UNIVERSITI PUTRA MALAYSIA

MEDIATING ROLE OF SELF-REGULATED LEARNING STRATEGIES ON PEER LEARNING, ONLINE LEARNING SATISFACTION AND ACADEMIC ACHIEVEMENT AMONG STUDENTS OF A PRIVATE UNIVERSITY IN MALAYSIA

LIM CHEE LEONG

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By

LIM CHEE LEONG

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Chair : Associate Professor Habibah binti Ab Jalil, PhD
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Challenges students face in the online component of blended learning, especially in the areas related to self-regulation challenges have deferred them in achieving their learning goals. Besides, improper utilization of online peer learning strategy has also been identified as an inherent problem related to self-regulation challenges in the blended learning environment. Therefore this study adopted Zimmerman's perspective of SRL which draws from social cognitive theory and Bandura's self-efficacy theory to determine the influence of Self-Regulated Learning (SRL) strategies and peer learning on students' learning satisfaction and academic achievement.

This study adopted a correlational research design to investigate the possibility of relationships between these variables in this case study. In this case study, the sample was selected based on proportional stratified sampling method in a Malaysian private university. Of the 409 respondents, only 347 were valid for data analysis, forming a usable case of 84.84%. Structural Equation Model (SEM) analysis was used to examine the relationship between the constructs in the hypothesised model.

The results unveiled that students' abilities to self-regulate their learning and to learn effectively with peer accounted for 41% of the variation in learning satisfaction. From the direct effect of the SEM analysis, peer learning was found to have significantly influenced students' SRL strategy, while the use of SRL strategy was found to have a positive and statistically significant effect on their learning satisfaction. Moreover, the findings from the Bootstrapping test concurred that SRL fully mediated the relationship between peer learning and learning satisfaction.

Besides, the results attained also produced a model that predicted 25.1% of the variation in the students' academic achievement. These results explained that peer learning contributed significantly to their academic achievement in blended learning courses. However, there was no significant relationship between peer learning and learning satisfaction. For the moderation test, the Multi-Group Analysis showed that academic discipline has a significant moderating effect on the relationship between peer learning and academic achievement, particularly in the discipline related the science courses. However, the gender difference was not evident in blended learning courses.

This study uncovers and contributes to the existing body of knowledge for blended learning in several ways. In terms of theoretical contribution, this study contributes to the literature on both peer learning and learning satisfaction, by introducing SRL as the mediating variable that interacts with peer learning to influence students' satisfaction. It proposes an integrated, coherent and actionable framework covering a variety of constructs, including SRL strategy, peer learning, learning satisfaction and academic achievement in the context of blended learning. In addition, it also provides insights for universities as to where future efforts need to be directed, especially in the areas related to the improvement of the facilities and infrastructure for blended learning implementation. It also discusses the practical implications as well as suggests several instructional approaches designed to facilitate the development of students' SRL strategy and peer learning through the use of educational technologies.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

PERANAN PERANTARA STRATEGI PEMBELAJARAN ARAHAN KENDIRI DENGAN PEMBELAJARAN RAKAN SEBAYA, KEPUASAN PEMBELAJARAN DALAM TALIAN DAN PENCAPAIAN AKADEMIK DALAM KALANGAN PELAJAR UNIVERSITI SWASTA DI MALAYSIA

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Cabaran yang dihadapi pelajar yang mengikuti pembelajaran teradun, terutamanya dalam bidang yang berkaitan dengan pembelajaran arahan kendiri telah merenjatkan matlamat pembelajaran mereka. Penggunaan strategi pembelajaran rakan sebaya dalam talian yang tidak sesuai juga telah dikenalpasti sebagai masalah yang berkaitan dengan cabaran kendiri dalam persekitaran pembelajaran teradun. Oleh itu, kajian ini menggunakan perspektif SRL Zimmerman yang diambil daripada teori kognitif sosial dan teori keberkesanan diri Bandura untuk menentukan pengaruh strategi Pembelajaran Arahan Kendiri (SRL) dan pembelajaran rakan sebaya terhadap kepuasan belajar pelajar dan pencapaian akademik.

Kajian ini menggunakan kaedah penyelidikan korelasi untuk meninjau kemungkinan hubungan antara pemboleh ubah ini dalam kajian kes ini. Sampel dipilih berdasarkan kaedah pensampelan berstrata berkadar daripada sebuah universiti swasta di Malaysia. Daripada 409 responden, hanya 347 yang sah untuk analisis data, menjadikan jumlah kes yang dapat digunakan sebanyak 84.84%. Analisis Structural Equation Model (SEM) digunakan untuk mengkaji hubungan antara konstruk dalam model hipotesis.

Keputusan menunjukkan bahawa kemampuan pelajar untuk mengatur pembelajaran mereka sendiri dan belajar secara berkesan dengan rakan sebaya menyumbang sebanyak 41% daripada variasi kepuasan belajar. Kesan langsung analisis SEM menunjukkan bahawa pembelajaran rakan sebaya telah mempengaruhi strategi SRL pelajar secara signifikan, malah penggunaan strategi SRL didapati turut mempunyai pengaruh positif dan signifikan terhadap kepuasan belajar mereka. Tambahan pula, penemuan daripada ujian

Bootstrapping mengesahkan bahawa SRL menjalinkan perantara sepenuhnya hubungan antara pembelajaran rakan sebaya dan kepuasan belajar.

Selain itu, keputusan yang diperoleh turut menghasilkan sebuah model yang meramalkan 25.1% variasi pencapaian akademik pelajar. Keputusan ini menunjukkan bahawa pembelajaran rakan sebaya memberi sumbangan besar terhadap pencapaian akademik mereka dalam kursus pembelajaran teradun. Walau bagaimanapun, tidak ada hubungan yang signifikan antara pembelajaran rakan sebaya dan kepuasan belajar. Analisis Pelbagai-Kumpulan hasil daripada ujian penyederhanaan menunjukkan bahawa disiplin akademik mempunyai kesan penyederhanaan yang signifikan terhadap hubungan antara pembelajaran rakan sebaya dan pencapaian akademik, khususnya dalam bidang yang berkaitan dengan disiplin sains. Walau bagaimanapun, perbezaan jantina tidak dapat dilihat dalam kursus pembelajaran teradun.

Kajian ini mendedahkan serta menyumbang kepada pengetahuan yang ada untuk pembelajaran teradun menerusi beberapa cara. Dari segi sumbangan teori, kajian ini menyumbang kepada literatur mengenai kepuasan belajar dan pembelajaran rakan sebaya, dengan memperkenalkan SRL sebagai pemboleh ubah perantara yang berinteraksi dengan pembelajaran rakan sebaya untuk mempengaruhi kepuasan pelajar. Ia turut mengusulkan kerangka kerja terpadu, koheren dan dapat dilaksanakan meliputi pelbagai konstruk, termasuk strategi SRL, pembelajaran rakan sebaya, kepuasan belajar dan pencapaian akademik dalam konteks pembelajaran teradun. Di samping itu, ia juga memberikan wawasan bagi universiti tentang hala tuju masa depan, terutama dalam bidang berkaitan dengan penambahbaikan kemudahan dan infrastruktur untuk melaksanakan pembelajaran teradun. Ia juga membincangkan implikasi praktikal serta menyarankan beberapa pendekatan instruksional yang dirancang untuk memudahkan pengembangan strategi SRL pelajar dan pembelajaran rakan sebaya melalui penggunaan teknologi pendidikan.

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"***It always seems impossible until it's done***"- Nelson Mandela.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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Declaration by graduate student

I hereby confirm that:

- this thesis is my original work;
- quotations, illustrations and citations have been duly referenced;
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Declaration by Members of Supervisory Committee

This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

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LIST OF ABBREVIATIONS

ALN	Asynchronous Learning Networks
AVE	Average Variance Extracted
BYOD	Bring Your Own Device
CAGR	Compound Annual Growth Rate
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CR	Construct Reliability
F2F	Face-To-Face
GFI	Goodness-of-Fit Index
GOF	Goodness-of-Fit
GOL	Globalised Online Learning
GPA	Grade Point Average
HEI	Higher Education Institutions
LMS	Learning Management System
MOOC	Massive Open Online Courses
MSLQ	Motivated Strategies for Learning Questionnaire
NFI	Normed Fit Index
OER	Open Educational Resources
OSLQ	Online Self-Regulated Learning Questionnaire
PGIAQ	Peer Group Influence Assessment Questionnaire
RMSEA	Root Mean Square Error of Approximation
ROI	Return On Investments
SDG4	Sustainable Development Goal 4
SEM	Structural Equation Model
SIE	Standardized Indirect Effect
SLT	Student Learning Time
SOLR	Student Online Learning Readiness
SRL	Self-Regulated Learning (SRL)
TCF	Taylor's Curriculum Framework
TLI	Tucker Lewis Index
VLE	Virtual Learning Environment

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Educational technology is a combination of the processes and tools in addressing educational needs and problems, with an emphasis on applying the most current and related technologies and tools (Roblyer, 2003). It also refers to the growing range of human-engineered products and processes, purposefully employed within educational contexts towards the ultimate goals of promoting and enhancing student learning (Subramony, D. P., 2008). In Malaysia, the uses of educational technology have been receiving get a strong push from the nation since 2011 with the aims to make the learning process more effective and to change the whole learning model in this century (Azmin, Amran, & Rusli, 2015).

The use of educational technology is beneficial for learning as supported by a recent meta-analysis by Steenbergen-Hu & Cooper, 2014. Educational technology provides certain features which offer potential benefits for blended learning practise. For teachers, it facilitates personalized learning through effective administration and organization in the lesson delivery. Moreover, it enhances students' motivation due to immersive and authentic task environments through simplified information retrieval. Thirdly, educational technology is capable in providing an infinite number of supportive tutorials and exercises for learners whenever they need help. It could also allow students to have multiple attempts to the practices and scaffold them in their learning journey. Likewise, Reinhold et al. (2020) also argued that low-achieving students benefit from the interactive and adaptive scaffolds features in educational technology.

Perceptions of blended learning have been shifting in its favour over the past several years. Blended learning continues to gain popularity in Higher Education Institutions (HEIs) because of its flexibility and ability to customize according to diverse students' learning needs (Allen and Seaman, 2016; Cui, Lockee and Meng, 2013). Blended learning is defined as ICT-enabled learning which integrates and harnesses the strength of both online and face-to-face modes of delivery (Krause, 2008). It is also commonly referred as the combination of face-to-face and online instruction with a reduction in class-time (Porter et al., 2014).

Blended learning approach drives technology adoption in the context of HEIs for better learning outcomes (Adams et al., 2017). Online Learning Consortium (2015) reported that 71.4% of academic leaders rated the learning outcomes in blended learning, either the same or more superior than traditional face-to-face instruction. This figure was only 57% in 2013. Along the same line, Allen and Seaman (2016) reported that more than 63.3% of academic leaders have indicated blended education as one of their long-term strategies. Also, from the *Teaching with Technology* survey conducted by Campus Technology in 2016, 71% of faculties worldwide reported that they are currently teaching in blended learning environments (Kelly and Schaffhauser, 2016).

Both learners and educators in higher learning institutions have seen blended learning as a viable alternative to some forms of face-to-face learning. According to Blended learning is a better alternative to education which combines face-to-face traditional learning with online learning (Kang & Seomun, 2018). Compared to conventional teaching, blended learning has the potential to enrich, engage and enhance students' learning experience and further improve the attainment of course learning outcomes.

In the context of Malaysia, due to the strong government initiatives and the rising of smartphone and tablet users in the country, the blended learning education market is anticipated to project a promising compound annual growth rate (CAGR) of 16.4% from 2016-2023 (Online Education Market In Malaysia, 2017). Malaysia government is continuously taking initiatives to promote education through the blended learning platform in order to increase the adoption of technology among the young generation. For instance, MOOC initiative aimed to narrow the educational inequality by offering high quality and affordable learning opportunities to all as long as they have Internet connectivity. This affordable and convenient delivery method also further propel the blended learning growth at ever-increasing rate.

In addition, since we are now in the age of Fourth Industrial Revolution, Malaysian government has urged all universities to constantly reimagine and redesign pedagogy for the 21st-century education. This transformation in learning is crucial to equip today's learners with critical thinking, creativity, communication and collaboration skills that meet the needs of a 21st-century marketplace. It's clear that innovations in the education technology space are beginning to show potential in helping the graduates to acquire skills and attributes that meet industry and society requirements. Thus, blended learning is well adopted by HEIs to prepare graduates for lifelong learning as this learning pedagogy equips students with self-regulated learning (SRL) strategies and the ability to work effectively with peers.

1.1.1 Blended Learning

The study of blended learning is crucial in the context of educational technology because blended learning approach is widely regarded as "the new

normal" in higher education (Dziuban, Graham, Moskal, Norberg, & Sicilia, 2018) that combines the benefits afforded by both face-to-face and online learning components. Moreover, according to the study by Chen et al. (2020) , blended learning had received a significantly increased amount of attention, particularly in collaborative and social learning among peers. However, this approach of combining online with face-to-face instructional components have raised concerns over the years according to Rasheed, Kamsin and Abdullah (2020). Therefore, educational research needs to focus on assessing students' ability in self-regulated learning and peer learning as the adoption of blended learning is related to students' capability to learn on one own and applying social skills in their learning process (Osman and Hamzah, 2017).

Blended learning plays a crucial role in promoting quality education and accelerates progress to achieve Sustainable Development Goal 4 (SDG4), which is also known as Education 2030. By incorporating new pedagogical possibilities of blended learning, the quality of higher education could be improved with increased access and flexibility for learners, especially hard-to-reach learners (Wang, 2018). Due to the benefits of blended learning, a growing number of HEIs in the Asia-Pacific region has adopted blended learning as a form of ICT-enabled learning to ensure inclusive and equitable quality higher education as well as to promote lifelong learning opportunities.

As the integration of blended learning in higher education is 'inevitable', the adoption of blended learning should be aligned to the SDG4-Education 2030 goals and targets. Harnessing the power of blended learning for quality higher education not only involves introducing online-based ICT innovations, but also requires HEIs to periodically review and evaluate their institution's approach to blended learning, identify gaps and improve blended learning strategies. All these efforts play essential roles in supporting HEIs to move towards a more promising institutional blended learning practice (Lim and Wang, 2016).

In this study, blended learning practices typically involve online instructions which are used to complement face-to-face learning. Figure 1.1 shows a summary of key elements in a blended learning environment which was adopted from Baragash and Al-Samarraie (2018). This framework is generic enough that it is applicable in any context of educational providers, including private universities. In a typical blended learning environment, online instructions are often used to complement the weekly face-to-face lectures and in-class peer discussion. To ensure diversity of blended learning activities in the delivery, course instructions are also recommended to make full use of Learning Management System (LMS) tools, covering key components such as resources, activities and assessments. These instructions include (i) synchronous and asynchronous e-activities, (ii) the use of e-Learning objects and resources as well as (iii) e-assessments. This is to promote collaborative and independent learning among the students while ensuring a balance between instructor-led and students-lead learning.

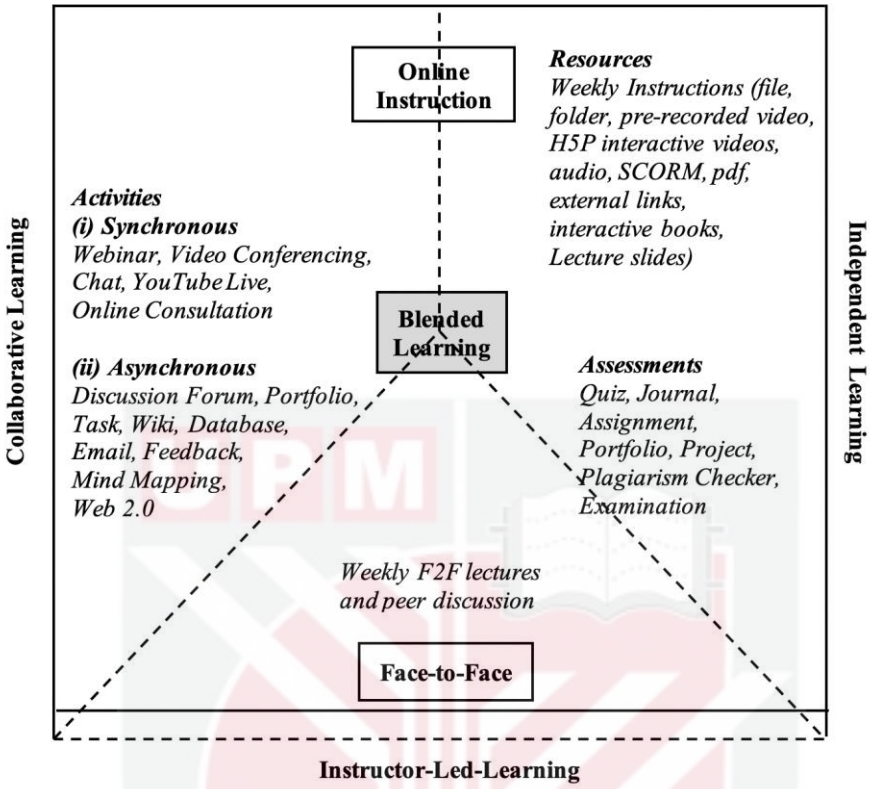

Figure 1.1: Key elements in a blended learning environment
(Source: Baragash and Al-Samarraie, 2018)

1.1.2 Learning Satisfaction and Academic Achievement

The review of the related literature has suggested for researchers to consider both cognitive and affective aspects of learning outcomes when evaluating the effectiveness of blended courses (Paechter, Maier and Macher, 2010). Similarly, Im and Kang (2019) posited that when measuring the attainment of learning outcomes, students' academic achievement (cognitive) and learning satisfaction (affective) are the two essential and commonly used dimensions in educational research. Therefore, it is critical to consider the satisfaction level of the learners together with their level of academic achievement to determine the overall success of blended learning courses.

Learning satisfaction is commonly related to the experience and pleasure level of the learners and the quality of services they received when studying online (Horzum, 2015; Kurucay and Inan, 2017). It also refers to the learners' perceived value of the education quality obtained throughout their learning journey (Bollinger and Martindale, 2004). Student's learning satisfaction may also affect their performance in a course, including their academic grades, attendance, and the willingness to participate in the online learning community actively. On the other hand, academic achievement in this study is expressed

in terms of grade point average (GPA), which is calculated by the total amount of grade points earned divide by the total credit hours attempted in the semester.

Previous studies have highlighted that student satisfaction is a crucial parameter used to assess students success and quality of learning in academic institutions (Wu and Liu, 2013). In fact, the perceived identity of an institution is increased when the numbers of satisfied students increases, and therefore satisfaction plays a crucial role in affecting students enrolment and retention (Lorenzo, 2012; Zhu, 2012). If these blended learning initiatives failed to procure satisfaction from the students, it would affect the reputation of the university and students' intakes in future.

In the context of blended learning in Malaysia, Al-Rahmi et al. (2013) found that the content used in blended courses has a significant influence on university students' learning satisfaction and substantially impact their intention to study in a blended learning environment. In a study of a public university in Malaysia, Omar and Hussein (2017) found that perceived usefulness, perceived ease of use and computer self-efficacy have positive and significant relationships with students' satisfaction on the use of LMS. Roslina et al. (2013) also found that students were satisfied with blended learning when it offered flexibility especially to those who were unable to attend classes due to work, distance, physical disability or being in a different time zone. However, students indicated low satisfaction in blended learning courses that required calculation and technical explanation.

In conclusion, students' learning satisfaction and academic achievement have received so much attention in academic literature, especially in the context of blended learning courses. It is crucial to measure both cognitive (achievement) and affective (satisfaction) dimensions of learning outcomes for courses delivered through blended modes of learning, which combines face-to-face learning with an online component. This is because the degree of students' learning satisfaction determines the adoption rate of blended learning (Zhu, 2012). As this study focuses on a private university, therefore, by understanding students' learning satisfaction and academic achievement, it enables the university to target critical areas for improvement and facilitates the development of strategic planning specific to blended learning.

1.1.3 Self-Regulated Learning (SRL)

Over the last three decades, SRL has become one of the significant areas in educational research and has been widely investigated by different authors in higher education (Hooshyar et al., 2020). SRL is an integrated learning process guided by a set of motivational beliefs, as well as behavioural, cognitive and metacognitive activities leading towards achieving personal goals (Schunk and Zimmerman, 2012). Zimmerman (1989) referred to SRL as the extent to which students are metacognitively, motivationally, and behaviorally active in the

process of monitoring their learning. Pintrich (2000) defines SRL learners as those who actively construct their learning process and are able to set their learning goals, while also making an effort to observe, adjust, and control their cognition, motivation, and behaviour in achieving those goals.
SRL is one of the most important learning strategies in the context of blended learning. It highlights the dynamic personality of a learner's interactions as well as constructs self-regulated behaviour in learning tasks (Martin, 2004). It is crucial to recognize the importance of SRL in blended learning environments since SRL is pre-requisite in such an environment, even more so than in face-to-face learning (Rowe and Rafferty, 2013). Learners with a high inclination for SRL may find more satisfaction in blended courses (Nicol, 2009; Rowe and Rafferty, 2013). Therefore, it is interesting to investigate the impact of SRL strategies in various online learning environments.

Different SRL models presents different theoretical perspectives to describe different variables influencing students' learning. Generally, all the existing SRL models mainly constitute of cognitive and metacognitive components. SRL's cognitive component refers to the use of basic strategies such as repeating words, paraphrasing, summarizing, outlining, and critical thinking to actively manipulate academic content (Kauffman, 2004; Zimmerman, 1989). SRL's metacognitive component refers to the skills that help students to monitor their cognitive processes as well as facilitates students' ability to organize learning plans or schedules and set goals to assess their learning growth (Kauffman, 2004).

As a conclusion, SRL is a vital element for developing students' successful learning experiences in the delivery of online instruction for blended learning courses (Nicol, 2009; Broadbent and Poon, 2015; Cho and Heron, 2015). This is because during online instruction, students assume greater responsibility and autonomy for their learning. When they acquire the skills to regulate different learning strategies in their learning process, they will have greater satisfaction in learning, and hence higher chances of being successful in blended learning courses. Therefore, this research focuses on the influence of students' ability to become self-regulated learners on their cognitive (achievement) and affective (satisfaction) dimensions of learning outcomes in blended courses.

1.1.4 Peer Learning

Peer learning is growing internationally as a beneficial pedagogical strategy in conceptualizing learning and teaching in the global classroom (Brannagan et al., 2013; Herie, 2013). The ability to learn effectively with peers is seen as one of the richest learning resources by many researchers (Slavin et al., 2003; Topping, 2005), especially when it is integrated successfully into a higher education culture (Havnes, 2008). In addition, according to the research report from the Australian Learning and Teaching Council Ltd, integration of peer learning has also been proven as an effective learning strategy, which enable students to gain confidence in their learning (Keppell et al., 2011).

In the context of peer-learning, it is important to consider who are the “peers”. Generally, peers are people from similar social groupings, who are not professional teachers, helping each other to learn and learning themselves by teaching (Topping, 1996). In this study, peers are students who interact formally and informally with each other, within and outside formal teaching and learning sessions. They are often assigned to work together in the same learning community to achieve a variety of learning outcomes, with relatively little involvement from their course instructors over a semester period. They not only collaborate on the learning task itself but also provide emotional support to each other throughout the learning journey (Boud et al., 2001).

Peer-learning is defined by Topping (1996) as “the acquisition of knowledge and skill through active helping and supporting among status equals or matched companions”. This pedagogical idea origins from theories by Piaget and Bandura among others who believe that cooperation and social interaction are essential elements in creating knowledge. According to Boud (1998), the term “peer learning” suggests two-way, reciprocal learning which involves notions of interdependence and mutual beneficial where students share knowledge, ideas and experience in a setting which is often constructed by the students themselves.

The concept of peer learning is also echoed well by Ab Jalil (2007), who emphasized that the teaching role should be shared among the students in order to promote peer learning. Tutors should not have to respond to all students’ online queries, but rather encourage peer assistance among students and make them view peer interactions as a valuable part in their online learning journey. Ab Jalil (2007) further posited that peer learning is enhanced when assisted performance is provided among the students, coupled with proper monitoring, encouragement and guidance. Furthermore, meaningful collaboration and contribution from the peers should be valued and credited.
In conclusion, the impacts of peer learning and its effectiveness as a learning strategy have been realized. Also, recent literature has proven that peer learning has the potential to be adopted as an effective learning approach to improve students’ academic performance. Therefore, it is important to formalize peer learning in the blended learning design and introduce it with adequate consideration of its implications in blended learning environments.

1.2 Problem Statements

One major problems encountered in the implementation of blended learning in higher learning institutions is often related to the issue of participation among students (Ma’arop and Embi, 2016; Alebaikan and Troudi, 2010; Heaney and Walker, 2012). Studies reported that students are unable to meet the demands of blended learning which require a high level of self-discipline and responsiveness. It may be challenging for universities to get students to adapt to the use of blended learning approach when they have been used to traditional lecture-based classroom (Alebaikan and Troudi, 2010). Moreover, poor time management (Kenney and Newcombe, 2011) and students’

heterogenous backgrounds (Lotrecchiano et al., 2013) also affect student participation in blended learning. Therefore, it is imperative to equip students with appropriate skills training to achieve learning success in blended courses.

Persistent criticism that there is little explicit use of theory to conceptualize educational technology research (Markauskaite and Reimann, 2014). This "under-theorisation" in educational technology research means the lack of using existing theory to frame or inform an empirical research study (Hew et al., 2019). In the same vein, Bennett and Oliver's (2011) also claimed that educational technology research is primarily driven by "common sense" assumptions about the potential benefits of technology, and mainly focuses on practical implementation and design based on the experience of the researchers without paying much attention to theories.

Since the use of theory and model are often neglected in educational technology research (Issroff & Scanlon, 2002), it is imperative to explicitly use existing theories and models to explain and predict the phenomena it relates to (Mueller & Urbach, 2017), as well as to help the researchers to generalize findings across a variety of contexts (Jones & Czerniewicz, 2011). Given the vital role of theory to conceptualise empirical educational technology research, this study discusses the Bandura's Social Cognitive Theory (Bandura, 1986) and self-efficacy theory (1997) and links these theories to SRL and Peer Learning to enhance students' learning satisfaction and academic achievement.

Although students' readiness is of utmost importance prior to the full implementation of the blended learning model of instruction (Baldwin-Evans, 2006), there was little research conducted in Malaysia to empirically examine student readiness for blended learning (Tang & Chaw, 2013). Students' readiness needs to be studied by assessing students' ability in self-regulated learning as suggested by Yukselturk and Bulut (2007). This is because readiness in adopting blended learning is related to students' capability to learn on one own, self-reliance in completing a given task, and skills for applying e-learning as suggested by Osman and Hamzah (2017).

Although improper utilization of online peer learning strategy has been identified as an inherent problem related to self-regulation challenges in blended learning environment, (Broadbent, 2017), it was found that most studies only focused on stimulating students' self-regulation through more-general intervention approaches as highlighted in the systematic review of the challenges in the online component of blended learning conducted by Rasheed, Kamsin & Abdullah (2020). Hence, there is a need for blended learning researchers to consider using group awareness and peer assistance as external scaffolds for stimulating students self-regulation behavior in a blended learning environment (Lin, Lai, Lai, & Chang, 2016). Furthermore, building sound relationships with peers in technology-mediated blended learning environment have also proven to be a key contributor in students'

academic success (Garrison, 2011). Therefore, this study aims to address the gap by proposing a research model to examine how SRL interacts with peer learning in order to improve the attainment of learning outcomes in blended learning courses.

In addition, without investigating what satisfies learners in their blended learning courses, it is difficult to improve the attainment of learning outcomes (Harsasi and Sutawijaya, 2018). However, many studies evaluating the course learning outcomes often focused on academic achievement or performance (Bell, 2006; Yukselturk and Bulbut, 2005), only little research measuring the affective outcomes such as student satisfaction (Artino, 2007; Puzziferro, 2008). Hence, this study provides a comprehensive view of learning outcomes attainment by measuring both cognitive (achievement) and affective (satisfaction) dimensions of learning outcomes in blended learning courses as suggested by Paechter, Maier, and Macher (2010) and Lim, Kang and Park (2016).

There have been various studies on predictors of student's academic achievements from both SRL (Sebesta and Speth, 2017; Chang, 2007; and Barnard, Lan, and Paton; 2010) and peer learning perspectives (Shen et al., 2013; Chen et al., 2004; Dishion et al., 2008). However, there is limited study investigated the mediator role of SRL between peer learning and students' academic achievement. Given the low volume of studies and the importance of adapting the conceptual lens of SRL to explore the dynamics of peer learning as suggested by Winters (2008), this study investigates SRL as a mediator in the relationship between peer learning and learning outcomes attainment using SEM data analysis techniques.

Until now, research addressing SRL in blended learning environments mainly does not take a comprehensive approach and only investigated a single variable in each study. For instance, Sebesta and Speth (2017) and Lee and Shin (2013) only investigated the relationship between SRL and academic achievement, whereas Puzziferro (2008), Cho and Jonassen (2009), Paechter, Maier, and Macher (2010) and Rowe and Rafferty (2013) examined the relationships between SRL strategy and course satisfaction. Similarly, Webb et al. (2008) and Boekaerts and Corno (2005) focused on how peers learning can foster the acquisition of SRL among students. To address the complex phenomena of SRL, this study integrates various factors related to SRL in a single research, including peer learning, gender, academic disciplines, learning satisfaction and academic achievements.

Additionally, existing literature suggests that the effect of student characteristics such as gender and academic disciplines on SRL have been mixed. Some researchers discovered gender and academic discipline influencing SRL strategy (Trautwein and Lüdtke, 2007; Schunk and Zimmerman, 2007; Bezzina, 2010; Tang and Neber, 2008; Panadero et al., 2015), while others have found that student characteristics do not relate to

differences in SRL (Atan et al., 2004; Bussey and Bandura, 1999; Khodabandelou et al., 2014). Therefore, this research explores the moderating effect of students' characteristics (gender and academic disciplines) on their SRL strategy and academic achievement as recommended by several reviews (Panadero and Jonsson, 2013; Kuo et al., 2014).

Lastly, in Malaysian universities, limited research was conducted to determine the mediating role of SRL strategy and how to use SRL to enhance the attainment of learning outcomes in blended courses. Also, the relationship between students' learning satisfaction and self-regulatory learning behaviours have yet to be quantitatively and extensively examined in the blended learning environment (Barnard et al., 2008). As suggested by Chang (2007), a quantitative measure of SRL in the blended learning context would be particularly useful to examine the relationship between these self-regulatory learning skills and learning satisfaction. Therefore, this study investigates the influences of SRL in students' academic achievement and learning satisfaction in a private university in order to close the gaps in knowledge in the Malaysian context.

1.3 Objectives of the Study

This study aims to determine the relationships between students' abilities to become self-regulated learners and to learn effectively with their peers, as well as how these two distinct abilities impact on their learning satisfaction and academic achievement in the blended learning environment. To establish a Structural Equation Model (SEM), students' ability to learn effectively with their peers was used as an independent variable; learning satisfaction and academic achievement as dependent variables; while students' ability to become self-regulated learners (SRL) was used as a mediator; and academic discipline and gender as moderators.

Specifically, the research objectives of this study are as follows:

1. To determine the influence of peer learning on online learning satisfaction, self-regulated learning (SRL) strategy and academic achievement in blended learning courses.
2. To determine the influence of students' SRL strategy on their online learning satisfaction and academic achievement in blended learning courses.
3. To determine the mediating role of self-regulated learning (SRL) strategy in the relationship between peer learning and online learning satisfaction in blended learning courses.
4. To determine the mediating role of self-regulated learning (SRL) strategy in the relationship between peer learning and academic achievement in blended learning courses.
5. To determine the moderating effect of gender on the determinants of online learning satisfaction and academic achievement among students in a private university in Malaysia.

6. To determine the moderating effect of academic discipline on the determinants of online learning satisfaction and academic achievement among students in a private university in Malaysia.
7. To develop a research model in predicting students' online learning satisfaction and academic achievement for blended learning courses in a private university from the perspectives of SRL and peer learning.

1.4 Research Questions

Six research questions below are formulated in order to achieve the objectives of this study.

1. Does peer learning directly influence students' SRL strategy, and lead to improved online learning satisfaction and academic achievement in blended learning courses?
2. Does students' SRL strategy lead to improved online learning satisfaction and academic achievement in blended learning courses?
3. Is self-regulated learning (SRL) strategy a mediator in the relationship between peer learning and online learning satisfaction?
4. Is self-regulated learning (SRL) strategy a mediator in the relationship between peer learning and academic achievement?
5. Does gender moderate the relationships on the determinants of online learning satisfaction and academic achievement among students in a private university in Malaysia?
6. Does academic discipline moderate the relationships on the determinants of online learning satisfaction and academic achievement among students in a private university in Malaysia?

1.5 Research Hypotheses

In this study, student's ability to learn effectively with peers represents the exogenous variable, while their ability to become self-regulated learners, learning satisfaction, and academic achievement are endogenous variables. The following hypotheses have been established based on previous studies and to be tested in this study.

H1: Peer learning has a significant effect on students' online learning satisfaction in a blended learning course.

H_2. Peer learning has a significant effect on students' self-regulated learning in a blended learning course.

H_3. Peer learning has a significant effect on students' academic achievement in a blended learning course.

H_4. Self-regulated learning has a significant effect on students' online learning satisfaction in a blended learning course.

H_5. Self-regulated learning has a significant effect on students' academic achievement in a blended learning course.

H_6. Self-regulated learning mediates the relationship between peer learning and online learning satisfaction in a blended learning course.

H_7. Self-regulated learning mediates the relationship between peer learning and academic achievement in a blended learning course.

$H_{8.}$ Gender moderates the relationships on the determinants of online learning satisfaction and academic achievement among students in a private university in Malaysia.

$H_{9.}$ Academic discipline moderates the relationships on the determinants of online learning satisfaction and academic achievement among students in a private university in Malaysia.

1.6 The Significance of the Study

From the practical perspective, this study provides insights as to where future efforts need to be directed for HEIs, especially in the areas related to the development of students' self-regulated learning (SRL) strategy as well as the improvement of facilities and infrastructure to improve the quality of blended learning delivery. These findings may be useful for the university to efficiently plan out the development roadmap for blended learning courses. These findings may also serve as guidelines for both private and public universities to redesign their blended learning courses in line with learner-centred and 21st-century pedagogies.

By understanding the mediator roles played by SRL, it helps course instructors and e-content development specialists to make pedagogically informed design decisions by integrating appropriate SRL strategies in the implementation of blended learning courses. They can gain insights and identify predictors which have a stronger relationship with academic achievement and learning satisfaction, and subsequently enhance these predictors to improve the overall quality of blended learning implementation.

From the theoretical perceptive, this comprehensive study makes a significant contribution to the field of educational technology as it links peer learning, learning satisfaction and academic achievement to students' SRL strategy in blended learning context. Perhaps most critically, the research proposes an integrated, coherent and actionable framework covering a variety of SRL strategy, peer learning, learning satisfaction and academic achievement. Taken together, the conceptual model developed from this research is potential of immense value for future researchers to explain the relationships among various variables used in blended learning courses, and working on future research in the similar context to further improve the attainment of learning outcomes in the blended learning environment.

1.7 Limitations of the Study

This study has several limitations and cautionary notes that must be acknowledged and considered. Firstly, the instrument used in this study is a self-reported survey. Self-reported measures used in this study rely on survey respondents' willingness to accurately and honestly in answering the questions. Also, self-report questionnaire may lead to biased results and there is a tendency for below-average students to be most likely to overreport their ability

and achievements (Cole and Gonyea, 2010). Therefore, the results should be interpreted with caution when generalizing them to other populations.

Secondly, in the study, online survey was posted in a private university's official LMS and was sent to consenting students in this private university during the 8th weeks of the semester. Students could complete the survey anytime between week 8-14 of the semester. It is possible that the timing answering the survey may have impacted findings, thus making the results less accurate as suggested by Timmons and Preachers (2015). It is possible that the impact of SRL strategy and peer learning on students' learning satisfaction may differ if measured earlier versus later in the semester (Broadbent, 2017). Therefore, it is important to consider the timing to distribute the survey to students as well as the context of blended learning implementation of the university.

1.8 Definition of Terms

In the present study, the following definitions are provided for a better understanding and uniformity of these terms throughout the study. For each key term, conceptual and operational definitions are provided as follows:

Blended Learning

Blended learning is an integration of different modes of delivery, models of teaching and styles of learning as a result of adopting a strategic and systematic approach to the use of technology combined with the features of face to face interaction (Krause, 2008). It is also defined as the combination of face-to-face and online instruction with a reduction in-class time (Porter et al., 2016).

Blended learning is regarded as an approach that combines the benefits afforded by face-to-face and online learning components, and it is the context of learning and teaching in this private university. The face-to-face learning refers to an instructional learning where course content and learning material are delivered in person to a group of students, whereas online learning is a method of delivery where students learn in a fully virtual environment. This study particularly focusing on the online component of blended learning.

Learning Satisfaction

Learning satisfaction is defined as fulfilment and pleasure level of the students about different aspects of learning service, which they received in an online learning program (Horzum, 2015; Kurucay and Inan, 2017). It is also referred as the student's perception pertaining to the blended course experience, and the perceived value of the education received while attending courses online (Bollinger and Martindale, 2004).

In this study, learning satisfaction refers to the extent to which students have enjoyed their studies, resulting from a subjective evaluation of learning experience and outcomes in a blended learning course. Learning satisfaction in

this study divided into three components, (i) facilitated learning, (ii) engaged learning and (iii) assessment.

Facilitated Learning

Facilitated learning refers to anytime and anywhere learning environment that provides students with improved control and flexibility in their learning process (Dziuban et al. 2007). It is a learning approach where students are encouraged to take ownership and control of their learning process and the role of the teacher changes from the supplier of knowledge to facilitating the process of learning (Carter, Maree, and Shakwa, 2018).

In this study, facilitated learning dimension measures students' satisfaction with regards to the concept of learner autonomy where the learner takes responsibility for their own learning and works creatively in collaboration with instructors and peers in blended learning environments.

Engaged Learning

Engaged learning is an active process in which knowledge and understanding are acquired through participation in "real-life" activities, inquiry, involvement, direct experience, collaboration, exploration and discovery with peers (Lewittes, H., 2007). Engaged learning relates to students' satisfaction with regards to responsiveness, collaboration, and interaction in online learning environments (Dziuban et al., 2015).

In this study, engaged learning measures the extent in which students become actively involved in the online community as an integral part of their learning.

Assessment

Assessment is an evaluative process to determine attainment of goals and objectives (Smith, 2017). It also refer to a means of measuring student progress and learning using instruments appropriate for the content (Elzarka, et al., 2016).

In this study, assessment dimension measures students' satisfaction in the assessment process which evolves in the online environment, including better assessment of student progress, and equitable treatment for online assessments.

Academic Achievement

Academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university (Steinmayr et al., 2014).

In this study, academic achievement is defined as the attainment of course learning outcomes in the current semester and it was expressed in terms of

grade point average (GPA), which is calculated by the total amount of grade points earned divide by the total credit hours attempted in the semester.

Self-Regulated Learning (SRL)

Self-regulated learning is defined as learning that occurs largely from the influence of students' self-generated thoughts, feelings, strategies, and behaviours, which are oriented toward the attainment of goals (Schunk and Zimmerman, 1998). Pintrich (2000) described self-regulated learning as an active and constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation and behaviour, guided and constrained by their goals and the contextual features in the environment.

In this study, SRL refers to scenarios where students are active, able to be self-aware, knowledgeable to decide an approach for learning, and responsible for their own learning. SRL in this study consists of six broad strategies, (i) goal setting, (ii) self-evaluation, (iii) environment structuring, (iv) help seeking, (v) time management and (vi) task strategy.

Goal Setting

Goal setting refers to a learning strategy which helps students to have a clear vision of what to do to reach their goals. It also refers to student-initiated efforts to set educational goals or sub-goals and planning for sequencing, timing, and completing activities related to those goals (Zimmerman and Martinez-Pons, 1986).

In this study, goal setting refers to students' ability to activate the goal-setting process and to determine the desired strategies to be used for achieving the goals.

Self-evaluation

Self-evaluation refers to students' ability to determine the development needed and the progress made in their learning journey. In the self-evaluation process, students will evaluate their work, based on a shared understanding of the expectations for quality (Robey, 2018). It is also related to student-initiated evaluations of the quality or progress of their works (Zimmerman and Martinez-Pons, 1986).

It this study, self-evaluation refers to students' ability to assess their own works and subsequently improve their works. It forms the basis for self-improvement and setting learning goals.

Environment Structuring

Environment structuring is a student-initiated effort to select or arrange the environment to make learning easier. It is also a learning strategy to monitor whether the study environment is conducive and students may change their

study place if they find it not suitable for them (Zimmerman and Martinez-Pons, 1986).

In this study, environment structuring refers to students' ability to choose their own learning space that is right for them to accomplish their goals, keeping in mind the right balance between when and where to study.

Help Seeking

Help-seeking is an essential strategy in the self-regulatory process as it relates to students' ability to obtain assistance from their peers in overcoming academic challenges (Richardson et al., 2012). This ability also refers to student-initiated efforts to secure help from their peers when undertaking an assignment (Zimmerman and Martinez-Pons, 1986).

In this study, help seeking refers to students' ability to collaborate well with their peers in both learning and assessments tasks.

Time Management

Time management strategy is a form of behaviour regulation in SRL in which a learner making schedules for studying and setting aside time for different learning activities (Effeney, Carroll and Bahr, 2013). It is commonly linked to self-regulated learning as it is closely related to learners' decision about what to study, how long to study, and how to study (Zimmerman and Martinez-Pons, 1986).

In this study, time management refers to students' ability to manage their time sufficiently to succeed with instructors' minimal intervention.

Task Strategy

Task strategy is defined as the process of students who applies strategies which help them to complete the task assigned (Zimmerman and Martinez-Pons, 1986). It involves the selective use of learning strategies adapted to each learning task, and students use task strategy to persist when confronted with academic challenges (Richardson et al., 2012).

In this study, task strategy refers to students' ability to choose appropriate strategies in order to accomplish the task given in their learning process.

Peer Learning

Peer learning is defined as the acquisition of knowledge and skill through active helping and supporting among people from similar social groupings, who are not professional teachers (Topping, 1996). Peer learning focuses on the use of teaching and learning strategies in which students learn with and from each other without the immediate intervention of a teacher (Boud et al., 1999).

In this study, peer learning refers to students' ability to learn effectively with their peers in the blended learning environment where learning is stimulated mainly from student-led initiatives.

Social Competencies

Social competencies are defined as skills, competencies, and the feeling of control essential for managing social situations and building and maintaining relationships (Myllylä and Torp, 2010). It also refers to the ability to empathize with others, interact positively with them and foster stable and harmonious relationships (TGC, 2018).

In this study, social competencies are measured on how confident students in their social interaction tasks when they collaborate and co-creating with their peers in blended learning courses.

Peer Group Influence

Peer group influence can be either positive or negative (Filade et al., 2019). If a student is influenced negatively by the peer, it affects his or her academic performance and satisfaction. Conversely, positive peer influence inspires student's academic vigour and motivation for achievement (Lashbrook, 2000).

In this study, peer group influence measures how peer relationship influences students' academic performance and learning satisfaction in blended learning courses.

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BIODATA OF STUDENT

Lim Chee Leong is currently the Director of Learning Innovation and Development, a department under Centre for Future Learning (CFL), Taylor's University. He has been in the education industry for 21 years, both in teaching and administration. He is passionate in exploring, evaluating and integrating various emerging classroom technologies in teaching, learning and assessment activities. He has also contributed very significantly in transforming the learning and teaching of students in the University.

In both 2008 and 2011, he was the recipient for ***Taylor's University Chairman's Award for Excellence in Teaching*** *and in 2013, he received* ***Taylor's University President's Award for Transformational Teaching and Learning Category***. At the national level, he is the first notable individual from a private university in Malaysia to be awarded the prestigious National Academic Award (**Anugerah Akademik Negara, AAN**) by the Ministry of Education Malaysia for his innovative teaching methodologies.

He has also been invited as the **selection panel and judge** for various national and international awards organized by Ministry of Education, Malaysia, including National Academic Award (2016-2019), International University Carnival on e-Learning IUCEL (2016-2017), Rethinking and Redesigning Malaysian Higher Education Awards (APRS 2017), and Anugerah Khas YB Menteri Pendidikan Malaysia: Rekabentuk Kurikulum Dan Penyampaian Inovatif (AKRI 2018 & 2019).

Other national and international awards received from 2014-2019 are as follows:

- ***Gold Medal****, International University Carnival on E-Learning (IUCEL), Ministry of Higher Education, Malaysia, 2016, 2018 & 2019.*
- *Shortlisted for* ***Digital Content Award****, Wharton-QS Stars Reimagine Education Awards 2016.*
- *Shortlisted for the* ***Wenhui Award for Educational Innovation 2016****,* ***Innovative Partnerships for Quality Inclusive Education,*** *the National Commission of the People's Republic of China for UNESCO and the UNESCO AsiaPacific Programme of Educational Innovation for Development, APEID (International).*
- ***Best e-Learning Management Award,*** *National University Carnival on E-Learning (NUCEL), Ministry of Higher Education, Malaysia, 2015.*
- ***Best Learning Management System Award****, National University Carnival on E-Learning (NUCEL), Ministry of Higher Education, Malaysia, 2015.*

LIST OF PUBLICATIONS

Scopus Indexed Journal

Lim, C. L., Hassan, N., Md. Isa, F., & Jalil, H. A. (2018). Mobile X-Space design, teaching strategies and undergraduate students' collaborative learning behaviour: A case study in Taylor's University, Malaysia. *Malaysian Journal of Learning and Instructions*, 15*(2)*, 175–205 **(Published).**

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Book Chapter

Lim, C. L., Jalil, H. A., Ma'rof, A. M., & Saad, W. Z. (2020). Assisting peer learning performance using online collaborative tools in virtual learning environments. In P. Kumar, M. Keppell, & C. Lim (Eds.), *Preparing 21st Century Teachers for Teach Less, Learn More (TLLM) Pedagogies* (pp. 108-124). Hershey, PA: IGI Global. doi:10.4018/978-1-7998-1435-1.ch007 **(Published)**

Conference Proceedings

Lim, C. L., Jalil, H. A., Ma'rof, A. M., & Saad, W. Z. (2019). Developing a conceptual framework for evaluating the effects of self-regulated learning (SRL) strategies on students' online learning satisfaction. In Holmes, L. (Ed), *Proceedings of 3rd Australia and New Zealand Conference on Advanced Research (ANZCAR 2019).* **(Published)**

Conferences Presentation

Lim, C. L., Jalil, H. A., Ma'rof, A. M., & Saad, W. Z. (2019). Differences in self-regulated learning (SRL) and online learning satisfaction across academic disciplines: a study of a private university in Malaysia. Paper presented in 2019 International Conference on Engineering Education and Innovation (ICEEI 2019), September 21-23, Seoul, South Korea. (**Best Presentation Award**).

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