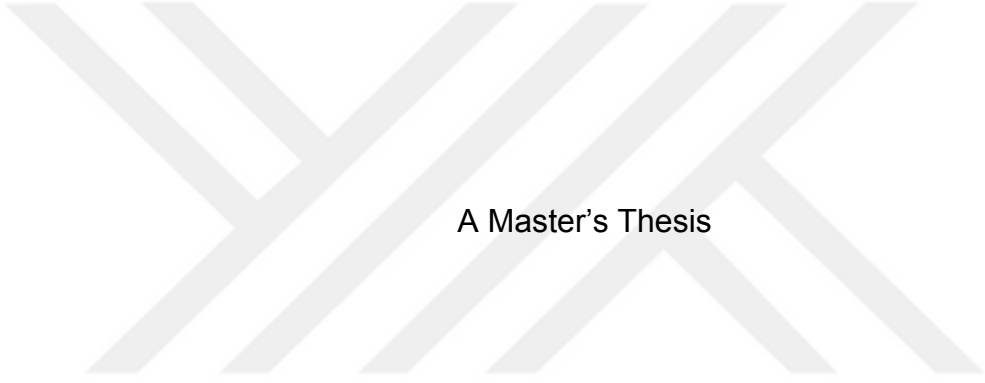


ANALYZING STUDENT SATISFACTION WITH BLENDED LEARNING IN A
STUDIO AND NON-STUDIO COURSE



A Master's Thesis

by
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by
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April 2017

ACKNOWLEDGEMENT

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Economics and Social Sciences.



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Hazal Aksoydan

ABSTRACT

ANALYZING STUDENT SATISFACTION WITH BLENDED LEARNING IN A STUDIO AND NON-STUDIO COURSE

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The aim of this thesis is to explore whether student satisfaction with blended learning (BL) differs according to studio and non-studio courses. Moreover, this thesis also aims to investigate the direct and indirect effects of BL environment on overall course satisfaction and student performance. The thesis is conducted at Bilkent University in Ankara, during 2015-2016 Spring and Fall Semester. Third and fourth year Interior Architecture and Environmental Design students, who are taking a studio and a non-studio course within a blended learning environment, are participated in the study. A structured survey was conducted under 4 different factors of BL: (1) interaction, (2) instruction, (3) instructor, and (4) technology. Findings were obtained by calculating exploratory factor analyses for each course type. Later, the developed factors were analyzed by employing Structural Equation Modeling to test direct and indirect effects among performance, course

satisfaction and overall course satisfaction. The findings indicated that the direct effect of BL satisfaction and overall course satisfaction on student performance is statistically significant in both studio courses and non-studio courses.

Keywords: *Blended Learning; Non-Studio Courses; Studio Courses; Student Satisfaction*



ÖZET

ÖĞRENCİ MEMNUNİYETİNİN KARMA ÖĞRETİMLİ STÜDYO VE STÜDYO DIŞI DERSLERDE ANALİZİ

Aksoydan, Hazal

İç Mimarlık ve Çevre Tasarımı Yüksek Lisans Programı

Tez Yöneticisi: Y. Doçent. Dr. Yasemin Afacan

Nisan, 2017

Bu tezin amacı, karma öğrenme ile öğrenci memnuniyeti arasındaki ilişkinin, stüdyo ve stüdyo dışı derslere göre farklı olup olmadığını araştırmaktır.

Ayrıca bu tez, karma öğrenme ortamının genel tatmin ve öğrenci performansı üzerindeki, doğrudan ve dolaylı etkilerini de araştırmayı amaçlamaktadır.

Tez, 2015-2016 Bahar ve Güz döneminde, Ankara'da Bilkent Üniversitesi'nde gerçekleştirilmiştir. Çalışmaya, karma öğrenme yöntemi ile tasarlanan bir

stüdyoya ve bir stüdyo dışı dersi alan üçüncü ve dördüncü sınıf İç Mimarlık

ve Çevre Tasarımı öğrencileri katılmıştır. Örneklem grubuna, karma

öğrenmenin 4 farklı faktörü altında yapılandırılmış sorulardan oluşan bir

anket yapılmıştır: (1) etkileşim, (2) öğretim, (3) eğitmen ve (4) teknoloji.

Bulgular, her ders türü için keşif faktörü analizleri hesaplanarak elde

edilmiştir. Daha sonra geliştirilen faktörler, performans, ders memnuniyeti ve

genel ders tatmini arasındaki doğrudan ve dolaylı etkileri test etmek için

Yapısal Eşitlik Modellemesi kullanılarak analiz edilmiştir. Bulgular, karma

öğrenme ile aktarılan hem stüdyo hem de stüdyo dışı derslerde, öğrenci memnuniyetinin ve genel ders tatmininin öğrenci performansı üzerindeki doğrudan etkisinin istatistiksel olarak anlamlı olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Karma Öğrenme; Öğrenci memnuniyeti; Stüdyo Dersler; Stüdyo Dışı Dersler





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CHAPTER 1

INTRODUCTION

As the higher education changed by time, blended learning (BL) becomes increasingly significant in terms of course learning objectives, student's time needs, and promoting effective learning. There are various advantages of BL such as; cost savings, time flexibility and pedagogic richness. Among these advantages, the most commons are a learner-centered educational method, and interactivity among students and the instructor (Wu, Tennyson, & Hsia, 2010). With this increasing trend of BL in higher education, some researches also find out some improvable factors of BL such as integrating technology into the course, technological difficulties, developing the course format, administrative support (Smyth, Houghton, Cooney & Casey, 2012; Ocak 2011).

The key aspect of BL is that, it shifts the focus of learning and enables students to contribute their own education. Thus, it is accepted as a useful approach that joins effectiveness and the socialization importunities of the classroom education with the technological developments of the online learning (Dziuban, Hartman, & Moskal, 2006).

Especially, in the field of interior architecture, there are many studies on BL. Some studies have compared the learning effectiveness of BL courses with non-BL courses, in terms of student achievement and engagement, course success, and student performance. However, there are a few studies examined the direct and indirect relationships among BL courses in terms of the course types (studio and non-studio) and student satisfaction. Thus, this study intends to find out the direct and indirect relationship between the student satisfaction and the studio/ non-studio courses in a BL environment.

1.1 Aim of the Study

In the light of the literature review, BL is a developing educational method in the field of architecture. The main purpose of the study is to explore whether student satisfaction with BL differs according to studio and non-studio courses. Moreover, this thesis also aims to investigate the direct and indirect effects of BL environment on overall course satisfaction (OCS) and student performance.

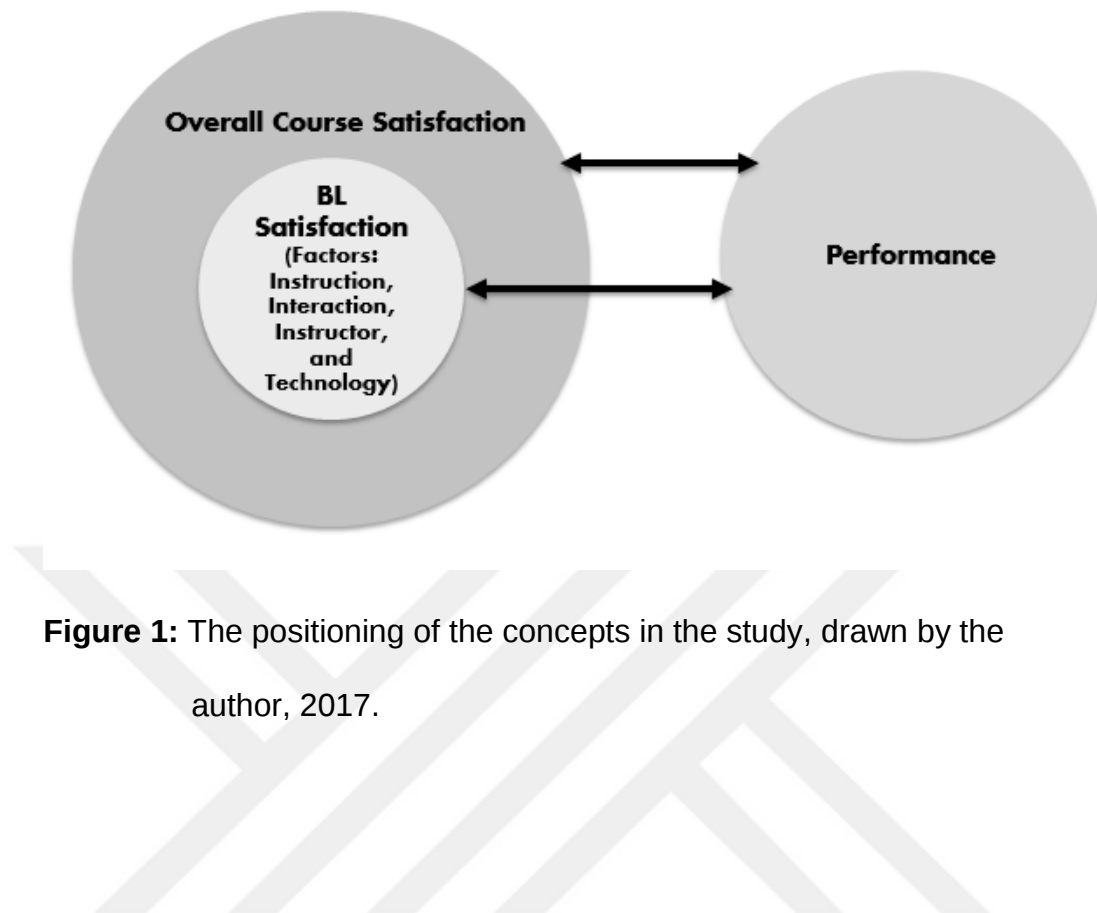


Figure 1: The positioning of the concepts in the study, drawn by the author, 2017.

1.2 The Structure of the Thesis

The chapters of this thesis are organized as follows; Chapter 2 is the literature review part that mainly examines the definition of the term 'blended learning' and its historical development with studies. Chapter 3 focuses on the architectural education and its relationship with BL. Chapter 4 is the methodology part of the research introduced. It mentions the hypothesis and the research question of the thesis. The statistical methods used in the study to obtain results are explained in the methodology part. Chapter 5 is the result chapter, in which firstly the results of the factor analysis are given in the order of studio and non-studio courses, and secondly, the results from the Structural Equation

Modeling (SEM) and structural correlation analysis are given in the order of studio and non-studio courses. Chapter 6 is the discussion part of the study, in which all the results are discussed. In addition to the statistical results given in Chapter 5, the discussion of open-ended questions is also added in Chapter 6. Chapter 7 is conclusion, which summarizes overall literature review, the scientific contributions of the thesis, limitations and suggestions with some notes for the future studies.



CHAPTER 2

LITERATURE REVIEW

2.1. What is Blended Learning (BL)?

Since the usage of technology and digital medium are increasing day-by-day, education systems have been also affected from this trend with a concept and system called e-learning. E-learning offered an education system with no space or place barriers such as classrooms, campuses, cities or countries. Anyone, who has an accessible system to the education platform, can start and continue his/her education. Although, it seemed highly advantageous and radical, e-learning has brought a configured diversion called BL.

BL has many definitions in various researches such as hybrid course (Garnham & Kaleta, 2002; Hensley, 2005; Reasons, Valadares, & Slavkin, 2005; Skibba, 2006; Young, 2002), mixed mode learning (Bates & Poole, 2003; Harasim, 2000), and distributed learning (Dabbagh, 2004; Dempsey & Van Eck, 2007; Lefoe, Gunn, & Hedberg, 2002; Saltzberg & Polyson, 1995; Twigg, 2001). Various definitions cover diverse topics. The most commonly accepted definition is that BL means combining face-to-face instruction technique with a web-supported online education technology (Afacan, 2015; De Zure, 2002,

Garrison & Kanuka, 2004). It shifts away from traditional, face-to-face classroom courses with a more student-centered learning model by using various active and interactive online applications such as readings, discussions, and uploads (Cicco, 2015). With the help of this combined learning process, students simply be a part of their self-learning processes. In this manner, it makes learning more meaningful to them (Buckey, 2002). BL combines face to face teaching with technology and aims to maximize student learning and their satisfaction of the course.

There are three main factors included in the broad definition of BL; (i) combining instructional modalities; '(ii) combining instructional methods and (iii) combining online and face-to-face instruction' (Curtis, Graham, Cross & Moore, 2005; Graham, 2006; Jones and Lau, 2010; Macdonald, 2008). Thus, the blend could be in between any forms of computer-mediated instruction such as videotape or a web-based learning interface with face-to-face (F2F) classroom teaching (Graham, 2006, Wu, Tennyson, & Hsia, 2010). As Thorne. K (2003) mentions, BL is the most reasonable and spontaneous evolution of the education practice since it makes the educational process possible to practice from all the advantages of both teaching methods; online learning and traditional, face-to-face classroom instruction (So & Bonk, 2010). It proposes an elegant solution to the education system in regards with the needs of individuals by blending two instructional methods.

2.2. Supportive Tools for BL

Since, BL is directly connected with technology, participants of BL education must be in collaboration with technology and multimedia. This collaboration should support the learning process in various different ways. There are some categories of knowledge application tools that strengthen BL such as: content portal technologies, collaborative filtering techniques, search engines and text retrieval, directory technologies and expertise locators, virtual synchronous classrooms, digital content asset management systems, web based content management systems, electronic document management systems, digital library technology, and knowledge map software (Suprabha & Subramonian, 2015). These supportive tools of BL provide a learning environment centering the learner and their needs through usage of technology and multimedia.

With the increase of WWW (World Wide Web) and Internet usage, these two tools become most common tools for supporting the education systems and directly included in blended learning systems. By using these tools, the following characteristics of BL (Horton, 2008) improve the quality and quantity of learning. Firstly, BL develops knowledge by making it more reachable to people (Suprabha & Subramonian, 2015). It intercepts knowledge by making it facile for people to record what they know (Suprabha & Subramonian, 2015). Secondly, it redefines knowledge so it is transferred in a way that is also

beneficial to others (Suprabha & Subramonian, 2015). Moreover, it allows rapid knowledge sharing, that involves making knowledge accessible. Besides sharing knowledge, it also applies information with action on pedagogical messages and pedagogical assumptions.

2.3. Benefits of BL

BL uses face-to-face instruction with technology, aim to maximize the learning by being learner-centered. To examine the profits and challenges of BL, dividing the system into two parts would make the process clearer. BL is more student-centered compared to the traditional classroom learning. Thus, it is beneficial both for the students and institutions. According to Driscoll (2002) and Abdelaziz (2012), a BL educational experience should cover the following factors: Firstly, it should engage students in the activities to maintain discipline (Suprabha & Subramonian, 2015). It should create collaboration and interaction of multiple visions on what is being learned with the help of forums or discussions (Suprabha & Subramonian, 2015). This engagement could be supported through technology or multi-media to integrate technological instruction materials such as 'video, audio, e-mail, text, live chat sessions, online discussions, quizzes, forums, and assignments with the traditional classroom experience' (Wu et. al 2010). With combination of traditional classroom and online learning method, the instructional delivery and communication between instructors and

students can be performed at the same time (synchronously) or at different times (asynchronously). Thus, it provides instructors and learners with multiple and flexible instructional methods, educational technologies, interaction mechanisms and learning resources. Practicing those in an interactive learning environment, could conquer both the limitations of classroom and e-learning. As a result, BL systems accommodate better the needs of students or instructors (Pituch & Lee, 2006).

According to Cheng, Sheng-Huang, Shi-Jer, and Ru-Chu (2012), the aim of BL model is integrating selected advantages of the classroom learning with e-learning to generate personalized learning process for students. It should encourage learners in setting their goals and shaping up their own learning experience by making students a part of their learning process. According to (Dhakiria, 2012), to develop the learning process, students should be a part of their learning sources and supplies. This approach also leads to different benefits, such as increase in the level of independency in the learning process, more interaction with the both lecturer and other students and motivation to learn more.

Lastly, it should make the students to think about what and how they are learning (Suprabha & Subramonian, 2015). Various studies find out that the learning outcomes of BL are higher than the traditional education. BL makes learning more convenient and flexible by

accessing classrooms according to our own appropriate time. It is interactive through digital platforms by promoting online discussions both with the lecturer and other students. Moreover, it provides getting feedback on online assessments. BL leads effective source usage by hyperlinking to websites by providing additional learning materials that are readily available. All of these features result in higher student satisfaction in BL (Dhakiria, 2012).

Despite the above-mentioned benefits of BL, there are challenges while blending two learning environments. Some studies find out that BL can pose challenges for both students and institutions. For example, according to Bullen (2006), students feel disconnected from other peers in a web-based education. The isolation feeling derives from low usage of classroom setting, students' unrealistic expectations about the course and technological problems for both students and institutions facing. The time commitment required for the course requires redesigning the course periodically by the instructor, and creates complexity in gaining new teaching and technological skills (Suprabha & Subramonian, 2015).

There are some opposing studies to the concept of combining the benefits of F2F education and online learning in the format of blended learning. According to Picciano (2002), there is a complexity in the application of successful interactive learning environments. There is

endless design probability and applicability to many context with the challenge of virtually (Garrison & Kanuka, 2004).

2.4. Models of BL

Blended learning models aim to connect two sides of learning methods with are teacher-led classroom teaching and learner-oriented online learning (Cicco, 2015). There are various types of learning models based on how BL is implemented. Staker and Horn (2012) have found out that there are four main BL models that analysis from the perspective of students. It had been modeled in details for the primary and secondary school education in their report for the Innosite Institute, Boston, USA (Suprabha & Subramonian, 2015). First one is *rotation model*, in which online engagement is combined or rather, embedded, within a range of face-to-face forms of instruction in a rotated manner. Secondly, in *flex model*, multiple students are engaged primarily online, but under the supervision of a teacher who is physically present in the model. Thirdly, the *self-blending model*, students choose different courses to take independently, but do so in a setting where a supervising teacher and other students are co-present. Lastly, the *enriched-virtual model*, in which virtual experiences are ought to enriched only periodically through the arrangements of physical co-presence (Friesen, 2012). The four discrete combinations are explained in Figure 2. Two of these four combinations, which are *rotation model*

and *enriched-virtual* are of direct relevance to the higher education, while the others show the kinds of combinations that are educationally feasible, but probably preferred for K-12 settings. These models listed as relatively classroom-intensive combinations to ones that are more dependent on online mediation.

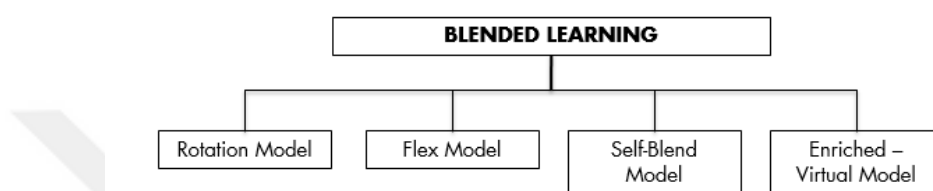


Figure 2: Blended learning models (Adapted from Stalker & Horn, 2012)

According to Stephen (2012), Model Driven Design (MDD) is the structure developed to apply complex learning experiences. MDD breaks down the complexity of the learning experience into three different models; a team model, a process model, and a perceptual model (Suprabha & Subramonian, 2015). Team model pays attention to the participants of learning experience and how the team is staffed and empowered in terms of their responsibilities. Process model covers the development phase of the learning. As a last step, perceptual model examines how the experience is disputed and visualized. This MDD system provides learning experiences beyond borders of institutions by modeling down parts of the BL experience.

Another modeling system of BL is explained by National Research Council (NRC), a blended instructional strategy should be consisted of four components which are; *knowledge-centered*, which puts emphasis on understanding rather than remembering; *learner-centered*, in which individual learners' personal and cultural backgrounds and learning styles are valued; *community-centered*, which has collaborative learning activities and fosters a community of practice and inquiry involving legitimates peripheral participation, and finally *assessment-centered*, during which formative assessment is used to make student thinking visible and evaluations performance-oriented. This model centers the needs of learners and creates the content requirements and delivery methods based on these needs. By being knowledge-centered, it emphasizes on understanding rather than remembering. Learner-centered and community-centered accepts learners' personal and cultural backgrounds and accepts differentiation of each learner's learning styles with covering out collaborative learning activities. Lastly, by being assessment-centered, the model provides students to see their process or learning experience solid and visible.

A very similar model by Dziuban et al. (2006) combines the pedagogical approaches that links the effectiveness and the socialization opportunities of the classroom with the technological materials of online learning under these five components (Gedik, 2010): '(1) the BL approach must be student-centered and use a selection process; (2) combining or mixing web-based technology to accomplish an

educational goal; (3) combining pedagogical approaches (e.g. constructivism, behaviorism, cognitivism) to produce an optimal learning outcome with or without instructional technology; (4) combining any form of instructional technology with face-to-face instructor-led training and (5) combining instructional technology with actual job tasks' (Suprabha & Subramonian, 2015). BL represents a new approach and a mix of classroom and online activities consistent with the goals of specific outcomes and behavioral changes. According to Garrison and Vaughan (2008), the main adoptions of the blended design are; integrating face-to-face and online learning, a optimizing course design to improve student engagement, and restructuring and replacing traditional class contact hours with the support of online platforms (Suprabha & Subramonian, 2015).

Lastly, according to Boitshwarelo (2009), a BL model consists of analysis, design, development, implementation, execution, and evaluation stages. These stages forms a systematic improvement of the instruction by highlighting the content structure, cognitive process, and collaborative activities among students and the instructor (Suprabha & Subramonian, 2015). Content structure formed by different information types and performance goals, whereas cognitive process is mostly aiming to enhance cognitive activity by using visual forms and formats to support and improve perception. On the other hand, collaborative activities are shaped by active participation in the activities.

2.5. The Role of Student Satisfaction in BL Courses

There are various definitions of student satisfaction in studies but they can be classified under two main categories; (1) the perception of enjoyment and state of being pleased of the student from the learning experience (Moore, 2009; Sweeney & Ingram, 2001) and (2) the total of student feelings and behaviors that concluded from the results of the learning process (Naaj et. al, 2012) and the learning environment (Thurmond et. al, 2002; Wu et. al, 2010).

As understood from these two common definitions, student satisfaction is not directly linked to the students' academic performance and course grades. It is more likely to be formed with particular aspect of their learning, for example their course materials. The student satisfaction may not rebound to the course performance (Sockalingam, 2013). It is more accurate to combine the student experience with the quality of the education since it effects the student's level of motivation (Chute, Thompson, & Hancock, 1999; Donahoe & Wong, 1997; Naaj et. al, 2012). Besides, it provides a contentment of taken education from the institute, positioning as a public relations asset for the university (Naaj, Nachouki & Ankit, 2012). According to Booker and Rebman (2005), student satisfaction is positively related to the interception and the decision making process of taking one or more additional course similar to the satisfied one (Naaj et. al, 2012).

However, previous studies on students' satisfaction do not compare it in between course types as studio and non-studio. In general, they focus on the relationship between the student satisfaction and student performance or student retention (Howard & Maxwell, 1982; Liu & Jung, 1980). Richardson and Swan (2003), examined social presence in online courses in relation to students' perception of learning and student satisfaction. The comparison studies focusing student satisfaction are subjected to the online learning and traditional learning (Archer, 1997; Maki, et. al, 2000; Pear & Novak 1996). This study focuses on the four aspects of student satisfaction and searches for a relationship between these four aspects and the course type; studio course and non-studio course.

2.6. Factors Effecting Student Satisfaction in BL Courses

Student satisfaction is one of the main factors in the successful application of blended learning method (Naaj et. al, 2012). Thus, student satisfaction could be affected directly and indirectly from different factors such as interaction, instruction, and technology. According to the literature, there are six main factors which can have both direct and indirect relationships with student satisfaction in BL; instructor, technology, class management, interaction, instruction, and learning management system (Naaj, et al, 2012). The purpose of the study of Naaj et. al. (2012) is to develop an acceptable and effective

survey instrument for the measurement of student satisfaction with BL. Besides this main purpose, there are two sub-purposes that is related to this study; '(i) identifying the factors influencing student satisfaction, and (ii) evaluate the level of the overall student satisfaction with BL' (Naaj, et al, 2012).

In a more compact study, Bollinger and Martindale (2004) have focused on instructor, technology, and interaction as the key factors effecting student satisfaction. However, instruction as a factor, has a significant role for this study, since there is a comparison between the course types; studio and non-studio. Thus, instruction is added to the three main factors, which are heavily focused by previous studies; interaction, instructor, and technology. In this study, the factor 'course management' from the Naaj's study is extracted since the studio courses do not have course book or both courses do not have a technical support member dedicated to BL method. This study examines the relationship between these four factors; instruction, interaction, instructor, and technology, effecting student satisfaction in BL courses.

2.6.1. Interaction

Interaction in its dictionary definition means a kind of an action, communication, or reaction in between two or more objects / subjects (Turner, 2006). According to American Psychological Association (1997), social collaboration between student and student, student and instructor, student and content (Moore, 1989) called interaction, should be allowed by the course and encouraged in the learning environments.

Providing collaborative learning tools such as group work and giving feedbacks and comments help to improve student satisfaction in the online and blended learning environment (Bonk & Cunningham 1998). Creating an active learning experience for students and social communication between students supports one of the perceptions of student satisfaction, which is 'learning by doing'. Since, blended-learning has more potential for interaction, it has also have a potential to change the learning pattern and practices (De George-Walker & Keeffe, 2010) which is a supportive characteristic for different learning styles of learners (McCray, 2000).

2.6.2. Instruction

Instruction in its dictionary definition means teaching by transferring knowledge or learning from one person to other(s) (Turner, 2006).

There are three main types of instruction; instructor-focused, dialogue-

oriented, and student-focused. These three categories have also sub categories. The sub categories of the instructor-focused instruction are as follows: (i) direct instruction, in which the instructor explains or demonstrates the subject, (ii) drill and practice, which repeats the information to memorize, and (iii) lecture format providing a one-way mainly verbal instructory. Secondly, there are two sub categories of dialogue-oriented; (i) question and answer format, requiring an exchange between the instructor and the learner, and (ii) discussion format, which means exchanging of opinions and perspectives. Last but not least, student-focused instruction has three sub categories; (i) mental modeling assists students to learn the information by themselves by the method of problem-solving; (ii) discovery learning derives from the personal experiences of the learners, and (iii) inquiry, allowing students firstly generating the questions by themselves and then search for the answers (The Educator's Field Guide, 2011).

In terms of BL, student-focused instruction gains importance since one of the main focuses of BL education is a learner. Students are more satisfied with understandable instructions as they learn easily. How well courses are planned and taught also affects the retention, enrollment of another blended course, and recommending the course to other students (DeBourgh, 2003).

2.6.3. Instructor

Instructor in its dictionary meaning is the person who instructs, teaches on a specialised subject (Turner, 2006). According to Finaly-Neumann (1994) and Williams and Ceci (1997), the instructor is the main predictor in BL course satisfaction. With rising of the online and BL, the role of the instructor has been also transformed. It had become closer to the facilitator than a lecturer (Richardson & Swan, 2003). In the dissertation study of Comey (2009), BL systems produce a higher level of student participation and a stronger sense of being connected to the instructor.

The in-class performance of the instructor (DeBourgh, 1999; Hiltz, 1993), his/her availability outside the class, his/her response on time, giving feedback on assignments in a timely manner (Moore & Kearsley, 1996), and communication on regular basis (Mood, 1995) are the specified expectations of students, which are affecting their course satisfaction.

2.6.4. Technology

The term technology in its simplest meaning is the body of knowledge devoted to creating tools, processing actions and extracting materials (Turner, 2006). Technology is the factor that forms the main difference between a BL and a traditional one (David, Bagozzi & Warshaw, 1989).

Online and BL technology usages enrich the learning experience by providing flexibility, accessibility, and a systematical tool. Access is the main issue in the use of technology in learning (Bower & Kamata, 2000). Students should have access to the supported reliable course materials place-independently, the opposite of this situation creates decrease in the student satisfaction level with high levels of frustration for the online learning environment (Naaj et. al, 2012; Hara & Kling, 2003). Technology also supports the learning experience by allowing students to create their own learning pace and style, storing information more effectively (Richardson & Swan, 2003). Content portal technologies, collaborative filtering techniques, search engines and text retrieval, directory technologies and expertise locators, virtual synchronous classrooms, digital content asset management systems, web-based content management systems, electronic document management systems, digital library technology, and knowledge map software are some items of technological materials that usage in BL (Suprabha & Subramonian, 2015).

CHAPTER 3

BL IN ARCHITECTURAL DESIGN EDUCATION

3.1. E-learning and Design Studios

Knowledge is defined as information combined with experience, context, interpretation and reflection (Davenport et al., 1998). In the field of design, the aim of the education is not barely acquiring available information (Lee, 2014). Knowledge is created through project based projects that are conducted both in studio and non-studio courses. A studio environment is promoted as the ideal educational setting in design disciplines, such as industrial design, architecture, interior architecture, urban design, as they are based on group problem-solving, collaboration, and problem-based learning (Bose, 2007; Saghafi, Franz, & Crowther, 2014).

According to Demirkan and Afacan (2012), design studios are the core of the architectural education since designing is a matter of analyzing, synthesizing, evaluating, and presenting ideas for a creative solution. Design studio education is based on the core process of 'learning by doing' (Schon, 1981). The design studio takes it base from the problem-solving learning approach and collaboration. It emphasizes team working, focuses on processes and practice and interdisciplinary (Eliouti, 2006). A design studio provides a discussion environment in which the students have the opportunity to take feedbacks from the instructor (Gürel, 2010). This interaction between the

learner and instructor enables the design studio education rich in teaching, learning with communication potential. Thus, design studio has a potential to benefit from blended-learning education since it allows both the instructors and the students to utilize the possibilities of new information and communication technologies (ICTs) (Afacan, 2015). The instruction in design studio could be supported with representations such as visual, verbal, tactile and written, assessment types such as design reviews, juries, and studio work and teaching methods as desk, individual critiques, group tutorials and lectures (Afacan, 2015).

As the daily trends have changed according to the technological improvements, the new generations' habits have also changed (Pektas, 2012). According to Prensky (2001), there are two types of person in this digital world; a digital native, who born into the digital world, and a digital immigrant, who learns to adapt to this digital environment. Since the population characteristics changed according to the digital improvements and applications, the traditional teaching methods are no longer sufficient for this community (Pektaş, 2012). Therefore, educational technology has started to change by being more flexible and adaptable. Online learning methods started to integrate with design studios in the architectural education since design studio based courses are considered as ideal educational settings for project based disciplines such as architecture, graphical design, and landscape design (Saghafi & Crowther, 2012).

3.2. E-learning and Non-studio Courses in Design Education

Design education could be classified into two main course groups as the theoretical and application based courses (Pektaş & Gürel, 2014). These two main groups are instructed to students in two different types of courses. The applicatory courses such as basic design, interior design, architectural design, and graphical design are instructed through studio classes in which the students are faced with cases solved with learning-by-doing, usually interactively by involved in a team or group (Pektaş, 2007). On the other hand, the theoretical courses of the design education are based on transformation of the up to date knowledge or the historical development of a subject. The theoretical knowledge is instructed through non-studio courses in the field of design.

Design education is also a mixture of design studio courses and theoretical courses and detailed technical information given in these non-studio courses (Bala, 2010). According to Afacan (2014), students have been facing with some difficulties on being motivated in non-studio courses in terms of design education. There are several reasons behind this which are ‘(i) students could not link their non-studio course content to their studio practices, (ii) students have a naïve conceptualization of creativity, and (iii) students could not find self-confidence about the skills that non-studio courses required’ (Eberly Center for Teaching Excellence, 2012). Non-studio courses which are instructed with BL, have been increased the active learning and affected the academic achievement (Afacan, 2014).

Researches about non-studio courses with BL are mostly studied in the field of psychology. In the field of psychology, BL format usually preferred for the introductory psychology course which is associated with large classes (Wilson, 1996). Adapting e-learning for the introductory courses resulted in decrease of poor attendance, disinterest to the subject, and inappropriate behaviors such as talking, sleeping (Forsyth & Archer, 1997).



CHAPTER 4

METHODOLOGY

4.1. Aim of the Study

As explained in the literature review, BL is an effective instructional method in the last ten years. To improve its impact on the student learning outcome and instructor performance, many researches have been working on its effectiveness. One of the most important key aspects of BL is student satisfaction. This study aims to explore whether student satisfaction with BL differs according to studio and non-studio courses. The following sub-aims are also investigated within the framework of this thesis:

- (1) To identify factors influencing student satisfaction in studio and non-studio courses through Factor Analysis and
- (2) To evaluate indirect effects of BL satisfaction factors on overall course satisfaction mediated by performance through Structural Equation Model (SEM) in studio and non-studio courses.

4.2. Research Questions and Hypotheses

4.2.1. Research Questions

This study analyzed the following research questions:

1. Does student satisfaction with BL differ according to studio and non-studio courses?
2. Does BL satisfaction have an indirect effect on overall course satisfaction mediated by performance in studio courses?
3. Does BL satisfaction have an indirect effect on overall course satisfaction mediated by performance in non-studio courses?

4.2.2. Hypotheses

To investigate the response to these research questions, there are four hypotheses that are formulated to be tested in the study. The first two hypotheses are related with the four factors, which are interaction, instruction, instructor and technology, contributing to the student satisfaction in blended learning education. They are tested by Exploratory Factor Analysis Method.

Hypothesis 1:

There are different factors contributing to student satisfaction in studio courses with BL.

Hypothesis 2:

There are different factors contributing to student satisfaction in non-studio courses with BL.

The other two hypotheses are concerned with the indirect relationships between the student performance and overall course satisfaction. They are tested by Structural Equation Modeling (SEM) analysis. After Structural Equation Modelling, to analyze the direct and indirect relationship paths between performance, BL satisfaction and overall course satisfaction (OCS), Structural Correlation Analysis is applied.

Hypothesis 3:

BL satisfaction has an indirect effect on overall course satisfaction mediated by performance in studio courses (tested through SEM).

Hypothesis 4:

BL satisfaction has an indirect effect on overall course satisfaction mediated by performance in non-studio courses (tested through SEM).

4.3. Method of the Study

4.3.1. Sample Group and the Setting

Third and 4th year undergraduate students were selected as the sample group from the Department of Interior Architecture and Environmental Design, Bilkent University. Two different types of courses were used as the studio and non-studio courses. As the studio course, IAED 301- Interior Design Studio V and IAED 401- Interior Design Studio VII were selected from the Fall Semester of 2015-2016. As the non-studio course, IAED 342- Sustainable Design for Interiors was selected from the Spring Semester of 2015-2016. In total 148 students, 85 female and 63 male, were participated. 118 of 148 participants were the same participants, who were taking both of the courses.

Modular-Object-Oriented-Dynamic-Learning-Environment (MOODLE), is the online course management system at Bilkent University and also used as a supporting online portal for the BL courses. The non-studio course, IAED 342 Sustainable Design for Interiors, consisted of twice-weekly two-hour lecture sessions, during which the theoretical part of the sustainability including seven topics (one per two weeks), sustainable strategies, water systems, waste water and its reuse, toilet design, energy conservation, indoor environmental quality: heating and cooling, were introduced.

4.3.2. Procedure

4.3.2.1. Data Collection Tool: The Survey

To observe the impact of BL on student satisfaction, performance and OCS, data was collected through a survey instrument at the end of each semester. The survey instrument is applied to each participant face to face. The survey instrument is consisted of 3 different parts, which are Part A, Part B, and Part C (See Appendix A for the survey instrument).

Part A collects some basic information about the participant demographic data and their previous BL experience(s). It starts with background information about the participant; such as their name, surname, age, gender, course title, and Grade Point Average (GPA). After that, it asks the participants' their previous BL experience(s) with four different questions; how many BL courses that they have taken, how often do they use the supporting online course tool MOODLE, do they want more BL courses for their department, and does the usage of MOODLE (for the course the survey given) saved their time.

Part B has 25 questions in 5-Point Likert-scale (from 5 'strongly agree' to 1 'strongly disagree') in order to form a reliable scale that is easy to read and complete for participants (Bertram, 2007). The questions are listed randomly under these three main groups of BL Satisfaction:

Interaction- Instruction- Instructor- Technology with reference to Naaj, et al. (2012), Performance, and Overall Course Satisfaction (OCS). The questions are listed randomly to avoid any biases. Each statement of survey was formed by considering these sub topics and by linking them with the BL experience.

Lastly, Part C has 3 open-ended questions to have the thoughts, comments and opinions of the participant students about their BL experience. First question is asking for any suggestions for the MOODLE usage. Second question is about how can be a BL course made more efficient and the last question is about whether they have any further issues related to BL.

To maintain the internal reliability of the questionnaire, after the completion of the data collection phase, a reliability analysis was conducted with the use of Cronbach's alpha, similar to the study of Naaj et. al. (2012). The alpha reliability coefficient of the factor analysis of studio course's Cronbach's alpha is 0.823 and non-studio course's is 0.841 indicating that the instrument was reliable.

4.3.3. Data Analysis

For data analysis exploratory factor analysis and SEM were applied. For these analyses, SPSS 21.0 package software and AMOS 21.0 package software were used. Figure 2 is showing the process model of data analysis of this study in phases. Starting with the phase one, the factors are identified by exploratory factor analysis and after with these factors, SEM is conducted to find out the direct and indirect relations between the factors by calculating coefficients for each one of them. Finally, a correlation analysis is made to construct an output diagram of causal relationship between these factors.

The data analysis has three main phases as; Phase 1: Factor Analysis, Phase 2: SEM, Phase 3: Structural Correlation Analysis to find out the direct and indirect relations between the factors by calculating coefficients for each one of them. Finally, a correlation analysis is made to construct an output diagram of causal relationship between these factors (See Figure 3).

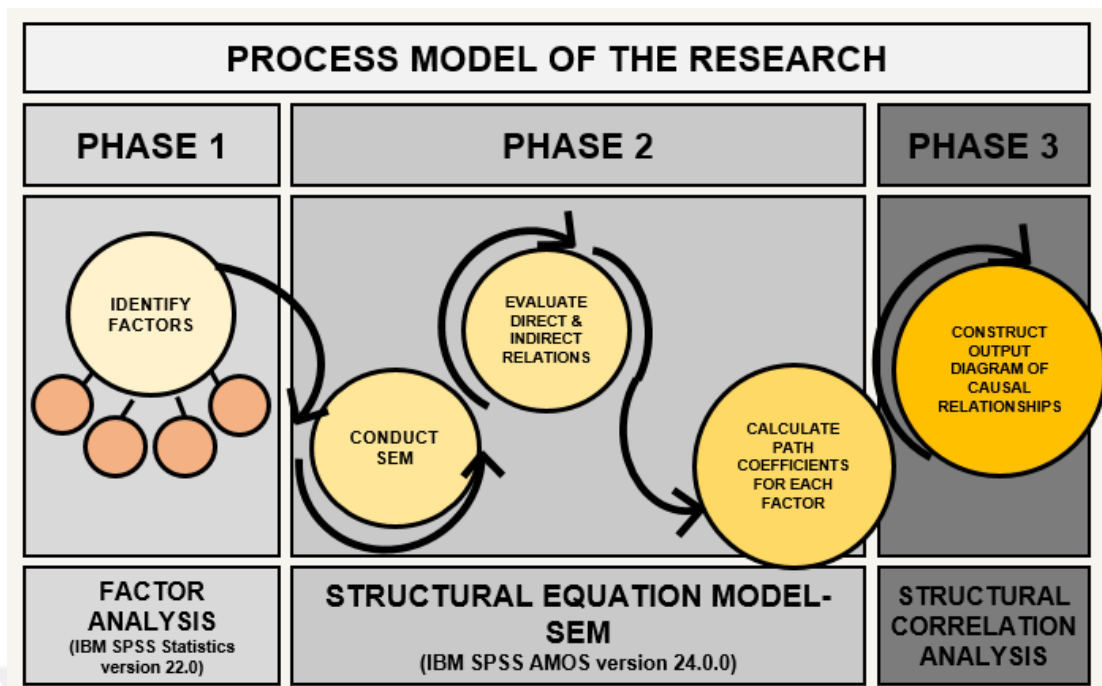


Figure 3: The process model of the study including phases, drawn by the author, 2016.

4.2.3.1. Factor Analysis

Statistical analyses are made in respect of the research hypotheses as stated previously. The comparison of student satisfaction in a blended studio and non-studio course is analyzed by the survey (See in Appendix A) with factor analysis by IBM SPSS Statistics version 22.0. The factor analysis test is used to group related to questions under a factor and to order these questions according to their importance. Firstly, a principal component analysis is carried out on the correlations of 25 questions. The correlation matrix of 25 questions is examined to decide if the strength of the correlation between the questions is reliable for factor analysis. The study defined factor

loadings in excess of 0.30 as suitable and excluded factor loadings below 0.30. Each question is found above 0.30, thus no question is extracted to increase the reliability of the test.

4.3.3.2. Structural Equation Modeling (SEM) and Structural Correlation Analysis

After the factor analysis, SEM analysis is conducted with SPSS AMOS version 24.0.0 to find out the direct and indirect relations between the factors by calculating coefficients for each one of them. SEM is a statistical methodology to form the casual relationships between the determined variables (Byrne, 2011). For this study, the hypothesized structural model was tested through SEM analysis, which confirms relationships and reveals their causal nature and strength (Bollen & Long, 1993; Naaj et. al, 2012).

The relationships between the theoretical constructs are represented by regression or path coefficients between the factors (Hox & Bechger, 2011). SEM has originated from path analysis, which is invented by Sewall Wright in 1921. It is still necessary to draw a path diagram to start a SEM analysis. To identify a path analysis Hox and Becher (2011) mentioned boxes for observed or measured variables and circles for latent or unmeasured factors. The relationship between them are explained by arrows. A single headed

arrow, also can be called as 'a path', is used to explain a causal relationships or regression coefficients in the model. A double-headed arrow shows a covariance or correlation, without a causal interpretation (McArdle, 1996).

Correlation analysis is a data analysis method developed by Jack Cohen in 1968 (Cohen, 1998). The analysis is based on the relationship between the multiple regression and correlation (MRS) and the analysis of variance (ANOVA). The purpose of using this method in this study is to measure the accuracy of the find out data results from the SEM (Hox, 1998).

CHAPTER 5

RESULTS

5.1. Factor Analysis Results for Studio Course

Exploratory factor analysis was conducted to the survey with 25 items via SPSS 22.0 package software. The correlation matrix was developed to understand whether the strength of the correlation between the questions is reliable for the factor analysis (Okutan, 2016). The items scored lower than 0.30 is needed to be eliminate since 1.00 is the indicator of a perfect correlation (Okutan, 2016). The scores below 0.30 represent a weak association (Argyrous, 2005). All items from the survey were scored above 0.30 and so, all statements were included in the analysis. With 25 items of the survey, a rotated component matrix was structured to determine the factors from the set of the correlations. The rotated component matrix resulted with factors below with the items rotated under the factors. The rotated items' loadings are important to identifying the factor's statement. Factors having 3 items or less than 3 items were excluded in order to maintain strong correlation system and 5 factors were identified with 60.55 % variances (See Table 1). The reliability of the survey items for studio course was investigated.

To carry out an effective data analysis, the items also checked for a floor and/ or ceiling effects. A floor and/or ceiling effect could be occurred in a Likert-Scale since the response means for each item are lower and/or higher than they should be (Krathwohl, 1997), i.e. extreme ends of the used scale (Okutan, 2016. None of the items are scored with a mean lower than 1.50 or greater than 4.50. Also, the reliability of the survey for studio course was investigated. As a result, the Cronbach's alpha value was found as 0.87. According to Nunnally, (1978) this value should be above 0.70 for a survey to be reliable. Therefore, the survey could be stated as reliable.

Table 1: Summary of the rotated factors for studio course, drawn by the author, 2016.

Factor	Scale	Eigenvalue	Variance (%)	Cumulative (%)
1	Course Mechanism	6.80	27.21	27.21
2	Student Course Experience	3.08	12.34	39.55
3	Inreraction with Instructor	2.37	9.50	49.06
4	Technology Management	1.48	5.92	54.99
5	Student Motivation	1.39	5.55	60.55

The rotated factor matrix of the studio course, showed in the Table 2, defined five meaningful factors of BL satisfaction in the studio course. For Factor 1, the rotated items are interpreted as 'Course Mechanism'. The items rotated under the Factor 1 specify the value of timely feedbacks and discipline observed in the classroom belonging to instructor sub-category, regular attendance taking and usage of BL

technology appropriately belonging to instruction, and enjoying working on assignments by themselves from the performance. These five items are a cluster of student 'course mechanism' perception each belonging to the sub-categories of; instructor, instruction, and performance. (See Table 2, Factor 1- Q19, Q20, Q21, Q18, and Q15). The component loadings of these five items are 0.801, 0.736, 0.683, 0.659, and 0.625.

Table 2: Factors of BL satisfaction in studio course with Cronbach's alpha = 0.876, drawn by the author, 2016.

Factor 1	Course Mechanism	
	Q19	0.801
	Q20	0.736
	Q21	0.683
	Q18	0.659
	Q15	0.625
Factor 2	Student Course Experience	
	Q3	0.866
	Q11	0.792
	Q5	0.617
	Q12	0.607
	Q10	0.565
Factor 3	Interacion with Instructor	
	Q17	0.761
	Q4	0.752
	Q2	0.739
	Q13	0.644
Factor 4	Technology Management	
	Q23	0.759
	Q24	0.756
	Q22	0.537
	Q25	0.527

Table 2: Continued

Factor 5	Student Motivation	
	Q14	0.784
	Q7	0.696
	Q14	0.491

The rotated items of Factor 2 are interpreted as 'Student Course Experience' of the blended studio course. The five items of Factor 2 related with the sub-categories of interaction with the quality of interaction between all involved participants of the course and satisfaction with the interaction with other students, instruction with the item being able to apply learning outcomes from the course, overall satisfaction with recommending the course to others, and performance with the satisfaction with the final grade of the course. Students relate their course experience with these five items selected from the sub-categories of interaction, instruction, overall satisfaction and performance. (See Table 2, Factor 2- Q3, Q11, Q5, Q12 and Q10). The component loadings of these five items are 0.866, 0.792, 0.617, 0.607 and 0.565.

Factor 3, the rotated items are named as 'Interaction with Instructor' in the blended studio course. There are four items cluster under this factor, which are dissatisfaction with the accessibility and availability of the instructor, dissatisfaction with the collaborative process during the course, cannot interrupt the lecturer in the classroom, and being less satisfied compared to a traditional learning experience. These four items belong to the sub-categories of instructor, interaction and instruction (See Table 2, Factor 3-

Q17, Q4, Q2, and Q13). The component loadings of these four items are 0.761, 0.752, 0.739, and 0.644.

The rotated items of Factor 4 are interpreted as 'Technology Management' in a blended studio course. There are four items clustered under the Factor 4, highlighting the importance of technology usage for a BL experience and how it affects the overall course satisfaction. The five items are: the clearance of the course content shown on the smart board, the frequency of the technological problems and how they affected the subjects' understanding of the course, reliability of the used technology and overall satisfaction with the course. These five items are belonging to the sub-categories of technology and overall satisfaction with their component loadings 0.759, 0.756, 0.537, and 0.527 (See Table 2, Factor 4- Q23, Q24, Q22 and Q25).

Lastly for the Factor 5, the clustered items are named as 'Student Motivation' of the blended studio course. There are three items rotated as the participants willing to take another blended course, the usage of BL technology encourages them to learn independently, and the BL session keeps them alert and focus. These three items belong to the sub-categories of overall satisfaction, technology and interaction with component loadings of 0.784, 0.696, and 0.491 (See Table 2, Factor 5- Q14, Q7, and Q1).

5.2. Factor Analysis Results for Non-studio Course

Exploratory factor analysis was formed with the refined survey with 25 items via SPSS 22.0 package software to find out the related ones. The correlation matrix was developed to decide on the strength of the correlation between the questions is reliable for the factor analysis. The items scoring lower than 0.30 are needed to be eliminate since 1.00 is the indicator of a perfect correlation (Okutan, 2016). The scores below 0.30 represent a weak association (Argyrous, 2005). All items from the survey were scored above 0.30 and so, all statements were remained in the analysis. With 25 items of the survey, a rotated component matrix was constructed to determine factors from the set of the correlations (Okutan, 2016). The rotated component matrix resulted with factors and their loadings which are essential to identifying the factor's statement. Factors with 3 items or less than 3 items were removed to maintain the strong correlation system and 4 factors were identified with 52.19 % variances (See Table 3).

To carry out an effective data analysis, the items also checked for a floor and/or ceiling effects. A floor and/or ceiling effect could be occurred in a Likert-Scale sinceteh response means for each item are lower and/or higher than they should be (Krathwohl, 1997), i.e. extreme ends of the used scale (Okutan, 2016). None of the items are scored with a mean lower than 1.50 or greater than 4.50. Also, the reliability of the survey for studio course was investigated. As a result, the Cronbach's alpha value was found as 0.803.

According to Nunnally, (1978) this value should be above 0.70 for a survey to be reliable. Therefore, the survey could be stated as reliable.

Table 3: Summary of the rotated factors for non-studio course, drawn by the author, 2016.

Factor	Scale	Eigenvalue	Variance (%)	Cumulative (%)
1	Student BL Course Interpretation	7.39	29.58	29.58
2	Student Motivation	2.32	9.30	38.88
3	Technology Management	1.89	7.57	46.45
4	Student Course Experience	1.43	5.56	52.19

The rotated factor matrix of the non-studio course, also showed in the Table 4, defined four meaningful factors of blended learning satisfaction in the non-studio course. The rotated items of Factor 1 are named as 'Student BL Interpretation'. The items of Factor 1 highlight the importance of students' feeling of satisfaction in different sub-categories. The first item, which is summarizing all of the BL course satisfaction of the students is as follows; 'Overall I am very satisfied with the course' ranked as the first item of the Factor 1. The other eight items are named as the satisfaction of student's own participation in the class, interaction as satisfaction of the student's own interaction with other students, instructor as made to feel as a true member and the usage of BL technology appropriately by the instructor, instruction as giving feedbacks in a timely manner, being able to apply what the course had learned, and comparing the BL course satisfaction to a face-to-face course setting. These 9 items defined the perception of BL in the course students' mindset. They are

interpreted as a BL experience in linked with these 9 items; each of belonging to the sub-categories of overall satisfaction, performance, interaction, instructor, and instruction (See Table 4, Factor 1- Q25, Q6, Q5, Q16, Q19, Q12, Q11, Q13 and Q18). The component loadings of these nine items are 0.742, 0.722, 0.692, 0.669, 0.636, 0.583, 0.555, 0.443 and 0.431.

Table 4: Factors of BL satisfaction in non- studio course with Cronbach's alpha = 0.803, drawn by the author, 2016.

Factor 1	Student BL Course Interpretation	
	Q25	0.742
	Q6	0.722
	Q5	0.692
	Q16	0.669
	Q19	0.636
	Q12	0.583
	Q11	0.555
	Q13	0.443
	Q18	0.431
Factor 2	Student Motivation	
	Q7	0.72
	Q1	0.696
	Q3	0.632
	Q20	0.484
Factor 3	Technology Management	
	Q24	0.837
	Q23	0.62
	Q22	0.475
Factor 4	Student Course Experience	
	Q9	-0.792
	Q4	-0.693
	Q17	-0.549
	Q21	0.476
	Q8	0.444

Factor 2, the rotated items are interpreted as the 'Student Motivation'. The items of Factor 2 highlight the importance of student motivation at the course with the items of technology as encouraging to learn independently, interaction as the BL session keeping the student always alert and focus and being satisfied with the quality of the interaction between all involved participants, and instruction as discipline during a BL classroom. Participants determined that their motivation is linked with these 4 items; each of belonging to the sub-categories of technology, interaction, and instruction (See Table 4, Factor 2- Q7, Q1, Q3, and Q30). The component loadings of these four items are 0.720, 0.696, 0.632, and 0.484.

The rotated items of Factor 3 are interpreted as 'Technology Management' in a blended non-studio course. In Factor 3, the three items highlight the importance of technology as frequency of technical problems during blended non-studio course, clearance of the course content displayed on smart board, and the reliability of the technology used for the blended non-studio. The subjects specify meaning of the technology management in a blended studio with these three items belonging all to the sub-category technology (See Table 4, Factor 3- Q24, Q23, and Q22). The component loadings of these three items are 0.837, 0.620, and 0.475.

Lastly in Factor 4, the rotated items are interpreted as the 'Student Course Experience' of the blended non-studio course. The five items of Factor 4 belong to the sub-categories of performance as dissatisfaction with the

subjects' own performance for the course, interaction as dissatisfaction with the process of collaborative activities during the course, instructor as dissatisfaction with the accessibility and availability of the instructor and his/her attendance taking, and overall satisfaction as the level of effort the course required. Participants determine their course experience with these five items belonging the sub-categories; performance, interaction, instructor and overall satisfaction. (See Table 4, Factor 4- Q9, Q4, Q17, Q21 and Q8). The component loadings of these five items are -0.792, -0.693, -0.549, 0.476 and 0.444.

5.3. SEM and Structural Correlation Analysis Results for the Studio Course

For this study, SEM is used as a confirmatory analysis for the second set of hypotheses. For the studio course, the hypothesis 2.A is 'BL satisfaction has an indirect effect on OCS mediated by performance in studio courses'. To explain the hypothesis 2.A in a figure form; the below structural model is created (See Figure 4).

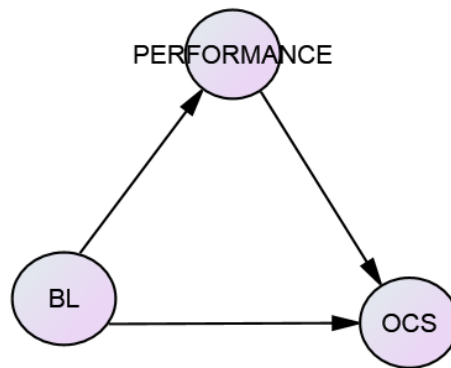


Figure 4: Structural model of studio course, drawn by Author, 2017.

The model in Figure 5 is a confirmatory factor model for the data collected for studio course, which was extracted from IBM SPSS AMOS version 24.0.0. The data are the answers of 118 students from the studio course on the survey. There are three hypothesized factors; BL satisfaction (shown as BL in the Figure 5), course performance (shown as PERFORMANCE in the Figure 5) and overall course satisfaction (shown as OCS in the Figure 5). In this study, the structural equation modeling is used to find out whether there is any influence of BL satisfaction on OCS mediated by the performance; all the questions in the survey is linked to the three main factors; BL Satisfaction, Performance and OCS. Seventeen questions belong to BL Satisfaction, four questions belong to Performance, and four questions belong to OCS. There is only one single headed arrow between the three factors, which indicates that there is an influence of BL satisfaction on OCS mediated through the performance. The arrows from the factors to the

variables represent a linear regression coefficients or 'factor loadings'. It is assumed that each observed variable and factor is associated with residual error term, which is also unmeasured and depicted by a circle which are shown as 'e' and 'R' in the Figure 5. BL satisfaction, performance, and OCS are the latent variables and questions of the survey which are symbolized with the letter Q and a number near are the observed variables (items on the survey) (Bowen & Guo, 2012).

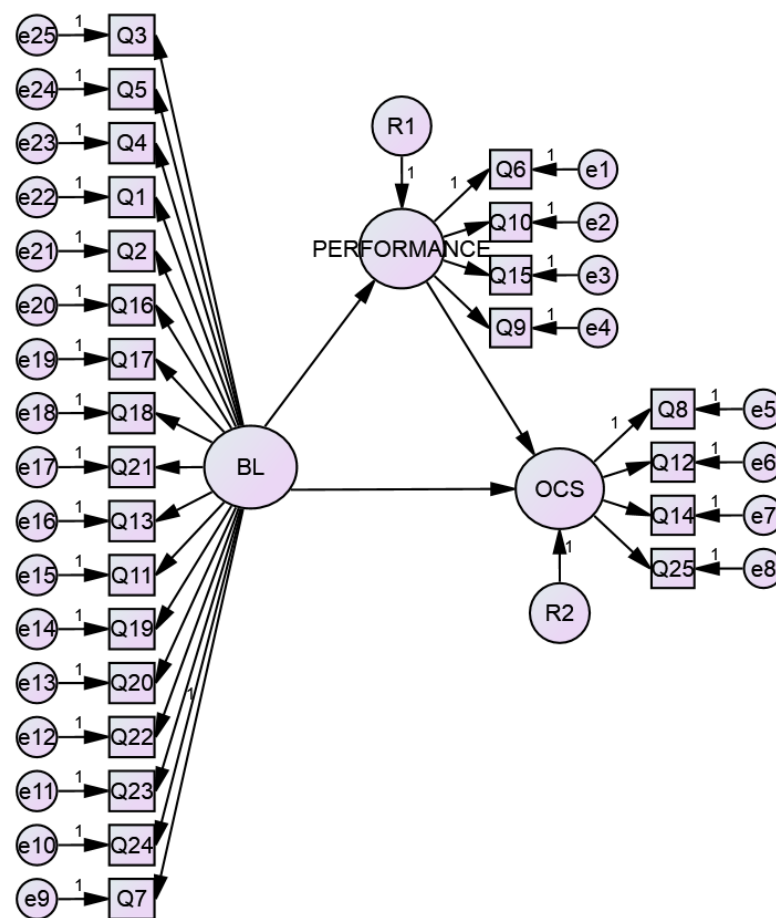


Figure 5: Measurement model of studio course with questions, drawn by Author, 2017.

The core parameters in a structural equation model are the regression coefficients and the variances and covariance of the independent variables (Byrne, 2011). Thus, after the first run of SEM analysis, the questions (Q3, Q5, Q4, Q2, Q17, Q18, Q21, Q13, Q11 from blended learning satisfaction- Q6 from Performance- Q8, Q12 from OCS) which have insignificant regression coefficients (above the value 1) are extricated from the model. After the extricated questions, the final model which is also called 'Measurement (CFA) Model of Studio' is as in the Figure 6.

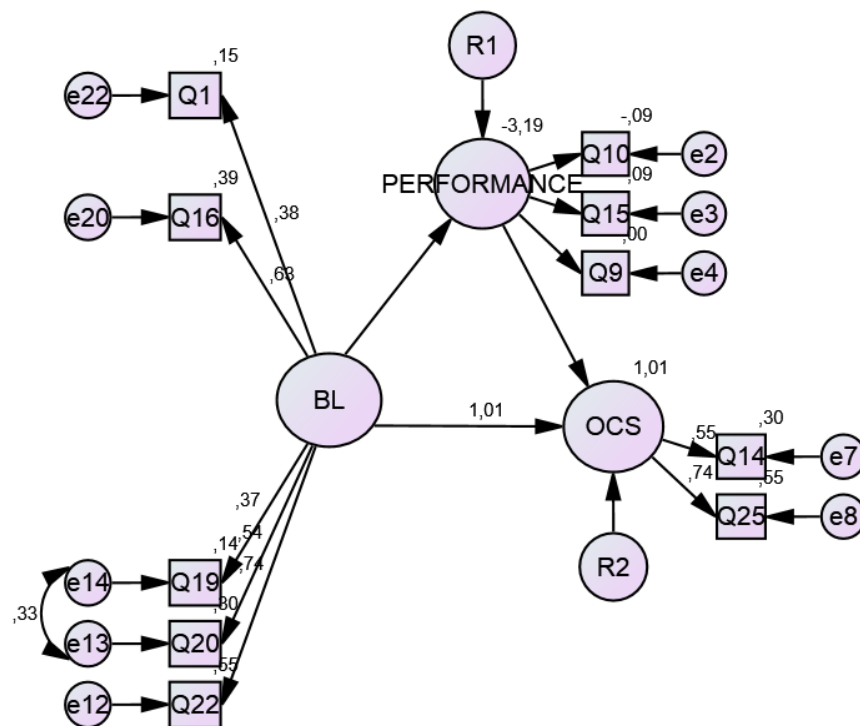


Figure 6: Modified model of studio with questions, drawn by Author, 2017.

Table 5: Fit measures for the structural model from the confirmatory factor analysis results for studio.

	X2	df	GFI	AGFI	TLI	CFI	RMSEA
Model	61.034	31	0.908	0.901	0.902	0.901	0.049
Acceptable range			>0.90	>0.90	>0.90	>0.90	>0.50

The goodness of fit was measured by the likelihood ratio chi-square (x2), GFI, AGFI, TLI, CFI, and RMSEA.

Table 5 presents the structural correlation analysis results for the studio course. There is a statistically significant direct effect of BL satisfaction on student performance similar to the direct effect on overall course satisfaction. Contrast to these two direct relationships, there is not a statistically significant direct effect of student performance on overall course satisfaction in the studio courses.

Table 6: Parameter estimates of the structural equation model for studio.

			Estimate	S.E	C.R	P
PERFORMANCE	<-----	BL	1.354	0.406	3.334	***
OCS	<-----	BL	1.442	0.425	3.396	***
OCS	<-----	PERFORMANCE	-0.004	0.083	-0.043	0.966

Hypothesis 2.A _ Rejecting

BL satisfaction has an indirect effect on overall course satisfaction mediated by performance in studio courses (tested through SEM).

- The direct effect of BL satisfaction on student performance is statistically significant in studio courses.
- The direct effect of BL satisfaction on overall course satisfaction is statistically significant in studio courses.
- The direct effect of student performance on overall course satisfaction is not statistically significant in studio courses.

5.4. SEM and Structural Correlation Analysis Results for the Non-studio Course

For this study, SEM is used as a confirmatory analysis for the second set of hypotheses. For the non-studio course, the hypothesis 2.B is 'BL satisfaction has an indirect effect on OCS mediated by performance in non-studio courses'. To explain the hypothesis 2.B in a figure form; the below structural model is created (See Figure 7).

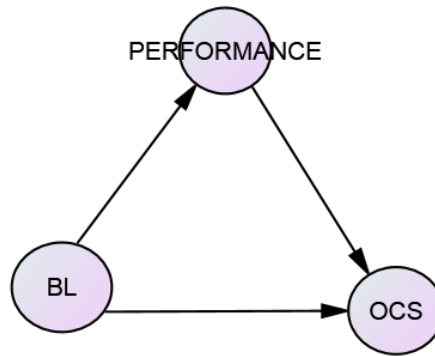


Figure 7: Structural model of non-studio course, drawn by Author, 2017.

The model in Figure 8 is a confirmatory factor model for the data collected for non-studio course, which was extracted from IBM SPSS AMOS version 24.0.0. The data are the answers of 148 students from the studio course on the survey. There are three hypothesized factors; BL satisfaction (shown as BL in the Figure 8), course performance (shown as PERFORMANCE in the Figure 8) and overall course satisfaction (shown as OCS in the Figure 8). In this study, the structural equation modeling is used to find out whether there is any influence of blended learning satisfaction on overall course satisfaction mediated by the performance; all the questions in the survey is linked to the three main factors; BL Satisfaction, Performance and OCS. Seventeen questions belong to Blended Learning Satisfaction, four questions belong to Performance, and four questions belong to OCS. There is only one single headed arrow between the three factors, which indicates that there is an influence of BL satisfaction on overall course satisfaction mediated through

the performance. The arrows from the factors to the variables represent a linear regression coefficients or 'factor loadings'. It is assumed that each observed variable and factor is associated with residual error term, which is also unmeasured and depicted by a circle which are shown as 'e' and 'R' in the Figure 8. BL satisfaction, performance, and OCS are the latent variables and questions of the survey, which are symbolized with the letter Q and a number near are the observed variables (items on the survey) (Bowen & Guo, 2012).

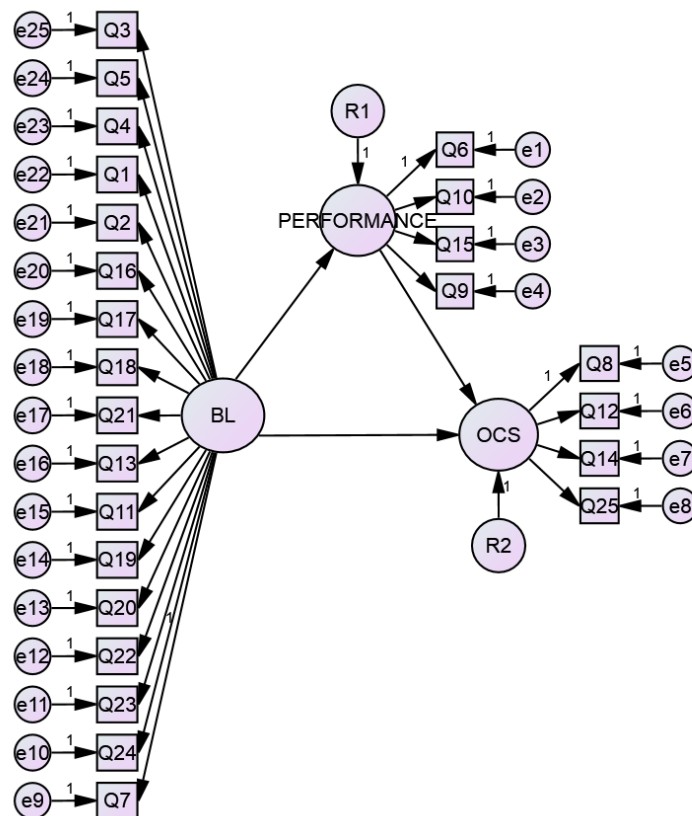


Figure 8: Measurement model of non-studio course with questions, drawn by Author, 2017.

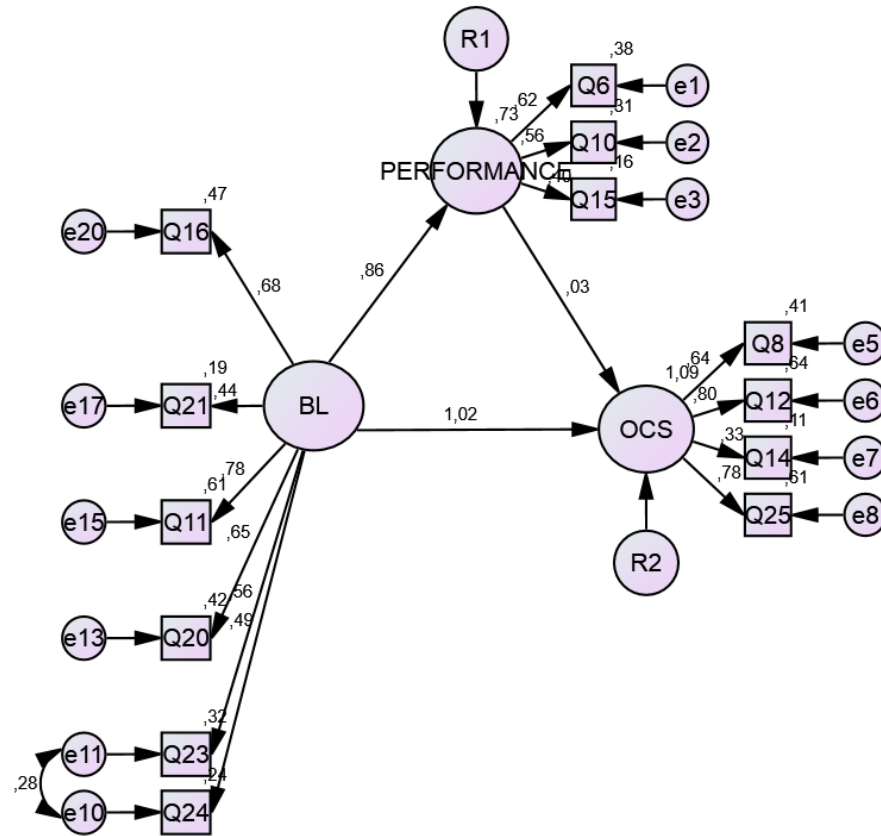


Figure 9: Modified model of non-studio with questions, drawn by Author, 2017.

The core parameters in a structural equation model are the regression coefficients and the variances and covariance of the independent variables (Byrne, 2011). Thus, after the first run of SEM analysis, the questions (Q3, Q5, Q4, Q1, Q2, Q17, Q18, Q13, Q19, Q22, Q7 from blended learning satisfaction- Q9 from Performance) which have insignificant regression coefficients (above the value 1) are extricated from the model. After the extricated questions, the final model which is also called ‘Measurement (CFA) Model of Non Studio’ is as in the Figure 9.

Table 7: Fit measures for the structural model from the confirmatory factor analysis results for non-studio.

	X2	df	GFI	AGFI	TLI	CFI	RMSEA
Model	95.574	61	0.908	0.901	0.933	0.947	0.049
Acceptable range			>0.90	>0.90	>0.90	>0.90	>0.50

The goodness of fit was measured by the likelihood ratio chi-square (x2), GFI, AGFI, TLI, CFI, and RMSEA.

Table 7 presents the structural correlation analysis results for the non-studio course. There is a statistically significant direct effect of BL satisfaction on student performance similar to the direct effect on overall course satisfaction. Contrast to these two direct relationships, there is not a statistically significant direct effect of student performance on overall course satisfaction in the non-studio courses.

Table 8: Parameter estimates of the structural equation model for non studio.

			Estimate	S.E	C.R	P
PERFORMANCE	<-----	BL	0.724	0.125	5.815	***
OCS	<-----	BL	0.942	0.241	3.908	***
OCS	<-----	PERFORMANCE	0.032	0.257	0.125	0.901

CHAPTER 6

DISCUSSION

To summarize, the purpose of the study is to explore whether student satisfaction with BL differs according to studio and non-studio courses.

Factor analysis method is used to examine this purpose by finding out the factors that influencing student satisfaction in studio and non-studio courses.

Factor analysis results also covered one of the sub-purposes of the study that is to evaluate indirect effects of BL satisfaction factors on overall course satisfaction mediated by performance in studio and non-studio courses.

These indirect effects are examined by SEM analysis.

In the first phase, for the studio course, five factors are rotated under the factors effecting BL satisfaction in studio course, which are named as course mechanism, student course experience, and interaction with instructor, technology management, and student motivation. For the non-studio course, four factors are rotated under the factors effecting BL satisfaction in non-studio course, which are named as student BL course interpretation, student motivation, technology management, and student course experience. The first set of hypotheses are ‘there are different factors contributing to student satisfaction in studio or non-studio courses with BL’, the factor analysis results support the hypotheses.

The factor analysis results of blended non-studio course supported that there are different factors affecting student satisfaction in a non-studio course. These factors are rotated as 4 main different components, which are named as 'Student BL Course Interpretation', 'Student Motivation', 'Technology Management', and 'Student Course Experience'. From the order of the factors rotated, to start with the Factor 1, it is significant that how the students experience the BL course from their own perspective. Their satisfaction level is affected from their own participation, their interaction with other students, feeling as a true member of the class, timely manner in the feedbacks, being able to apply what they have learned, and the usage of appropriate technology. According to Maki et. al. (2000), the degree of student satisfaction has a direct relationship with learning effectiveness and achievements. In this study, Factor 1 supports this relationship. The items that are rotated under the Factor 1 is also supported the fact that blended learning is a student-centered education experience and the studies of Chute, Thompson, and Hancock (1999) and Donahoe and Wong (1997) focusing on linking the student satisfaction with the students' course experience and the quality of the education.

In the second phase, SEM is conducted to evaluate direct and indirect relationships between student performance, BL satisfaction and OCS. To build a model, following hypotheses are formed 'BL satisfaction has an indirect effect on OCS mediated by performance in studio / non-studio

courses'. The results of the SEM analysis of the studio course, have shown that:

1. The direct effect of BL satisfaction on student performance is statistically significant in studio courses (P value is smaller than 0.5).
2. The direct effect of BL satisfaction on OCS is statistically significant in studio courses (P value is smaller than 0.5).
3. The direct effect of student performance on OCS is not statistically significant in studio course (P value is greater than 0.5, $p = 0.966$).

Resulting from these three outcomes, the hypothesis 'BL satisfaction has an indirect effect on OCS mediated by performance in studio courses is rejected.

The results of the SEM analysis of the non-studio course have shown that:

1. The direct effect of BL satisfaction on student performance is statistically significant in non-studio courses (P value is smaller than 0.5).
2. The direct effect of BL satisfaction on OCS is statistically significant in non-studio courses (P value is smaller than 0.5).
3. The direct effect of student performance on OCS is not statistically significant in non-studio course (P value is greater than 0.5, $p = 0.901$).

Resulting from these three outcomes, the hypothesis 'BL satisfaction has an indirect effect on OCS mediated by performance in non-studio courses' is rejected.

Table 9: A comparison table of the studio and non-studio course results, drawn by the author, 2017.

Studio Course	Non-studio Course
"Feedback on evaluation of tests and other assignments was given in a timely manner" has the highest component loading.	"Overall I am very satisfied with the course" has the highest component loading
"A BL session keeps me always alert and focused" has the lowest component loading.	"I am satisfied with the level of effort this course required" has the lowest component loading.
Five factors rotated under the studio course.	Four factors rotated under the non-studio course.
Three factors named as same as with the non-studio factors; 'Technology Management', 'Student Course Experience' and 'Student Motivation'.	Three factors named as same as with the studio factors; 'Technology Management', 'Student Course Experience' and 'Student Motivation'.
Factor 4 named as 'Technology Management' is ranked 1.48 as Eigenvalue.	Factor 3 named as 'Technology Management' is ranked 1.89 as Eigenvalue. .
Factor 2 named as 'Student Course Experience' is ranked 3.08 as Eigenvalue.	Factor 4 named as 'Student Course Experience' is ranked 1.43 as Eigenvalue.
Factor 5 named as 'Student Motivation' is ranked 1.39 as Eigenvalue.	Factor 2 named as 'Student Motivation' is ranked 2.32 as Eigenvalue.
All five factors are 60.55% significant as the cumulative.	All four factors are 52.19% significant as the cumulative.
There is a direct effect of BL satisfaction on student performance in studio courses.	There is a direct effect of BL satisfaction on student performance in non-studio courses.
There is a direct effect of BL satisfaction on OCS in studio courses.	There is a direct effect of BL satisfaction on OCS in non-studio courses.
There is not a direct effect of student performance on OCS in studio courses.	There is not a direct effect of student performance on OCS in non-studio courses.

CHAPTER 7

CONCLUSION

To summarize, the purpose of the study is to explore whether student satisfaction with BL differs according to studio and non-studio courses. As shown in the results, there are different BL factors contributing student satisfaction when the studio and non-studio courses are compared. Thus, the hypothesis 'There are different factors contributing to student satisfaction in studio / non-studio courses with BL' is not rejected by the results from factor analysis.

However, the hypothesis 'BL satisfaction has an indirect effect on overall course satisfaction mediated by performance in studio / non-studio courses' is rejected by the results from the SEM analysis. According to the results from SEM analysis, it is found that BL satisfaction has a direct effect on student performance and overall course satisfaction in both studio and non-studio course. However, the direct effect of student performance on overall course satisfaction could not found statistically significant both for studio and non-studio course.

BL is a new instructional strategy. A lot of studies are focusing on the BL nowadays (Suprabha & Subramonian, 2015). Previous studies on the BL mainly focus on student performance and its relationship between BL. Reviewing the literature has shown that there had also been studies about

BL satisfaction with traditional course satisfaction, BL satisfaction effect on student performance, BL satisfaction effect on the student success, BL for studio courses, or BL for non-studio courses. However, besides student performance, student satisfaction is another key issue to be focused on BL courses because satisfaction is linked with both performance and OCS and also comparing the BL satisfaction in terms of the course types; studio and non-studio is a new study especially for the field of architecture. In this respect, this study contributes to the literature by being a first study on student satisfaction in BL of two different course types.

From the results of the study, there are some specific outcomes in terms of better student satisfaction in BL studio and non-studio course. To start with the studio, Q3 which is 'I am satisfied with the quality of interaction between all involved students and instructors' has the highest mean value (0.866) among the all survey questions. Thus, the majority of the studio participants highlight interaction as linked to student satisfaction. Supportively, from the open-ended questions at the Part C (See Appendix A), there are some suggestions to increase the interaction between the students and instructors. According to one student, 'Face-to-face is always a better option to me, maybe a chat option could be added to the MOODLE (the online platform of the course) and instructors could reply time to time in a specific time period such as office hours to increase the interaction'. On the other hand, Q24 which is 'Technical problems are not frequent- they do not adversely affect my understanding of the course.' has the highest value (0.837) among the all survey questions for the non-studio participants. The possible reason behind

this finding could be more frequent usage of the technology in the non-studio course compared to the studio course. The non-studio course that is subjected for this study, IAED 342- Sustainable Design for Interiors, integrates presentations through online forums, studioworks are uploaded in MOODLE, and feedbacks are given through the online platform that links with the technology perception of the students.

To maximize the student satisfaction in a studio course with BL, course mechanism should be clear to improve students' course experience (see Table 1). Also, students should be able to communicate and interact with the instructor (see Table 1). Last but not least, technology management should be improved and well-designed according to the studio. As from the open-ended questions from the Part C (see Appendix A), another student (22) mentions an easier and well-designed interface increase the usage of online platforms. Similar to the studio courses, to maximize the student satisfaction in non-studio course, it is important to students' interpretation of the BL course. Secondly, students should be motivated by learning independently and interactively in a disciplined BL classroom. Last but not least, technology management and student course experience should be considered in the non-studio courses similar to the studio courses.

There are also some limitations for this study. The student number and the cultural differences could be counted as the limitations of the study.

According to the study of Naaj et al. (2012), the student satisfaction with BL differs according to the gender. According to the results of Naaj's study, male

students tended to be more satisfied with BL than the female students. For further research, the number of female students and male students could be equalled to compare the outcomes and findings. Also, an increase at the number of participated students will create more comprehensive findings. Moreover, this study is limited to Turkish context and especially interior architecture in the field of design. Broadening the study in other design departments such as graphic design architecture, urban design would improve the scope. With this extension, understanding student approach in those design departments on BL would explain other key factors to promote BL instruction.

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APPENDIX

FINAL VERSION OF THE SURVEY IN ENGLISH



SURVEY

This survey aims to collect data about your experiences with the blended learning in a studio/ non-studio course. Blended-Learning is integration of MOODLE with traditional face-to-face class activities in a planned and valuable manner.

Part A:

Background information

Name & Surname:

Age:

Gender:

Course:

GPA:

1. Your prior experience with a blended learning course (please indicate the course and the department)?
 - a. 0 course
 - b. 1 course
 - c. 2 courses
 - d. 3 courses
 - e. more than 3 courses
2. Your usage of MOODLE?
 - a. using it everyday
 - b. using it two or three times a week
 - c. using it only when it is required by the course
3. Do you want more blended-learning courses in your department?
 - a. Yes
 - b. No
4. MOODLE usage of the course has saved my time?
 - a. Yes
 - b. No

Part B:

Please indicate whether you agree or disagree with the following statements:

QUESTIONS		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
		1	2	3	4	5
1	A blended learning session keeps me always alert and focused.					
2	I cannot interrupt the lecturer to ask a question when he/she is on the other side of the blended-learning classroom.					
3	I am satisfied with the quality of interaction between all involved students and instructors.					
4	I am dissatisfied with the process of collaboration activities during the course.					

QUESTIONS		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
		1	2	3	4	5
5	I am satisfied with the way I interact with other students.					
6	I am satisfied with my participation in the class.					
7	The use of blended learning technology in this course encourages me to learn independently.					
8	I am satisfied with the level of effort this course required.					
9	I am dissatisfied with my performance in this course.					
10	I believe I will be satisfied with my final grade in the course.					
11	I am satisfied with how I am able to apply what I have learned in this course.					
12	I am satisfied enough with this course to recommend it to others.					
13	Compared to face-to-face course settings, I am less satisfied with this learning experience.					
14	I am willing to take another course using the blended learning delivery mode.					
15	I enjoy working on assignments by myself.					
16	The instructor makes me feel that I am a true member of the class.					
17	I am dissatisfied with the accessibility and availability of the instructor.					
18	The instructor uses blended learning technology appropriately.					
19	Feedback on evaluation of tests and other assignments was given in a timely manner.					
20	Discipline is highly observed when the lecturer is on the other side of the blended learning classroom.					
21	The lecturer/supervisor always takes attendance.					
22	The technology used for blended teaching is reliable.					

QUESTIONS		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
		1	2	3	4	5
23	Course content shown or displayed on the smart board is clear.					
24	Technical problems are not frequent and they do not adversely affect my understanding of the course.					
25	Overall, I am very satisfied with the course.					

Part C: ADDITIONAL COMMENTS

1. What will you suggest for the MOODLE use for this course?

2. How can be Blended-Learning made more efficient?

3. Please describe any other issues related to the combining online learning and face to face learning.