the details of results and then interprets the results, discusses the implications, presents the recommendations for future research and identifies limitations of the study.

5.1. Introduction

While the technology was seen an instrument to address basic needs of humans at behavioral level and to facilitate their daily lives in the past, it evolved into a mechanism with its systemic and systematic tools where humans are cognitively, socially, emotionally as well as behaviorally involved and engaged. The changing dynamics underlying the motivation to get involved and engaged in use of technologies at social, cognitive and hedonic levels mostly rely on the advent and fast spread of the Internet over society. The dynamic capabilities of the Internet enabled people to create new autonomous and social virtual lives in which they become active participants and producers.

The popularity and high adoption of technologies via technological devices and Internet in daily lives also led new generation of students to have competence, knowledge and skills quickly to be able to use technology easily and intensely and therefore it is thought an educational opportunity since students are not required to take any formal education to learn how to use technology (Prensky, 2001). The present state has inspired scholars to research how technology can be used effectively in learning environments and what might cause students to adopt the relevant technology as part of instruction (Robinson & Hullinger, 2008; Laird & Kuh, 2005; Kuh & Hu, 2001). This is an important research area for researchers because despite promising features of technologies, some of them disappear over time due to their low adoption by students.

It has been a serious challenge for motivation theorists and technology adoption model experts to investigate the key motivation factors to clarify why some technologies are highly adopted and the others not (Davis, 1983; Bagozzi, 2007). The challenge led several researchers to offer several technology adoption models. While these models are numerous and some of them are highly popular like Technology Acceptance Model of Davis (1985), they are far beyond estimating user motivation toward current technologies since they disregard completely or partially the changing dynamics over the relationship between technology and society. While technology was regarded as an instrument adopted for its tools and facilities on utilitarian level at 80s and 90s, the reciprocal relationship between technology and society constituted after 2000s, - in which technology influences society on every aspects of life, and society influences technology via its belief systems and values -, has caused deeper involvement and engagement of people at social and cognitive level. Moreover, given ever-growing rates on internet and smart devices access, society is far above the intention and initial acceptance that existing technology adoption models have assumed and tested accordingly. Therefore, considering the current state and progress of technology and society, focusing only on usefulness, instrumental and technical aspects of technology like current adoption models made lacks important information to explain user motivation to explain user motivation to adopt, get involved and engaged in technology.

Similar limitations are valid for the adoption models evaluating educational technologies used for instruction and learning by teachers and students. Many of the models in the literature adapts traditional technology adoption models to the educational context which focus on students' behaviors and observable actions like number of logins, number of uses of tools and materials, time spending on the medium etc. to identify student acceptance and adoption toward technology, and usefulness, instrumental and technical aspects, and student intentions to use technology as estimators for adopting the educational technology. However, just like technologies used in daily and social lives, educational technologies require high cognitive and social exertion by students for effective use of them. In other words, the behaviorist approaches of current adoption models to identify adoption is problematic for evaluation of educational technologies since learning is not only comprised of observable behaviors but also requires cognitive and social attachment to the related technologies (Krause & Coates, 2008).

Consequently, as Salomon and Perkins (1998) suggested, research aiming to evaluate the influence of technology on learning should consider the cognitive and social behaviors as well as observable behaviors regarding system use because an effective learning also requires higher order thinking skills that involve cognitive and social processing. Therefore, it requires the modification of technology adoption models thus a comprehensive model can be proposed to be used for evaluation. In line with this motivation, the current study proposed a new educational technology model by altering and updating traditional technology adoption models with new determinant constructs, and upgrading with unconventional motivational beliefs, goals, desires and outcomes toward the adoption of the technology thus it was aimed that the new model can respond to the changing dynamics and paradigm shift of 21st century regarding the relationship between society and technology.

However, before proposing a new model, the current study suggested a guideline while generating technology adoption models considering the limitations, redundancy and trivial justifications of previous adoption studies. Based on the recommendations of Smith et al. (2007), a process-based model construction approach was introduced and exemplified. Thus, the guideline presented a methodology to design and develop a technology adoption model rather than directly implementing and expanding traditional models. The guideline basically requires theoretical understanding of relevant motivational processes, extracting relevant motivational constructs based on these processes and grounding as a conceptual framework, and then step-by-step elaboration of the conceptual framework to be evolved as a technology adoption model. The elaboration is comprised of 3 steps:

1. Identification of motivational theory which best fits the technology to be evaluated by considering its idiosyncratic structure and the context in which it is being implemented, and adaptation of the theory into the conceptual framework by embedding relevant theoretical constructs
2. The elaboration of the constructs decided in the first step with appropriate factors to make it relevant and feasible at a technology-mediated environment.
3. Drawing hypothetical relationships among the determined factors to embody the process as a technology adoption model.

Based on the guideline proposed, the current study offered an educational technology engagement model:

1. Expectancy-Value Theory (EVT) to identify motivational beliefs, Theory of Planned Behavior (TPB) to identify extrinsic motivators and Self-Determination Theory (SDT) to identify intrinsic motivators are selected to be grounded to be able to evaluate an educational technology.
2. The theoretical constructs extracted from selected theories are elaborated with relevant factors at educational technology context.
3. Hypothetical relationships among determined factors are drawn to embody an educational technology adoption model to be tested statistically.

Consequently, the purpose of the study was to create and test an educational technology adoption model based on a process-based model construction approach requiring comprehensive understanding of relevant motivation theories and constructs. Based on the constructed model, the following research questions were aimed to be answered. The next sections will discuss the results in line with the following research questions based on the statistical analysis of the constructed model.

5.2. The Relationship between Motivators and Extrinsic Motivation

The current study defines extrinsic motivation as a type of human motivation manifesting as beliefs, expectations or values which is stemmed from, rooted in or nourished by outside sources surrounding the task or activity to be carried out (Ryan & Deci, 2000). The study also defines motivators (motivational needs) as prerequisites that need to be met and satisfied to be able to generate beliefs and values. In short, motivational needs are estimators of motivational beliefs and attitudes.

Expectancy-Value Theory (EVT) of Fishbein and Ajzen (1975) was chosen to be grounded as motivation theory to identify values, beliefs and attitudes because the theory addresses different forms of motivation as 4 types of values in which Attainment Value refers to the internalized significance of the task, Intrinsic Value refers to the interiorized pleasure of the task, Utility Value refers to the perceived usefulness of the task, and Cost refers to the perceived exertion and time devotion to carry out the task (Eccles, 1983). From the definitions of values, it is decided that both extrinsic and intrinsic motivation concepts can be matched to and embedded into these values. Relevant factors to identify extrinsic motivation in a technology adoption context are extracted from Technology Acceptance Model of Davis (1985) as Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). While PU refers to Utility Value, PEOU refers to Cost in EVT. Moreover, Mobile Flexibility (MF) is added by the researcher as a factor referring to Cost considering the changing paradigms over the relationship between society and technology. While PU is defined as personal judgement on the usefulness of a particular technology based on the benefits arising from using it, PEOU is defined as personal judgement of whether the technology being engaged is simple enough to for effective use. MF is defined by the researcher as the evaluation on whether the flexibility and mobility of technology sufficiently and easily enable anytime anywhere interaction with the environment, resources, system and other stakeholders within the system.

Theory of Planned Behavior (TPB) was grounded as the relevant theory to identify motivators predicting, estimating, pointing and relating to extrinsic motivation. TPB identifies 2 motivational constructs as Subjective Norm (SN) and Perceived Behavioral Control. Subjective Norm refers to social pressures based on the evaluations and attitudes of others about a specific behavior which trigger individual consciousness to act in a determined way (Martin et al., 2008). Perceived Behavioral Control (PBC) refers to individual judgement on self-competency or self-control to be able to carry out a specific behavior. PBC is estimated by 2 motivators: Control Beliefs (CB) and Perceived Facilitation (PF). CB addresses the beliefs about whether essential qualities to perform a behavior are existing in self whereas PF refers to the beliefs about whether environmental factors which triggers to behave in a specific is sufficiently and satisfactorily grounded such as essential resources or equipment (Martin et al., 2008). After reviewing literature about technology adoption, 4 factors as Student Characteristics, Technology Self-Efficacy, System Characteristics and Content Quality were identified as motivators to estimate extrinsic motivation. While Student Characteristics covers SN and Technology Self-Efficacy covers CB in TPB, PF is identified with System Characteristics and Content Quality. Student Characteristics can be defined as influence of other students on individual to encourage technology use. Technology Self-Efficacy is the perceived competence to be able to use a new technology without outside support. While System Characteristics refers to perceived quality and usability of the system behind the technology, Content Quality refers to the personal evaluation on the significance and relevance of content shared on the technology-mediated learning environment.

After identifying relevant constructs, the research problem questioning the relationship between extrinsic motivation and anticipated motivators estimating extrinsic motivation was annotated with specific relationships among constructs to be elucidated through Structural Equation Modeling statistical analysis.

The results indicated that system quality and characteristics is a strong mediator of perceived usefulness. That means if students think that the educational technology has an attractive interface, provides appropriate solutions when faced with individual problems, has a reliable infrastructure, provides satisfying resources to be able to use technology, allows for effective interaction and offers well-organized, readable and easy-accessible course materials, they believe that the particular technology is useful and beneficial on their learning and they value in terms of its utility (Roca et al., 2006; Pituch & Lee, 2006). The result is consistent with several studies finding system quality is an important factor to explain perceived usefulness (Al-Busaidi & Al-Shihi, 2010; Nanayakkara, 2007; Pituch & Lee, 2006).

The results demonstrated that content quality affects moderately the perception on the usefulness of a particular technology. That means if students find the shared content in a technology-mediated environment relevant, easy to understand, useful, updated regularly and helpful, they believe that the educational technology is useful over their learning and valuable in terms of its utility Roca et al., 2006; Lee, 2006). The result is consistent with several studies finding content quality is an important motivator to predict perceived usefulness (Dastorani & Khoshneshin, 2017; Trakulmaykee et al., 2015; Calisir et al., 2014).

The results showed that student characteristics functioning as a social norm is a significant but weak predictor of perceived usefulness. It means that when students see their classmates show positive attitude toward the technology, support the use of technology and consider the benefits on the use of the educational technology, their beliefs on the usefulness of the technology increases and they give more values on using that particular technology (Webster & Heckley, 1997). The result is consistent with previous studies considering peer and classmate characteristics is an important quality affecting student beliefs and what they value (Günüc & Kuzu, 2014; Fullan, 2007).

The results indicated that there is no significant relationship between perceived ease of use and perceived usefulness. Although the result is inconsistent with several studies conducted long before (Park, 2009; Cole, 2009; Fullan, 2007) and it might seem surprising since it is the basics of Technology Acceptance Model of Davis (1985), the recent studies indicated that PEOU is no more significant and sufficient even if it might be expected and necessary (Lowry et al., 2013). A possible explanation is that the use of Internet technologies is so widespread in daily lives of students that they are used to similar menus, interfaces and tools in almost every Web-based environment therefore it takes very short time for students to get used to using a new Web technology with similar infrastructure and features. Thus, the influence of PEOU to contribute to perception of usefulness diminishes and even disappears in a short time.

Since the potential non-significant effect of PEOU on PU was foreseen by the researcher, Mobile Flexibility construct was added to the model to substitute PEOU and remedy as a Cost Value in the model. The results indicated that mobile flexibility functioning as a Cost value is a significant but weak estimator of perceived usefulness. It means that if the technology allows students to access to system through mobile devices easily, helps them organize learning and study schedule in mobile devices effectively and flexibly, and allows them to control and use course materials and activities efficiently, then students considers the system is utilitarian in terms of anytime anywhere interaction with the environment, resources, system and other users inside the system (Arbaugh, 2000). Thus, their beliefs on the usefulness of the technology improves and they value on using that particular technology. Since it is a new construct tested for the first time in a technology adoption study, there is no way to compare and contrast with previous studies. However, a recent study found out that students spoke highly of the usefulness in terms of interaction, independent learning, and sharing and cooperation with other students and instructors due to mobile flexibility of devices, and took advantage of easy access of instructional materials through mobile devices at any time (Veira, Leacock & Warrica, 2014).

5.3. The Relationship between Motivators and Intrinsic Motivation

The current study defines intrinsic motivation as a type of human motivation manifesting as natural tendency of self towards acceptance, involvement, adoption and engagement to carry out a specific behavior to attain desired outcomes (Ryan & Deci, 2000b). Intrinsic motivation requires significant time to be formed and appear as attitudes and beliefs. The study defines motivators (intrinsic motivational needs) as prerequisites that need to be met and satisfied to be able to feed attitudes and beliefs. In short, motivational needs are hypothesized to be estimators of motivational beliefs and attitudes.

As mentioned before, Expectancy-Value Theory (EVT) of Fishbein and Ajzen (1975) was chosen to be grounded as motivation theory to identify attitudes. Among as 4 types of values, Attainment Value (AV) and Intrinsic Value (IV) address the intrinsic motivation. AV was chosen to identify intrinsic motivation in the study because AV refers to interiorized significance of the phenomenon which requires significant time to be accommodated and assimilated in self (Eccles, 1983). In the context of the study, IV was disregarded because IV refers to the internalized pleasure of the task and it is a concept that is mostly appropriate for hedonic technologies.

Several technology adoption studies were reviewed to identify intrinsic motivation in a technology adoption context. Attitude towards technology was decided to be used a construct to refer to intrinsic motivation. However, unlike TAM studies which choose attitude toward a specific technology that is to be formed during actual use of the technology in a short term, the current study chose general attitude toward every kind of educational technologies which starts to be formed in the past and continues to be shaped and likely to be modified via motivators in the present because intrinsic motivation in its inherent nature requires accommodation and assimilation in self which requires significant time in the long term. Accordingly, the current study defines general attitude toward technology as the belief stemming from both current and previous technology experiences, knowledge and habits, and judgement on general technology usefulness and efficacy in terms of meeting academic needs and interests.

Relevant constructs to identify intrinsic motivators are extracted from Self-Determination Theory (SDT) of Ryan and Deci (2000a). SDT assumes 3 innate psychological needs as estimators for intrinsic motivation: perceived competence, sense of autonomy, and feelings of relatedness. When these needs are fulfilled, people become more inclined to perform behavior intrinsically. Relatedness refers to individual need to belong and form connection to other people being valued and appreciated (Ryan, Stiller & Lynch, 1994). Competence addresses perceived self-efficacy of individuals to behave in a desired way. Autonomy refers to deeper wish to be a "causal agent," with the abilities to accommodate and regulate behaviors. When individuals grasp the essence, significance and worth of a desired behavior, they become autonomous.

After reviewing the literature, 3 factors as Self-Regulation, Technology Self-Efficacy and Interaction were identified as motivators to estimate intrinsic motivation in a technology adoption context. While Self-regulation covers Autonomy and Self-efficacy covers Competence in SDT, Relatedness is identified with Interaction. Technology Self-efficacy is the perceived competence to be able to use a new technology without outside support based on the previous experiences regarding technology use. Self-regulation is defined as deliberate and conscious reactions of self to integrate and regulate intended goal and behaviors in a technology-mediated learning environment regardless of external forces or stimuli. Interaction refers to the quality and intensity of the interactional relationship between instructor and students in terms of taking emotional and instructional support, and students regulating behaviors and activities being involved based on the feedback from the instructor.

After identifying relevant constructs, the research problem questioning the relationship between intrinsic motivation and anticipated intrinsic motivators estimating intrinsic motivation was detailed with specific relationships among constructs to be analyzed through Structural Equation Modeling.

The results indicated that self-regulation representing autonomy in a technology-mediated environment is a strong estimator of attitude toward technology. That means when students have confidence on using appropriate learning strategies, be able to learn on their own, have competence to evaluate learning speed and effectiveness, modify learning approaches if necessary, and be aware and judge whether they learn or not, they are able to actively use and utilize educational technology along with other learning strategies as part of their metacognitive processes to plan, organize and evaluate their learning (Puzziferro, 2008) thus they show positive attitude toward technology.

The results demonstrated that interaction in a technology-mediated environment affects strongly the attitude toward technology. It shows that if instructors use the technology, guide and support students how to use the technology effectively, encourage active participation of students in the technology-mediated learning environment, and demonstrate good control over the system, students feel relatedness to their instructors over the educational technology thus show positive attitude toward technology (Volery & Lord, 2000; Webster & Heckley, 1997). This result is consistent with several studies indicating that instructor adoption of online learning platforms revealed in the form of interaction and relatedness is one of the most influential factors to demonstrate the educational value of educational technologies (Coates, 2006; Ehrmann, 2004; Ertmer, 1999).

The results showed that perceived technology self-efficacy is a significant but moderate predictor of attitude toward technology. It means that when students have the confidence to be involved in an unfamiliar technology and to be able to use the system without outside support including instructions and guidelines provided by the system, and aids by instructors and students (Compeau & Higgins, 1995), they become more inclined to show positive attitude toward technology (Holden, 2010). This result is consistent with several studies indicating that higher self-confidence causes positive attitude thus higher level of involvement towards using educational technologies (Cole, 2009; Sam, Othman, & Nordin, 2005; Torkzadeh, & Van Dyke, 2002).

5.4. The Relationship between Extrinsic Motivation and Intrinsic Motivation

The current study defines extrinsic motivation as the motivation of humans stemmed from or nourished by outside sources surrounding the task or activity to be carried out. Intrinsic motivation is defined as natural tendency of self to carry out a specific behavior to attain desired outcomes (Ryan & Deci, 2000). To reflect extrinsic motivation in a technology context, perceived usefulness (PU) construct of Davis (1986) is identified. General Attitude toward Technology (AT) is identified as a manifestation of intrinsic motivation. After identifying relevant constructs, the research problem questioning the relationship between extrinsic motivation and intrinsic motivation was examined through Structural Equation Modeling. It was anticipated that PU affects AT significantly. To be more precise, it was estimated that if students believe and consider that a specific technology makes easier to learn course content, enhances student performance and effectiveness in the course, gives control over learning activities, enables to complete learning tasks successfully, in short if they believe that the specific technology being implemented during the course is useful for their learning, then this belief influences student interiorized motivation toward technology use for instructional purposes in terms of using technology willingly and effectively for learning activities, and utilizing educational technologies for productive studying, learning, practice, revision and understanding challenging course content (Arslan, 2006).

The results indicated that PU is an insignificant and weakly negative estimator of AT. The result might be surprising since it is hypothesized that extrinsic motivation influences intrinsic motivation over time based on the assertion by Ryan (1995) that motivational forms lie in a continuum and people can progress along this continuum depending on the impact of contextual factors on self. A possible explanation for the result is that considering technology being implemented in a mandatory course, students might focus on only instrumental value of the specific technology in terms of completing course requirements rather than considering the inherent values of utilizing educational technologies therefore students might prefer to stay at extrinsic motivation district at these mandatory conditions rather than reflecting the beliefs to intrinsic motivation district. Another explanation might be the duration of 12 weeks' implementation of the technology might not be sufficient to influence intrinsic motivation therefore longitudinal studies might be useful to explain the relationship between extrinsic and intrinsic motivation.

5.5. The Relationship between Motivation and Goals

The current study defines motivation as beliefs referring to expectations, values and attitudes which influence the direction and intensity of efforts toward the goals. Two types of motivational beliefs as intrinsic and extrinsic are identified to address motivation. While intrinsic motivation refers to natural tendency to carry out a specific behavior, extrinsic motivation is defined as outside sources and determinants that contribute to behave in a desired way. Motivational goals are defined as mental and emotional states in which stakeholders assume and expect target group to reach. Motivational beliefs function as prerequisites for motivational goals. Perceived Usefulness (PU) to identify extrinsic motivation and Attitude toward Technology (AT) to identify intrinsic motivation in a technology-mediated learning environment are determined as motivational belief constructs in the study.

Student engagement refers to motivational goal in the current study which is expected by teachers to be addressed from intended population as mental and emotional readiness, and intentional and conscious efforts to fulfill desired outcomes. The current study defines engagement in a technology-mediated learning environment as cognitive, social and behavioral attachment to digital technologies for instructional purposes. The study identifies 2 types of engagement as cognitive engagement (CE) and social engagement (SE) to be used as constructs to be analyzed. While CE is defined as student mental effort to be able to engage in learning activities in virtual learning environments, SE is defined as the quality and frequency of interaction between students and instructors using communication tools.

After identifying relevant constructs, the research problem questioning the relationship between motivation types and goals was examined through Structural Equation Modeling. More specifically it was anticipated that PU affects CE and SE significantly, and AT estimates CE and SE significantly. The results indicated that both PU and AT are significant predictors of both CE and SE. It means that when students believe that educational technology address their needs, when they find the technology valuable to be engaged in and when they have a positive attitude toward educational technologies, they become more active in terms of individual learning, questioning, analyzing and valuing knowledge shared in the platform, evaluating and enhancing their performance, involving in learning activities by following the teachers' post and updates, finding relevant materials and working harder on the assignments to be successful. This result is consistent with the result of Liaw et al. (2007) reporting that technology-mediated learning environment requiring high order thinking skills is affected by learner self-regulation and teacher relatedness, pointing intrinsic motivation, and multimedia content addressing extrinsic motivation. Moreover, it means that when students believe that educational technology fulfill their expectancies, when they have a positive attitude to be involved in learning technologies and when they find the particular technology valuable to be engaged in, they become more active in terms of getting in touch with the teacher and other students, commenting and giving feedback to the teachers' posts and updates, sharing their thoughts and feelings with others, and learning in cooperation with other students. This result is consistent with studies of both Paechter et al. (2010) and Liaw et al. (2007) indicating that instructor relatedness through counseling and support and self-paced learning addressing intrinsic motivation, and system flexibility and structure pointing extrinsic motivation are important predictors of social engagement in online learning environments.

The results indicate that both PU and AT have more influence on CE than on SE. A possible explanation for this result is that activities requiring cognitive exertion was much more on Edmodo than activities requiring social interaction therefore student motivation might focus on cognitive aspects of learning than cooperative learning. The limitation of communication tools on Edmodo might be another reason for lower social interaction. Another explanation might be since Edmodo only allows students for contact with the instructor directly and does not allow direct communication with other students through messaging systems, students' motivation to engage in cooperative learning might divert to cognitive activities.

In terms of predictive validity, the results indicate that PU is stronger predictor of both CE and SE than AT. This result might be surprising since students are ideally expected to have more intrinsic motivation. However, as Ryan and Deci (2000) stated, students are reluctant to be involved in learning activities inherently in reality and therefore they might focus on instrumental value and separable outcome of the online learning environment rather than interior values and natural outcomes. Another explanation might be that statistical analyses indicate that relatedness in the form of interaction is the most powerful estimator for intrinsic motivation in the study however since Edmodo only allows for teacher-student interaction and not for student-student interaction, a likely mediating effect of the relatedness construct might be moderated and diminished.

5.6. The Relationship between Motivational Goals and Outcomes

The current study defines ultimate outcome as the specific behavior being expected by the intended population. Motivational goals are defined in the study as mental and emotional readiness and drive to be able to reach ultimate outcome. It is assumed that motivational goals are determinants of ultimate outcomes. The study identifies student achievement (SA) as ultimate outcome in the online learning environment. SA is defined as perceived accomplishment and success of desired instructional objectives and behaviors by students in an online learning platform. The study identifies cognitive engagement (CE) and social engagement (SE) of students as motivational goals. It is hypothesized that CE and SE are significant estimators of SA.

After identifying relevant constructs, the research problem questioning the relationship between motivational goals and ultimate outcome was examined through Structural Equation Modeling. More specifically it was estimated that CE affects SA significantly, and SE estimates SA significantly. The results indicated that both CE and SE are significant predictors of SA. It means when students are able to communicate with teachers and other students easily, when they express themselves to teachers and other students clearly and quickly through comments and feedbacks, and when they are able to form groups to cooperate with other users for the sake of learning in the online learning platform, they are likely to perceive achievement in terms of handling group learning, increasing learning through cooperation and feeling adequacy and excellence to complete a web-based course. The results also indicate that when students become active for their individual learning process, when they find opportunities to create their own knowledge and find relevant materials, and when the online platform allows them to evaluate their performance and judge their performance, they are likely to perceive success in terms of understanding course materials in the course, learning basic concepts and mastering the skills being taught in the class. These results are consistent with the study of Paechter et al. (2010) indicating that cooperative learning instructor and support and guidance addressing social engagement, and self-regulated learning addressing cognitive engagement are the best predictors for learning achievement.

The results indicate that CE is a stronger mediator of SA than SE. As mentioned before, partial social interaction opportunity on Edmodo limited with teacher-student interaction might result in only moderately mediating effect of social engagement on student perception of achievement. Excessive learning activities on Edmodo addressing mostly cognitive exertion of students might have surpassed the influence of social engagement. A surprising result might be the low explanatory power of CE and SE on SA. Squared Multiple Correlations (R2) value of CE and SE only explains

36% of the perceived achievement of students on Edmodo and it indicates that there are plenty of emptiness for explaining achievement on the online learning platform. It might be interpreted that other engagement types apart from cognitive and social can play significant role to explain perceived achievement on web-based and online learning platforms. A future study challenge can be the inclusion of other engagement such as behavioral engagement in online platforms involving student observable behaviors and participation through system logs and in curricular activities, individual and group works, class discussions and questioning-answering sessions, and emotional engagement in online platforms involving specific attitude, student interest and value to the particular technology being implemented for online learning.

5.7. Recommendations

This section provides recommendations to academicians, practitioners, instructors and instructional designers who plan to benefit from the outcomes of this study. Firstly, this study recommends academicians and researchers who aim to propose technology adoption models to adopt a process-based model-construction approach requiring a theoretical understanding of the relevant motivational processes comprehensively rather than directly extending current traditional models and applying outdated constructs and factors. Considering the contemporary technologies being idiosyncratic, having their own typical characteristics, functioning in different contexts and including specific circumstances, the study also recommends academicians to propose contextual-specific technology adoption models rather than attempting to propose general technology acceptance models that is hard to function as one-size-fits-all solution for 21st century technologies. Accordingly, the current study recommends researchers to start to develop an adoption model by grounding on a conceptual framework like the one being proposed in this study (see Figure 5.1.) because starting a technology adoption model with a conceptual framework provides greater flexibility in terms of identifying, elaborating and manipulating motivational constructs and factors in further steps. After determining the conceptual framework, the study proposes a 3-steps guideline to develop a technology adoption model:

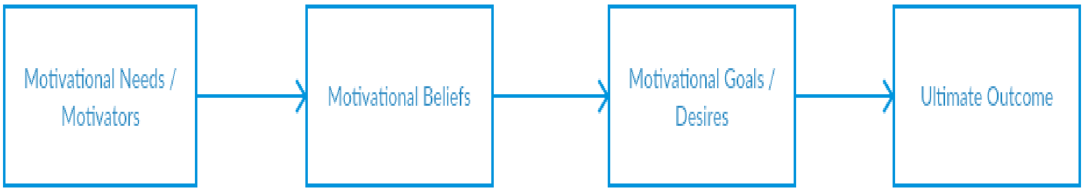

Figure 5.1. Conceptual Framework

1. Turning the conceptual framework into theorized conceptual framework: This step requires identification and decision of motivational theory (or theories) together with its constructs that are found most appropriate to identify and describe user motivation to adopt the specific technology by considering its idiosyncratic structure and the context in which it is being implemented thus the determined theory is embedded and adapted to the conceptual framework. An example can be seen in Figure 2.2.
2. Turning the theorized conceptual framework into conceptual model: This step requires the elaboration of the constructs decided in the first step with appropriate factors to make it relevant and feasible at technology adoption context. An example can be seen in Figure 2.3.
3. Transformation of conceptual model into technology adoption model: This step requires drawing hypothetical relationships among identified factors determined in previous step. An example can be seen in Figure 2.4.

The study also has recommendations for practitioners who aim to apply and develop the model being developed in the study. First of all, it should be kept in mind that as a typical example of developmental research, this study is context-specific therefore the model being developed in the study is contextual and should be approached with caution. The model is not a general model that can be applied for any kind of technologies rather it is an engagement model targeting social learning platforms. Moreover, the study can’t claim and declare itself as a general educational technology adoption model since different motivational mechanisms and constructs might play role for the adoption of different types of educational technologies. However, the model can also be used with some modifications for other educational technologies by sticking to the motivational constructs being assumed to play role, based on the literature, on the motivation of students toward the engagement for educational technologies. For those practitioners who want to use the model, ETEM for other social learning platforms, it is recommended to use idealized solution based on the refinements of statistical analyses, as can be seen in Figure 5.2, rather than the earlier forms of the model. The practitioners can also use the questionnaire and the scales within the questionnaire developed for the study. As can be seen in Appendix 2 and Appendix 3, the items have no validity and reliability concern. However, it is strongly recommended for those practitioners to use parsimonious version of the scales that can be seen in Table 5.1 because dealing with high number of factors along with high number of items is challenging, problematic and tedious in terms of statistical analyses' giving unreliable results regarding estimators and fit indices of the model. Moreover, dealing with high number of items might give inefficient solutions in terms of prospective relationships among factors. The study overcomes these problems by using item parceling method for statistical analyses. However, reducing item numbers to 3 to 5 by selecting the items with highest factor loadings might also work to overcome the problems due to high number of items. Therefore, the practitioners might prefer to use reduced version of scale items as can be seen in Table 5.1. The practitioners can also modify, remove or add new items from the scales being validated in the literature with the aim of adapting to the context that the technology is to be implemented. For example, this study does not have any components and any scale items regarding the relatedness and interaction of students with other students to explain intrinsic motivation of students since Edmodo does not allow student-student interaction directly. If the technology that is to be tested allows student-student interaction, practitioners might consider to create or insert items from the literature to demonstrate the possible impacts of student-student interaction over student motivation.

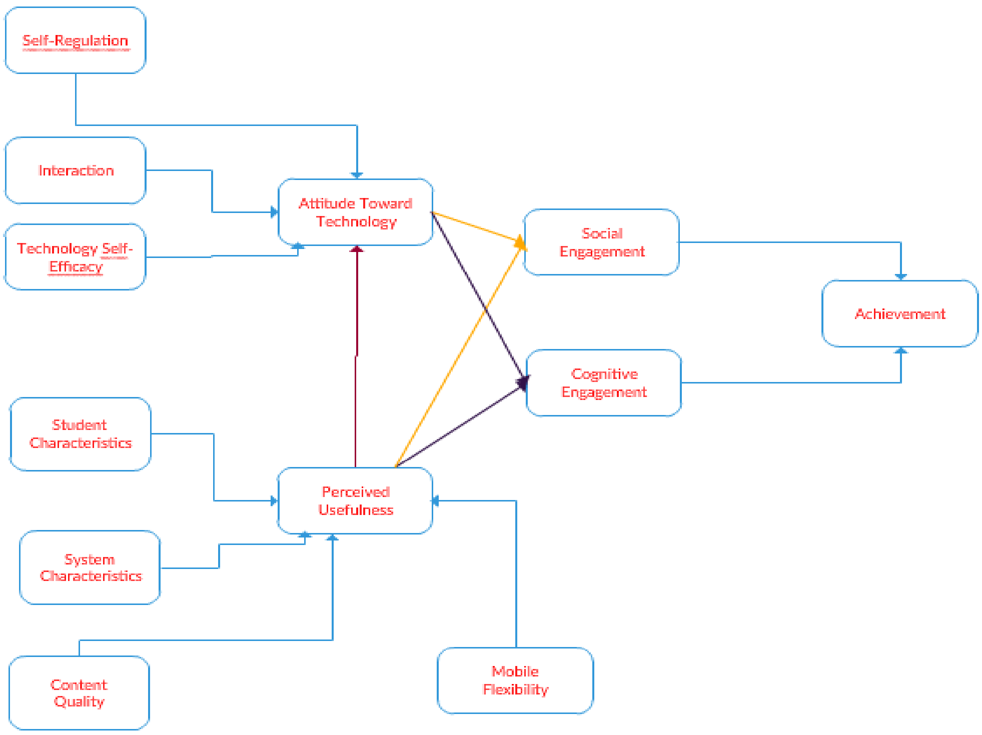

Figure 5.2. Ideal Model for Social Learning Platforms

Table 5.1. *Reduced Version of Scale Items*

Construct Name	*Item Statement*
System Quality	Edmodo enables interactive communication between instructor and students
	Edmodo can present course material in a well-organized and readable format
	Edmodo offers multimedia (audio, video, and text) types of course content
	The communication tools in Edmodo are effective
Content Quality	The contents shared in Edmodo is relevant to the course
	The contents shared in Edmodo were good
	The contents shared in Edmodo were up-to-date information that fit my learning objectives
	The contents shared in Edmodo helped my learning

Peer Characteristic	My classmates showed a positive attitude toward Edmodo My classmates supported the use of Edmodo for the course My classmates considered the use of Edmodo was useful
Self-Efficacy	I could use Edmodo even if I had never used such a system before I could use Edmodo even if there was no one around to show me how to use it I could use Edmodo if I had only the system manuals for reference I could use Edmodo if I had seen someone else using it before trying it myself
Self-Regulation	I am able to review and evaluate my learning effectiveness I am able to improve my learning approaches when it is necessary I am able to judge what contents I have learned in class time I am able to judge what I do not know in class time
Interaction	My instructor explained how to use Edmodo components My instructor encouraged me to use Edmodo I liked my instructor's use of Edmodo to support lessons My instructor exhibited a good control over Edmodo tools and features
Mobile Flexibility	Accessing to Edmodo via mobile devices was easy Edmodo mobile application allowed me to arrange my work for the class more effectively Edmodo mobile application allowed me to spend more time on course activities Edmodo mobile application allowed me to finish my studies more quickly
Perceived Ease of Use	Learning to operate Edmodo was easy for me I found Edmodo easy to use I found it easy to get Edmodo to do what I want it to do Using Edmodo tools were easy to me
Perceived Usefulness	Edmodo made it easier to learn course content Edmodo improved my learning performance Edmodo enhanced my effectiveness in the course Edmodo allowed me to accomplish learning tasks more quickly
Attitude Toward Technology	I use computer willingly in my courses Students learn better in courses where computers are actively used Computer is an effective medium to draw attention of students Technological tools could be used for practice or revision
Social Engagement	When I needed, I easily got in contact with my teacher/instructor via Edmodo tools Edmodo enabled students to comment and give feedback to posts

	There are ample opportunities in the course to contact with other students
	Edmodo enabled students to share their feelings and opinions easily
Cognitive Engagement	I had opportunities to create my own knowledge on Edmodo
	Edmodo helped me evaluate my performance in the course
	Edmodo enabled me to engage in individual learning activities
	Edmodo enhanced my learning motivation
	I worked harder on my assignments and other course-related activities using Edmodo
Perceived Achievement	I think I understood even the most difficult materials provided in the course
	I think I understood the most complex materials presented by the instructor in the course
	I think I did an excellent job on the assignments and tests in the course
	I think I mastered the skills being taught in the class

The study also has some recommendations for instructional designers who plan to design systems and technologies like social learning platforms. The results indicate that self-regulation and interaction are the stronger motivators that needs to be satisfied for intrinsic motivation, and system characteristics is the strongest motivators that needs to be satisfied for extrinsic motivation of students. Therefore, system designers should give special emphasis and place a particular importance in terms of addressing these needs. Edmodo has a great potential to address student self-regulatory needs because apart from Edmodo's own tools, it also provides several third-party educational applications from reliable sources, and various extensions and add-ons which enable students to regulate their own learning. Instructional designers who design and develop such systems might consider making arrangements with different educational companies and embedding these kind of third-party tools as well as creating their own tools to enable students to regulate learning. Moreover, designers should also consider designing and developing communication tools as many as possible since interaction has a stronger influence on student intrinsic motivation. Lastly, instructional designers should consider creating social learning platforms which have appealing interfaces, give appropriate solutions when faced with problems, have reliable infrastructures, provide fulfilling resources to guide users to be able to use technology easily and effectively, enable fruitful interaction and have simple and easy interfaces allowing for both students and teachers to handle and exploit course materials easily and in an organized way.

Lastly, the study has recommendations for instructors and teachers who plan to implement social learning platforms for their instruction. First of all, instructors should select a trustworthy system to secure students' safety and to guarantee parents' confidence. The system should be appealing for initial motivation of students towards system use. The system should provide necessary guidelines for students to be able to use the system effectively. Most importantly, the system should provide required infrastructure to allow effective communication between students and instructors. Secondly, instructors should choose social learning platforms giving various and a wide array of opportunities and providing tools enabling students to regulate their own learning. Moreover, instructors should encourage and guide their students to use and benefit these self-regulatory facilities and tools ensured by the system. Lastly, instructors should use communication tools as much as possible to increase their students' intrinsic motivation to be engaged in the system.

5.8. Implications, Limitations and Future Research

The current research has several implications contributing to theory and practice in the technology adoption literature. The study attempted to address several limitations of traditional adoption and acceptance models. Firstly, the study provides a conceptual framework ensuring flexibility to manipulate and design motivational constructs rather than a theoretical framework which attempts to offer one-size-fits-all solution. The study indicates that one-size-fits-all solution adoption models are not appropriate considering idiosyncrasy of 21st technologies. Secondly, to address the criticisms of Silva (2007) in terms of traditional models' following a natural sequence among motivational constructs thus being difficult to be falsifiable, the study adopted using at least two mediators for the constructs in the model, which includes motivational needs, beliefs and goals, to pave the way for falsifying core constructs. Thirdly, all the variables included in the model were identified and selected based on the motivation theories and considering theoretical concerns. Fourthly, the model was created considering different stakeholders' needs including educators, instructional designers and motivation theory researchers, not just technology vendors, and Information Systems researchers and practitioners. Fifthly, the study aimed to provide a comprehensive model to become as explanatory as possible rather than adopting a parsimonious structure providing limited conclusive results. Lastly and more importantly, the study inserted intrinsic motivators and intrinsic motivation construct to address the major limitation of traditional adoption models.

The current research has also several implications contributing to future research. Firstly, Mobile Flexibility (MF) construct was offered, measured and tested as a new Cost Value construct in a technology adoption model considering the outdated and insignificant effects of Perceived Ease of Use (PEOU) estimating Perceived Usefulness (PU). When MF is included into the model, PEOU drops out completely as a predictor of PU. Considering the widespread use of technological devices and Internet among youth, it is reasonably foreseeable of PU's non-significant effect because it takes shorter time for students to be accustomed to use a new Web technology with similar infrastructure and interfaces thus the influence of PEOU on PU decreases and even disappears in a short span. MF as a construct offers an area for future research that needs further exploration thus more evidence can be gathered for the thesis that mobile flexibility in terms of time, place and accessibility might cause students to regulate their own learning process based on the belief of usefulness of the technology, and indirectly increase participation and involvement over learning activities. However, statistical analysis indicated that MF is a weak predictor of PU. A possible explanation is that the scale items to measure MF is adapted and modified from Arbaugh's scale (2000) which is originally created for Internet flexibility rather than mobility targeting time, place and accessibility flexibility. Therefore, the scale can be examined to add and revise items to reflect the mobile flexibility. Even a new scale for MF can be generated to better show the relationship between MF and PU.

Secondly, the research provided the initial test to integrate intrinsic motivation and intrinsic motivators to estimate technology adoption. Previous studies mostly focused on extrinsic factors to explain user acceptance of technology however the study indicated that intrinsic factors such as self-regulation and interaction are also strong predictors of technology adoption. Further studies are needed to support intrinsic factors being estimators of user motivation to use technology. Moreover, the research is the first among adoption studies in terms of using new constructs of motivational goals and ultimate outcomes. While previous studies have been using Intentıon to Use of Technology as motivational goal and Actual Use of Technology as ultimate goal, the current study fits engagement and achievement as goals and outcomes to the model successfully in the educational technology context. Considering society's being far beyond initial acceptance and intention to use technology after widespread adoption of technology and Internet, determining new constructs is more plausible and explanatory however further studies are needed to show that traditional constructs can be replaced with new constructs.

This study also contributes to Kozma-Clark media-method debate indirectly. Although Clark (1994) claims that media can only function as vehicle to deliver instruction, this study indicates that system quality and characteristics is the strongest predictor for extrinsic motivation of students therefore the quality of technology and media can indirectly influence student engagement and achievement. Since the study is a correlational research, not causal-comparative research, the results should be approached with caution. The study does not claim media affects learning significantly. However, considering many studies indicating motivation as the prior condition of learning (Saeed & Zyngier, 2012; Ryan & Deci, 2009; Sternberg, 2005; Huitt, 2001; Schlechty, 2001), it can be concluded that media characteristics as the significant predictor of motivation is far from being mere vehicle to deliver instruction and not a neutral element in terms of influencing learning. The media being an appealing interface with a safe and sound infrastructure, guiding appropriate solutions to the problems encountered, enabling effective interaction might be as important as delivering course content and materials. Moreover, considering extrinsic motivation, which mostly predicted and fed by technical aspects and media characteristics of the technology, being more significant than intrinsic motivation in the current study, which mostly predicted and fed by instructional and learning methods, it might be concluded that media is as important as method in terms of influencing learning process. Lastly, media does not only deliver instruction but also allows for anytime anywhere learning and instruction. Considering mobile flexibility being a weak but significant predictor of motivation in the study, the role of media can't be restricted with being mere vehicle but it also allows for new opportunities for designing instruction and using new instructional methods and approaches. Based on the results, the current study stands by Kozma's ideas (1994) stating that media and methods are interrelated, the degree of effectiveness of instructional methods might increase with media characteristics and instructional methods might benefit from the capabilities and opportunities that media provided.

As a future challenge, the relationship between intrinsic motivation (IM) and extrinsic motivation (EM) offers an area that needs further exploration. Although it is hypothesized that EM predicts IM at the beginning of the study and it is expected that IM has more influence on goals and outcomes than EM, statistical analyses indicate there is no significant relationship between EM and IM, and EM has more predictive validity than IM. A possible explanation is that Ryan (1995) asserts that the motivational forms lie in a continuum and people can progress and perform behaviors along this continuum depending on the impact of contextual factors on self. Students are ideally to be expected to have IM but most of them are not eager to carry out responsibilities in real life. However, they are still involved in performing more or less. It shows that extrinsic motivators play a significant role in terms of triggering students to be involved and engaged (Ryan & Deci, 2000b). Considering the context of the technology use as part of a mandatory course, conditions might cause students shoulder responsibilities in the technology-mediated learning environment even if they are not interesting and valuable, and students might concentrate upon instrumental value and separable outcome of the technology rather than the inherent value and natural outcomes. As a result, students might stay at extrinsic motivation district along the continuum at these mandatory conditions and therefore it is plausible EM has more predictive validity than IM. Distance education learners who takes courses voluntarily might have more IM to behave in a desired way. Further studies can compare the effects of EM and IM in non-mandatory settings. Another explanation might be that the progress from EM to IM requires significant time and devotion to be accommodated and assimilated in self. Considering mandatory use of technology for 12 weeks might not be ideal to affect IM. Longitudinal studies might be required to explain whether EM estimates IM in long term.

Apart from the aforementioned limitations above to challenge future studies, there are also some limitations that needs to be taken into consideration by researchers while interpreting the results of this study. Firstly, the model developed in the study is a contextual model for educational technologies, not a general technology adoption model therefore it can't be generalized to every kind of technologies. Moreover, the model was shaped and developed considering the circumstances of formal educational settings therefore the model can't be generalized to every type of educational technologies. Secondly, this study disregards the potential impact of student-student interaction on student intrinsic motivation to adopt the technology due to Edmodo's safety and security polices preventing student-student interaction. Future studies might consider to insert student-student interaction as a motivator. Thirdly, although Mobile Flexibility (MF) is inserted to predict Perceived Usefulness (PU) in the model, Edmodo mobile application was not that popular among student at the time of data collection year when is 2016 and 2017. The demographics also indicates that Edmodo Mobile usage time by students is shorter when compared with Edmodo Web. This could be the reason why the influence of MF on PU was significant but weak. Considering higher popularity and adoption of educational mobile applications in recent years, MU might show stronger influence in future studies. Lastly, the data was collected for the study at the end of the semesters. Exposure to 12-weeks educational technology might be a sufficient time for students to fade away the effect of Perceived Ease of Use (PEOU) on Perceived Usefulness (PU). Therefore, the non-significant effect of PEOU should be interpreted with caution. It should be reminded that gathering data at the beginning or middle of the semester might give different results.

5.9. Conclusion

This study proposes a guideline for adoption studies regarding the use of a process-based model-construction approach that requires a theoretical understanding of the relevant motivational processes to develop a technology adoption model rather than directly expanding existing traditional models and applying outdated constructs and factors. In particular, the study presents an educational technology engagement model by demonstrating how an adoption model can be designed and developed step by step. It is aimed that a process-based model-construction approach addresses some of the limitations of technology adoption studies outlined in the Literature Review section and offer new perspective for future studies.

Technology adoption models have been illuminating researchers for 3 decades to understand how and to what extent motivational factors affect people's use of technology. They provide a comprehensive perspective to grasp the relationship between motivational needs and beliefs and intentions/goals and outcomes for the use of technology. The study begins with reviewing the theories of motivation that root technology adoption models. Then, well-known technology models were reviewed. The quality, validity and reliability of traditional technology models is questioned and criticized considering the paradigm shift due to the changing dynamics between society and technology at 21st century. Taking into account of the limitations, a process-based model-construction approach was introduced with the aim of developing new and explanatory technology models. Specifically, Educational Technology Engagement Model (ETEM) was developed following the guideline proposed in the methodology and considering both intrinsic and extrinsic motivation of students toward technology use. The developed model was tested through statistical analyses, and then the results were interpreted and discussed. Possible implications, future research challenges and limitations of the study were discussed. It is hoped that both information systems experts and technology adoption model researchers in general, and educational technology practitioners and researchers in particular, will benefit from the model construction approach offered in the study and helps the researcher of the study to revise the proposed model through their criticisms and feedbacks

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APPENDICES

A. Appendix 1 – Survey Items

Table 0.1. *Survey Items*

Construct Name	*Item Statement*	*Item Code*	*Source*
System Quality	Edmodo has a visually appealing interface	sys1	Roca et al. (2006)
	Edmodo provides appropriate solutions to my requests	sys2	
	Edmodo is reliable	sys3	
	Edmodo has sufficient functions for my learning	sys4	Pituch & Lee (2006)
	Edmodo enables interactive communication between instructor and students	sys 5	
	Edmodo offers flexibility in learning as to time and place	sys6	
	Edmodo can present course material in a well-organized and readable format	sys7	
	Edmodo offers multimedia (audio, video, and text) types of course content	sys8	
	The communication tools in Edmodo are effective	sys9	
	Edmodo enables interactive communication among students	sys10	
Content Quality	The contents shared in Edmodo is relevant to the course	cnt1	Roca et al. (2006)
	The contents shared in Edmodo is easy to understand	cnt2	
	The contents shared in Edmodo were good	cnt3	
	The contents shared in Edmodo were up-to-date information that fit my learning objectives	cnt4	
	The contents shared in Edmodo were updated on a regular basis	cnt5	Lee (2006)
	The contents shared in Edmodo helped my learning	cnt6	
Peer Character	My classmates showed a positive attitude toward Edmodo	stu1	Webster & Heckley (1997)
	My classmates supported the use of Edmodo for the course	stu2	
	My classmates considered the use of Edmodo was useful	stu3	

Self-Efficacy	I could use Edmodo even if I had never used such a system before	sefc1	Compeau & Higgins (1995)
	I could use Edmodo even if there was no one around to show me how to use it	sefc2	
	I could use Edmodo if I had only the system manuals for reference	sefc3	
	I could use Edmodo if I had seen someone else using it before trying it myself	sefc4	
Self-Regulation	I am able to use appropriate learning strategies	sreg1	Lee & Tsai (2011)
	I am able to learn at my own pace	sreg2	
	I am able to review and evaluate my learning effectiveness	sreg3	
	I am able to improve my learning approaches when it is necessary	sreg4	
	I am able to judge what contents I have learned in class time	sreg5	Kim & Park (2001)
	I am able to judge what I do not know in class time	sreg6	
Interaction	My instructor explained how to use Edmodo components	inter1	Volery and Lord (2000)
	My instructor encouraged me to use Edmodo	inter2	
	My instructor used Edmodo actively while teaching course subjects	inter3	Soong et al. (2001)
	I liked my instructor's use of Edmodo to support lessons	inter4	Liaw et al. (2007)
	My instructor exhibited a good control over Edmodo tools and features	inter5	Webster & Heckley (1997)
	My instructor handled Edmodo effectively	inter6	
Mobile Flexibility	Accessing to Edmodo via mobile devices was easy	moflex1	Arbaugh (2000)
	Edmodo mobile application allowed me to arrange my work for the class more effectively	moflex2	
	The advantages of Edmodo mobile application outweighed any disadvantages	moflex3	
	Edmodo mobile application allowed me to spend more time on course activities	moflex4	
	Edmodo mobile application has no serious disadvantages for the course	moflex5	
	Edmodo mobile application allowed me to arrange my study schedule more effectively	moflex6	

	Edmodo mobile application allowed me to finish my studies more quickly	moflex7	
Perceived Ease of Use	Learning to operate Edmodo was easy for me	peou1	Davis (1989)
	I found Edmodo easy to use	peou2	
	I found it easy to get Edmodo to do what I want it to do	peou3	
	Using Edmodo tools were easy to me	peou4	
Perceived Usefulness	Edmodo made it easier to learn course content	pu1	Davis (1989)
	Edmodo improved my learning performance	pu2	
	Edmodo enhanced my effectiveness in the course	pu3	
	Edmodo gave me greater control over learning activities (reading, homework, discussions etc.)	pu4	
	Edmodo allowed me to accomplish learning tasks more quickly	pu5	
	Overall, Edmodo was useful during learning process	pu6	
Attitude Toward Technology	I use computer willingly in my courses	pta1	Arslan (2006)
	I investigate the ways to use computers more effectively in my classes	pta2	
	Students learn better in courses where computers are actively used	pta3	
	Computer is an effective medium to draw attention of students	pta4	
	Technological tools could be used for practice or revision	pta5	
	Technological facilities have a positive effect on productive studying and learning	pta6	
	Using technology would facilitate the understanding of difficult subjects	pta7	
Social Engagement	When I needed, I easily got in contact with my teacher/instructor via Edmodo tools	soen1	Paechter et al. (2010)
	My teacher/instructor had a high level of expertise in teaching over Edmodo	soen2	
	My teacher/instructor gave fast feedback via Edmodo communication facilities	soen3	
	My teacher/instructor supported and counselled me during the term	soen4	
	I exchanged knowledge easily and quickly with other students via Edmodo tools	soen5	

	Edmodo enabled students to comment and give feedback to posts	soen6	
	There are ample opportunities in the course to contact with other students	soen7	
	Edmodo enabled students to share their feelings and opinions easily	soen8	
	Learning in groups and cooperation with other learners are fostered in the course (group activities, discussions, comments etc.)	soen9	
Cognitive Engagement	I learned actively on Edmodo	coen1	Liaw et al. (2007)
	I had opportunities to create my own knowledge on Edmodo	coen2	
	Edmodo helped me evaluate my performance in the course	coen3	
	Edmodo enabled me to engage in individual learning activities	coen4	
	Edmodo enhanced my learning motivation	coen5	
	I followed my instructor's posts and updates regularly on Edmodo	coen6	
	I found materials that help my learning on Edmodo	coen7	
	I worked harder on my assignments and other course-related activities using Edmodo	coen8	
	When I was absent from class, I checked Edmodo for course content, announcements or notes	coen9	
Perceived Achievement	I believe I received an excellent grade in this class	pach1	Pintrich et al. (1991)
	I think I understood even the most difficult materials provided in the course	pach2	
	I think I learned the basic concepts taught in the course	pach3	
	I think I understood the most complex materials presented by the instructor in the course	pach4	
	I think I did an excellent job on the assignments and tests in the course	pach5	
	I think I mastered the skills being taught in the class	pach6	
	Considering the difficulty of this course, the teacher, and my skills, I think I did well in the class	pach7	

B. Appendix 2 - Edmodo Social Learning Platform Usage Questionnaire

Table 0.2. *Edmodo Social Learning Platform Usage Questionnaire*

EDMODO SOSYAL ÖĞRENME PLATFORMU KULLANIM ANKETİ

Değerli Katılımcı,

Bu anket, Edmodo sosyal öğrenme platform kullanımını etkileyen faktörleri belirlemek için yapılan bilimsel bir araştırma kapsamında hazırlanmıştır. Ölçekte yer alan sorulara verdiğiniz yanıtlar, tamamen bilimsel amaçlı kullanılacak ve gizli tutulacaktır. Lütfen aşağıda verilen tüm soruları dikkatle okuyarak uygun şekilde yanıtlayınız.

Bu anket iki ana bölümden oluşmaktadır. Birinci bölümde kişisel bilgileri toplamaya yönelik genel sorular; ikinci bölümde ise "Edmodo Sosyal Öğrenme Platformu Kullanım Deneyimi Ölçeği" bulunmaktadır.

Çalışmaya katkılarınızdan dolayı çok teşekkür ederim.

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ODTÜ Bilgisayar ve Öğretim Teknolojileri Eğitimi

I. Genel Sorular

1. Cinsiyetiniz: ( ) Kadın ( ) Erkek
2. Yaşınız:_____________
3. Öğrenim Durumunuz: ( ) Ön lisans ( ) Lisans
4. Bölümünüz ve Sınıfınız:____
5. Okul Ortalamanız: _____________
6. Aşağıdaki bilişim cihazlarından hangilerini kullanıyorsunuz? (Birden fazla seçeneği işaretleyebilirsiniz)
   ( ) Kendime ait bilgisayarı kullanıyorum (masaüstü veya dizüstü)
   ( ) Ailenin ortak kullanımında olan bilgisayarı kullanıyorum (masaüstü veya dizüstü)
   ( ) Bilgisayar laboratuvarlarındaki bilgisayarı kullanıyorum
   ( ) Tablet bilgisayar kullanıyorum
   ( ) Akıllı telefon kullanıyorum
   ( ) Diğer (Belirtiniz) ………………………………
7. Günde ortalama kaç saat internete giriyorsunuz?
   ( ) 0-1 saat ( ) 2-3 saat ( ) 4 saat ve daha fazlası
8. İnterneti en çok hangi amaçlar için kullanıyorsunuz? (Birden fazla seçeneği işaretleyebilirsiniz)
   ( ) Araştırma
   ( ) Zaman geçirmek (video izleme, müzik dinlemek vb.)
   ( ) İletişim kurmak (e-posta, chat vb.)
   ( ) İş amaçlı
   ( ) Ders çalışmak/ödev yapmak
   ( ) Sosyal Medya (Facebook, Twitter, Instagram vb.)

( ) Diğer (Belirtiniz) …………………………

9. İnternete aşağıdaki araçlardan hangisi ile bağlanıyorsunuz? (Birden fazla seçeneği işaretleyebilirsiniz)

   ( ) Masaüstü bilgisayar ( ) Dizüstü bilgisayar (Laptop) ( ) Tablet bilgisayar ( ) Telefon ( ) Diğer (Belirtiniz) ………………………………

10. Aşağıdaki işletim sistemlerinden hangisini/hangilerini kullanıyorsunuz? (Birden fazla seçeneği işaretleyebilirsiniz.)

    ( ) Kullanmıyorum ( ) Windows ( ) Mac OS X ()iOS

    ( ) Android ( ) Windows Phone ( ) Linux ( ) Diğer (Belirtiniz): …………

11. Aşağıdaki Sosyal Paylaşım Sitelerinden hangisini/hangilerini kullanıyorsunuz? (Birden fazla seçeneği işaretleyebilirsiniz.)

    ( ) Kullanmıyorum ( ) Facebook ( ) Twitter ( ) Instagram ( ) Diğer (Belirtiniz): …

12. En sık kullandığınız web tarayıcısı hangisidir? (Lütfen sadece bir seçenek işaretleyiniz)

    ( ) Kullanmıyorum ( ) Internet Explorer ( ) Google Chrome

    ( ) Mozilla Firefox ( ) Apple Safari ( ) Diğer (Belirtiniz): ………

13. Edmodo kullanım sıklığınızı nasıl değerlendiriyorsunuz?

    ( ) Sürekli ( ) Sıklıkla ( ) Ara sıra ( ) Nadiren ( ) Hiçbir zaman

14. Edmodo'ya mobil cihazlardan erişim sıklığınızı nasıl değerlendiriyorsunuz?

    ( ) Sürekli ( ) Sıklıkla ( ) Ara sıra ( ) Nadiren ( ) Hiçbir zaman

15. Edmodo'yu en çok hangi amaçlar için kullandınız? (Birden fazla seçeneği işaretleyebilirsiniz)

    ( ) Ders notlarını görüntülemek ( ) Tartışmalara katılmak ( ) Ders materyallerini indirmek

    ( ) Kaynaklara erişmek ( ) Ödev veya sunu yüklemek ( ) Duyuruları takip etmek

    ( ) Öğretim elemanıyla iletişim kurmak ( ) Dosya veya link paylaşmak ( ) Yorumları okumak

    ( ) Diğer öğrencilerle iletişim kurmak ( ) Yaklaşan olayları ve etkinlikleri görüntülemek

    ( ) Diğer (Belirtiniz): ………

16. Aşağıdaki Edmodo araçlarını ne sıklıkla kullandığınızı belirtiniz

	Sürekli	**Sıklıkla**	**Ara sıra**	**Nadiren**	**Hiçbir zaman**
Sırt Çantası					
Paylaşım (Dosya, link vb.)					
Yorum					
Ödev					
Quiz					
Anket					
Planlayıcı (Takvim)					
Direkt Mesaj					

II. Edmodo Sosyal Öğrenme Platformu Kullanım Deneyimi Ölçeği

Edmodo kullanım deneyiminizi göz önünde bulundurarak lütfen aşağıdaki maddelere ne ölçüde katıldığınızı herbir ifadenin karşısındaki seçeneklerden sizin için en uygun olanı işaretleyerek belirtiniz.

Sosyal Bağlılık

Öğretim elemanı ve öğrenciler ile olan etkileşimlerinizi göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz (1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

	1	**2**	**3**	**4**	**5**
İhtiyaç duyduğumda Edmodo'daki araçları kullanarak öğretim elemanım ile kolayca iletişim kurdum					
Öğretim elemanım Edmodo üzerinden ders vermede çok tecrübeliydi					
Öğretim elemanım Edmodo'daki araçları kullanarak hızlı bir şekilde geribildirimde bulundu					
Edmodo üzerinden çevrimiçi iletişim sosyal ilişkilerin göz ardı edilmesine neden oldu					
Edmodo'daki araçları kullanarak dersin diğer katılımcılarıyla kolaylıkla ve hızlıca bilgi paylaştım					
Edmodo, ders katılımcılarının, paylaşımlara kolaylıkla yorum yapmalarına ve geribildirimde bulunmalarına olanak sağladı					
Dersin diğer katılımcılarıyla iletişime geçmek için yeterli olanak vardı					
Edmodo, dersin katılımcılarına, duygu ve düşüncelerini rahatlıkla yansıtma fırsatı sundu					
Derste grup çalışması ve öğrenciler arası işbirliği teşvik edildi (Grup etkinlikleri, tartışmalar, yorumlar vb.)					

Algılanan Yararlık Ve Kullanım Kolaylığı

Edmodo kullanımınızı göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz (1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

Edmodo Sosyal Öğrenme Platformu…	**1**	**2**	**3**	**4**	**5**
Ders içeriğini anlamamı kolaylaştırdı					
Öğrenmemi olumlu yönde etkiledi					
Derse yönelik etkinliğimi artırdı					

Öğrenme etkinlikleri (okuma, ödev, tartışmalara katılma) üzerinde daha fazla kontrol verdi					
Derse yönelik sorumluluklarımı hızlı bir şekilde tamamlamama yardımcı oldu					
Genel olarak öğrenme sürecinde faydalıydı					
Kullanımını öğrenmek benim için kolaydı					
Kullanmak kolaydı					
Yapmak istediklerimi gerçekleştirmek kolaydı					
Araçlarını kullanmak kolaydı					

Sistem

Edmodo sistem özelliklerini göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz (1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

Edmodo Sosyal Öğrenme Platformu Sistemi…	**1**	**2**	**3**	**4**	**5**
Görsel olarak güzel bir arayüze sahipti					
Bireysel isteklerime uygun çözümler sundu					
Güvenilirdi					
Öğrenme sürecimi kolaylaştıran yeterli özelliğe sahipti					
Öğretim elemanı ve öğrenciler arasındaki iletişimi başarılı bir şekilde sağladı					
Zaman ve mekân yönüyle öğrenmemde esneklik sağladı					
Ders materyallerinin düzgün ve okunaklı biçimde sunulması için gerekli ortamı sağladı					
Ders içeriğinin farklı medya türleriyle (ses, görüntü vb.) sunulması için gerekli ortamı sağladı					
İletişim araçları etkiliydi					
Öğrenciler arasındaki iletişimi başarılı bir şekilde sağladı					

Öğretim Elemanı ile Etkileşim ve Edmodo'ya Karşı Öğrenci Tutumu

Öğretim elemanınız ile olan etkileşiminizi ve diğer öğrencilerin Edmodo kullanımına yönelik duygu ve düşüncelerini göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz

(1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

	1	**2**	**3**	**4**	**5**
Sınıf arkadaşlarımın Edmodo'ya karşı tutumu olumluydu					

Sınıf arkadaşlarım Edmodo'nun ders için kullanımını destekledi					
Sınıf arkadaşlarım Edmodo kullanımının yararlı olduğunu düşünmekteydi					
Öğretim elemanım Edmodo bileşenlerini nasıl kullanmam gerektiğini açıkladı					
Öğretim elemanım Edmodo'yu kullanmam için beni teşvik etti					
Öğretim elemanım ders konularını öğretirken Edmodo'yu sıkça kullandı					
Öğretim elemanımın dersi desteklemek için Edmodo'yu kullanmasını faydalı buldum					
Öğretim elemanımın Edmodo araçları ve özellikleri üzerinde kontrolü vardı					
Öğretim elemanım Edmodo'yu etkili bir şekilde kullandı					

Mobil Erişim

Akıllı telefonlar veya tabletler aracılığıyla Edmodo kullanımı deneyimlerinizi göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz

(1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

Mobil cihazlar üzerinden Edmodo erişimi…	**1**	**2**	**3**	**4**	**5**
Kolaydı					
Ders ile ilgili işlerimi etkili bir şekilde düzenlememe olanak sağladı					
Olumlu yönleri olumsuz yönlerinden fazlaydı					
Ders ile ilgili etkinliklere daha fazla zaman ayırmamı sağladı					
Derse yönelik ciddi bir olumsuz yönü yoktu					
Çalışma programımı etkili bir şekilde düzenlememe olanak sağladı					
Çalışmalarımı daha hızlı bir şekilde tamamlamama olanak sağladı					

İçerik Kalitesi

Edmodo'da paylaşılan ders içeriğini göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz

(1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

Edmodo'da paylaşılan içerik…	**1**	**2**	**3**	**4**	**5**
Dersin amacına uygundu					
Kolay ve anlaşılırdı					
Faydalıydı					
Öğrenme hedeflerime uygun güncel bilgilerdi					
Düzenli bir şekilde güncellendi					
Öğrenmeme yardımcı oldu					

Bilişsel Bağlılık

Edmodo kullanımı deneyiminizin bilişsel öğrenme sürecinize olan katkılarını göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz

(1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

Edmodo Sosyal Öğrenme Platformunu Kullanarak…	**1**	**2**	**3**	**4**	**5**
Etkin şekilde öğrenme sürecine katıldım					
Kendi bilgimi yapılandırmaya yönelik fırsatlar yakaladım					
Başarıma yönelik öz değerlendirme yapabildim					
Bireysel öğrenme etkinliklerinde bulundum					
Öğrenmeye yönelik motivasyonumu artırdım					
Öğretim elemanımı düzenli olarak takip ettim					
Öğrenmeme yardımcı olacak materyalleri arayıp buldum					
Ödevlerime ve derse yönelik diğer işlerime daha sıkı çalıştım					
Derse gelmediğim zamanlarda ders içeriğini, duyuruları veya notları kontrol ettim					

Öz-Yeterlik

E-öğrenme sistemlerine yönelik öz-yeterlik algınızı göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz

(1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

	1	**2**	**3**	**4**	**5**
Daha önce böyle bir sistem kullanmamış olsaydım bile Edmodo'yu kullanabilirdim					

Nasıl kullanılacağını gösteren biri olmasa bile Edmodo'yu kullanabilirdim					
Sistem tarafından sunulan kullanım kılavuzları ve yönergeler Edmodo'yu kullanabilmem için yeterliydi					
Kendim denemeden önce başka birinin nasıl kullandığına bakmak Edmodo'yu kullanabilmem için yeterliydi					

Öz-Düzenleme

Öğrenme sürecindeki öz-düzenleme yetinizi göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz

(1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

	1	**2**	**3**	**4**	**5**
Uygun öğrenme stratejilerini kullanırım					
Öğrenme hızını kendim belirlerim					
Öğrenme etkinliğimi gözden geçirip değerlendiririm					
Gerektiğinde öğrenme yöntemlerimi geliştiririm					
Ders süresince hangi içerikleri öğrendiğimin farkına varırım					
Ders süresince neleri bilmediğimin farkına varırım					

Teknoloji Tutum

Bilgisayar ve teknoloji destekli eğitime karşı tutumunuzu göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz

(1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

	1	**2**	**3**	**4**	**5**
Bilgisayarı derste isteyerek ve severek kullanırım					
Bilgisayarı derslerimde daha etkili kullanmanın yollarını araştırırım					
Bilgisayarın kullanıldığı derslerde öğrenciler daha iyi öğrenir					
Bilgisayar öğrencilerin dikkatini çekmede etkili bir araçtır					
Teknolojik araçlar alıştırma yapma ve tekrar amaçlı kullanılabilir					

Verimli çalışma ve öğrenme konusunda, teknolojinin getirdiği imkânlar olumlu bir etkiye sahiptir					
Teknoloji kullanımı ile anlaşılmasında güçlük çekilen derslerin kavranması daha kolay hale gelecektir					

Algılanan Başarı

Derse yönelik başarı algınızı göz önünde bulundurarak aşağıdaki maddeleri 1-5 arasında değerlendiriniz (1-Kesinlikle Katılmıyorum 2-Katılmıyorum 3-Kararsızım 4-Katılıyorum 5-Kesinlikle Katılıyorum)

	1	**2**	**3**	**4**	**5**
Dersten iyi bir not alacağıma inanıyorum					
Derste sunulan en zor materyalleri bile anladığımı düşünüyorum					
Derste öğretilen temel kavramları öğrendiğimi düşünüyorum					
Öğretim elemanı tarafından sunulan en karmaşık materyali bile anladığımı düşünüyorum					
Ödevlerde ve sınavlarda mükemmel bir iş çıkardığımı düşünüyorum					
Derste öğretilen becerileri iyice öğrendiğimi düşünüyorum					
Dersin zorluğunu, öğretim elemanını ve becerilerimi göz önünde bulundurduğumda, başarılı olduğumu düşünüyorum					

Anket sona ermiştir. İlginiz için teşekkür ederim.

İbrahim H. Bulut

C. Appendix 3 – Summary of Factor Loadings

Table 0.3. *Summary of Factor Loadings for Oblimin Thirteen-Factor Solution*

	Factor Loading												
Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
pu2	**.48**	.01	.05	.01	.06	.13	.17	.05	.11	.05	.09	.03	.06
pu3	**.47**	.08	.16	.06	.09	.13	.03	.06	.04	.03	.18	.04	.08
pu1	**.45**	.03	.08	.01	.07	.03	.12	.12	.05	.01	.20	.04	.07
pu5	**.40**	.02	.04	.17	.04	.10	.00	.04	.10	.08	.02	.11	.12
pu4	**.32**	.02	.10	.10	.03	.02	.03	.18	.08	.03	.15	.08	.14
pu6	**.31**	.03	.07	.10	.07	.12	.16	.18	.11	.03	.00	.07	.05
sys7	.01	**.81**	.03	.02	-.04	.05	.03	.03	.05	.02	.05	.10	.01
sys9	.04	**.75**	.02	.02	.01	.01	.04	.04	.02	.06	.01	.01	-.02
sys8	.05	**.73**	.06	.03	.07	.04	.04	.00	.03	.05	.02	.09	-.06
sys5	.05	**.72**	.00	.03	-.03	.01	.03	.01	.04	.03	.00	.03	.00
sys6	.01	**.66**	.01	.02	.00	.07	.10	.04	.00	.06	.01	.03	.02
sys4	.07	**.65**	.10	.04	-.06	.04	.02	.01	.05	.02	.06	.07	.07
sys10	.00	**.60**	.04	.02	-.01	.05	.03	.03	.04	.01	.05	.09	-.02
sys1	.01	**.48**	.05	.08	.11	.19	.03	.02	.03	.09	.18	.10	.04
pach2	.09	.02	**.77**	.00	.02	.02	.09	.04	.03	.01	.03	.02	-.01
pach4	.03	.02	**.73**	.00	-.04	.05	.09	.02	.01	.04	.02	.06	-.01
pach6	.01	.08	**.67**	.00	.06	.00	.00	.04	.06	.18	.01	.09	.08
pach5	.05	.00	**.63**	.02	.05	.09	.01	.02	.02	.18	.08	.07	.12
pach7	.09	.04	**.61**	.02	.02	.05	.04	.03	.11	.17	.03	.10	.10
pach3	.04	.02	**.58**	.03	.04	.13	.10	.04	.03	.04	.07	.06	-.02
pach1	.02	.02	**.47**	.02	-.02	.00	.00	.08	.01	.07	.01	.05	-.06
moflx1	.08	.00	.01	**.78**	.08	.02	.04	.03	.00	.05	.10	.07	.00
moflx7	.12	.02	.01	**.78**	-.02	.05	.03	.03	.00	.06	.09	.05	.01
moflx2	.11	.01	.03	**.77**	.02	.00	.00	.07	.04	.03	.06	.05	-.01
moflx4	.10	.01	.01	**.77**	.05	.01	.03	.01	.03	.05	.10	.05	-.05
moflx6	.06	.05	.03	**.72**	-.02	.08	.01	.09	.01	.02	.20	.03	.03
moflx3	.02	.03	.02	**.71**	.02	.04	.03	.04	.08	.01	.12	.00	.00

moflx5	.01	.01	.02	**.69**	-.01	.05	.03	.02	.02	.05	.13	.03	.05
peou2	.02	.05	.02	.01	**.93**	.01	.01	.00	.00	.02	.01	.04	.00
peou1	.01	.01	.01	.01	**.83**	.04	.03	.03	.01	.03	.10	.00	.03
peou3	.00	.00	.04	.05	**.83**	.04	.06	.00	.02	.06	.05	.05	-.02
peou4	.01	.01	.04	.05	**.69**	.04	.11	.07	.02	.05	.09	.11	-.01
pta4	.04	.03	.03	.01	.04	**.92**	.01	.12	.01	.01	.01	.01	.10
pta1	.07	.03	.03	.03	.00	**.78**	.00	.11	.08	.03	.03	.01	.10
pta3	.03	.03	.01	.17	-.01	**.69**	.04	.02	.04	.01	.05	.04	-.01
pta5	.08	.01	.00	.02	.04	**.68**	.11	.08	.02	.06	.06	.01	-.06
pta6	.11	.08	.02	.02	.04	**.64**	.07	.05	.02	.12	.02	.05	-.04
pta7	.13	.04	.05	.07	.08	**.62**	.03	.05	.02	.07	.03	.02	-.05
pta2	.00	.05	.01	.07	.01	**.41**	.04	.05	.02	.01	.02	.06	-.01
sys3	.07	.10	.13	.03	.08	**.26**	.05	.05	.02	.05	.10	.12	.17
cnt3	.06	.01	.03	.09	.01	.07	**.81**	.02	.00	.03	.08	.01	-.10
cnt4	.02	.00	.00	.02	-.04	.04	**.79**	.04	.02	.04	.01	.04	.03
cnt1	.00	.04	.03	.02	.13	.10	**.59**	.10	.04	.03	.13	.05	.03
cnt6	.06	.03	.13	.03	-.03	.02	**.58**	.02	.07	.03	.09	.04	-.03
cnt5	.07	.04	.05	.04	.08	.11	**.57**	.01	.08	.00	.02	.05	.12
cnt2	.04	.01	.05	.05	.13	.04	**.55**	.04	.00	.02	.04	.06	.03
inter4	.02	.04	.00	.02	.04	.05	.00	**.83**	.06	.02	.04	.00	-.03
inter5	.02	.00	.07	.03	.01	.05	.02	**.75**	.03	.04	.02	.07	.00
inter6	.01	.04	.06	.02	-.02	.04	.07	**.67**	.07	.04	.03	.07	.08
inter3	.02	.08	.07	.05	.01	.09	.07	**.57**	.02	.02	.02	.03	.10
inter2	.10	.00	.03	.03	.03	.10	.15	**.48**	.04	.07	.09	.04	.06
inter1	.04	.07	.03	.10	.07	.06	.01	**.47**	.08	.04	.15	.03	.03
stuch3	.03	.01	.06	.01	-.02	.06	.01	.03	**.94**	.03	.02	.02	-.02
stuch2	.03	.01	.05	.04	-.03	.02	.04	.01	**.91**	.05	.05	.01	-.01
stuch1	.01	.01	.03	.01	.07	.04	.03	.04	**.83**	.03	.02	.05	-.01
coen1	.17	.05	.09	.03	-.04	.08	.13	.02	**.26**	.11	.23	.07	.07
sreg4	.05	.02	.05	.07	-.06	.04	.01	.03	.03	**.77**	.01	.06	.04
sreg3	.04	.08	.07	.06	.00	.01	.00	.02	.01	**.70**	.13	.03	.01
sreg5	.14	.02	.15	.02	.08	.01	.06	.10	.06	**-.60**	-.13	-.01	-.04

sreg6	.17	.02	.05	.09	.06	.00	.03	.13	.03	**-.59**	-.12	.03	.02
sreg2	.08	.03	.01	.03	.12	.12	.03	.03	.07	**-.55**	.05	.09	.00
sreg1	.03	.07	.09	.02	.11	.07	.09	.12	.01	**-.46**	.15	.07	.06
coen5	.15	.04	.09	.00	.04	.06	.04	.17	.09	.02	**.58**	-.05	.04
coen4	.13	.00	.04	.00	.02	.07	.10	.10	.14	-.04	**.55**	-.02	.09
coen8	.07	.01	.07	.04	.09	.02	.06	.10	.06	-.10	**.53**	.04	-.02
coen3	.20	.03	.04	.04	.01	.03	.02	.02	.11	-.12	**.52**	.10	.04
coen2	.17	.08	.10	.08	-.05	.00	.04	.01	.13	-.09	**.52**	.06	.03
coen7	.11	.03	.09	.10	.10	.01	.08	.11	.02	-.01	**.48**	.07	.11
sys2	.02	.24	.18	.08	.12	.14	.07	.08	.03	.07	**.32**	.14	.01
coen6	.11	.05	.10	.10	-.03	.00	.11	.19	.02	-.05	**.29**	.12	.25
coen9	.02	.02	.00	.08	.05	.09	.13	.20	.06	-.13	**.24**	.05	.02
sefc2	.02	.04	.00	.08	.08	.05	.03	.08	.00	-.04	-.05	**.85**	.02
sefc1	.07	.05	.02	.09	.02	.07	.06	.09	.04	-.02	-.04	**.63**	.03
sefc3	.04	.07	.01	.01	.10	.06	.05	.03	.06	-.06	.00	**.63**	-.01
sefc4	.03	.04	.03	.04	.03	.01	.06	.05	.03	-.03	.13	**.46**	-.02
soen7	.14	.01	.06	.13	.10	.08	.07	.10	.04	.04	-.10	.05	**.47**
soen6	.17	.02	.01	.09	.07	.07	.08	.01	.05	-.08	-.01	.09	**.46**
soen8	.24	.03	.08	.00	.08	.00	.05	.00	.11	-.07	-.02	.09	**.41**
soen1	.10	.01	.13	.05	.12	.04	.11	.06	.00	-.02	.06	.07	**.41**
soen4	.03	.06	.08	.03	.01	.04	.02	.23	.04	-.07	.15	-.02	**.41**
soen2	.06	.06	.06	.00	.04	.07	.06	.28	.11	-.04	-.03	.05	**.39**
soen3	.04	.01	.03	.07	.03	.10	.07	.32	.05	-.13	-.05	.01	**.39**
sone5	.03	.03	.07	.06	.12	.05	.02	.02	.18	-.04	.20	.00	**.38**
soen9	.17	.01	.01	.09	-.03	.02	.12	.02	.13	-.10	.14	.11	**.28**

Factor correlations

Factor1	-						
Factor2	.10	-					
Factor3	.26	.21	-				
Factor4	.22	.11	-.32	-			
Factor5	.24	.13	.27	.35	-		
Factor6	.24	.20	.27	.32	.39	-	
Factor7	.31	.22	.45	.32	.46	.41	-

Factor8	.34	.20	.36	.33	.30	.43	.41	-					
Factor9	.35	.15	.35	.35	.39	.42	.37	.45	-				
Factor10	.23	.16	.48	.33	-.35	.28	.32	.25	.32	-			
Factor11	.29	.20	.32	.28	.18	.23	.20	.27	.34	-.23	-		
Factor12	.15	.12	.24	.31	.54	.35	.29	.32	.35	-.23	.19	-	
Factor13	.27	.16	.35	.24	.32	.29	.36	.41	.39	-.34	.26	.28	-

Note. Boldface indicates highest factor loadings.

D. Appendix 4 – Cronbach's Alpha If Item Deleted

Table 0.4. *Cronbach's Alpha Values for Each Factor If an Item is Deleted*

Item	Cronbach's Alpha if Item Deleted
Social Engagement	
soen1	.89
soen2	.89
soen3	.89
soen4	.89
soen5	.89
soen6	.89
soen7	.89
soen8	.89
soen9	.89
Self-regulation	
sreg1	.88
sreg2	.88
sreg3	.87
sreg4	.86
sreg5	.87
sreg6	.87
Mobile Flexibility	
moflex1	.91
moflex2	.90
moflex3	.91
moflex4	.90
moflex5	.91
moflex6	.91

moflex7	.90
System Characteristics	
sys1	.87
sys4	.86
sys5	.85
sys6	.86
sys7	.85
sys8	.86
sys9	.85
sys10	.87
Perceived Ease of Use	
peou1	.92
peou2	.89
peou3	.90
peou4	.92
Technology Attitude	
pta1	.87
pta2	.92
pta3	.88
pta4	.87
pta5	.88
pta6	.88
pta7	.88
sys3	.90
Content Quality	
cnt1	.86
cnt2	.86
cnt3	.85
cnt4	.85

cnt5	.87
cnt6	.86
Interaction	
inter1	.92
inter2	.91
inter3	.91
inter4	.89
inter5	.89
inter6	.90
Student Characteristics	
stuch1	.91
stuch2	.87
stuch3	.87
Perceived Achievement	
pach1	.90
pach2	.86
pach3	.88
pach4	.86
pach5	.87
pach6	.86
pach7	.88
Cognitive Engagement	
coen1	.92
coen2	.92
coen3	.92
coen4	.92
coen5	.92
coen6	.92
coen7	.92

coen8	.92
coen9	.93
sys2	.93
Self-efficacy	
sefc1	.77
sefc2	.73
sefc3	.75
sefc4	.81
Perceived Usefulness	
pu1	.90
pu2	.90
pu3	.90
pu4	.91
pu5	.91
pu6	.91

E. Appendix 5 – Approval of Ethical Committee

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY

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08.01.2015

Gönderilen : Doç. Dr. Ömer Delialioğlu
Bilgisayar ve Öğretim Teknolojileri Eğitimi

Gönderen : Prof. Dr. Canan Sümer
IAK Başkan Vekili

İlgi : Etik Onayı

Danışmanlığını yapmış olduğunuz Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü öğrencisi İbrahim Hakkı Bulut'un "A Comprehensive Evaluation of Social Learning Platforms: Edmodo Case" isimli araştırması "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

08/01/2015

Prof.Dr. Canan Sümer
Uygulamalı Etik Araştırma Merkezi
(UEAM) BaşkanVekili
ODTÜ 06531 ANKARA

F. Appendix 6 – Informed Consent Form

Orta Doğu Teknik Üniversitesi İnsan Araştırmaları Etik Kurulu

Gönüllü Katılım (Bilgilendirilmiş Onay) Formu

Bu çalışma Orta Doğu Teknik Üniversitesi Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü doktora öğrencisi İbrahim Hakkı BULUT tarafından doktora tezi olarak yürütülmektedir. Bu araştırmayla e-öğrenme sistemleri kullanımını etkileyen kritik başarı faktörlerinin sosyal öğrenme platformu kullanıcılarının bağlılığını ve algılanan başarısını ne ölçüde açıkladığı araştırılacaktır. Belirlenen faktörlere göre oluşturulan modelle bu ortamların etkililiğini ve verimliliğini en üst düzeye ulaştırabilecek öneriler sunmak amaçlanmaktadır. Dönem boyunca Edmodo sosyal öğrenme platformunu kullanan öğrenciler bu çalışmanın katılımcısı olarak belirlenmiştir. Katılımcılardan anket yoluyla veri toplanacak ve kullanım deneyimleriyle ilgili mülakat yapılacaktır. Araştırma iki dönem boyu sürecek olup anket ve mülakat çalışmaları dönem sonlarında gerçekleştirilecektir.

Bu çalışmaya katılım tamamen gönüllü olup katılmamaktan ötürü ya da katılımdan vazgeçme sonunda olumsuz hiçbir sonuç olmayacaktır. Toplanan bilgiler sadece araştırmacı tarafından kullanılacaktır. Katılımcıların isimleri tamamen gizli tutulacaktır. Hiçbir rapor ya da tezde katılımcı isimleri kullanılmayacaktır.

Araştırmaya yönelik oluşabilecek sorularla ilgili olarak araştırmacının kendisiyle doğrudan iletişime geçilebilecektir. Aşağıdaki araştırmacının adresi, telefon numarası ve e-posta adresi verilmiştir.

Araştırmacının Adı: İbrahim Hakkı Bulut

Adres: ODTÜ Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü Üniversiteler Mah. Dumlupınar Blv. No:1 06800 Çankaya Ankara

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Bu bilgileri ışığında (araştırmanın amacı, araştırmacının kimliği, kullanılacak veri toplama araçları, araştırmanın süresi ve katılımcılar ile toplanan verilerin güvenliği) çalışmaya gönüllü katılmayı kabul ediyorum.

CURRICULUM VITAE

PERSONAL INFORMATION

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EDUCATION

Degree	Institution	Year of Graduation
MS	Bilkent University CEIT	2010
BS	Bilkent University CEIT	2009
High School	H.Ö. Tarman And. High School, Ankara	2004

WORK EXPERIENCE

Year	Place	Enrollment
2016-Present	İstanbul Medeniyet University	Research Assistant
2012 Sept.	METU CEIT	Research Assistant
2011 Sept.	İstanbul Medeniyet University	Research Assistant
2011 January	Amasya Education Faculty	Research Assistant

FOREIGN LANGUAGES

Advanced English

PUBLICATIONS

1. Bulut, IH., Delialioglu, O. & Lane, HC. (In press). Beyond Acceptance: A New Model for Technology Engagement in 21st Century Learning. Embracing Digital Learners in an Age of Global Educational Change and Rapid Technological Advancements.

2. Çalık, B., Bulut, IH., Akgün, OE., & Uçan, S. (2018). Education faculty students' attitudes and perceptions towards distance education. VI. International Curriculum and Instruction Congress, Kafkas University, Kars, Turkey.

3. Arslantas, T. K., Bakay, S., Bulut, İ. H., & Kilis, S. (2015). Faculty Members' Perception toward Computer Education and Instructional Technology Field in terms of Opportunities and Risks & Future of the Field. In EdMedia: World Conference on Educational Media and Technology (pp. 1238-1246). AACE.

4. Bakay, S., Bulut, I. H., & Delialioglu, Ö. (2013). English as a Foreign Language (EFL) Students' Readiness and Perceptions towards Mobile Learning. EDULEARN13 Proceedings, (pp. 251-257). IATED.

5. Bulut, I. H., Bakay, S., & Delialioglu, Ö. (2013). Third-Person Effect in Violent Video Games. EDULEARN13 Proceedings, (pp. 1050-1054). IATED.