Differences in Self-Regulated Learning (SRL) and Online Learning Satisfaction Across Academic Disciplines: A Study of a Private University in Malaysia

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Abstract-Students' online learning satisfaction is an important variable used to measure attainment of learning outcomes in blended learning courses. Previous studies found that learners who portray a high level of SRL contributed positively to online learning satisfaction. To date, research has also shown that students display different level of online learning satisfaction under different academic disciplines. Therefore, this quantitative research aims to investigate if students' SRL abilities significantly influence their online learning satisfaction in blended learning courses and if differences exist in online learning satisfaction across multiple academic disciplines. A set of online self-reported questionnaire was posted through the official LMS of the university to collect data from 497 undergraduate students in a private university in Malaysia. The results from the regression analysis revealed multiple that SRL explained 40.2% of the variability in online learning satisfaction (OLS). In addition, the results from one-way ANOVA with Tukey Post Hoc analysis revealed that OLS level was significantly different statistically between students in Health & Medical science discipline and Innovation & Technology discipline. The outcomes of this research provide insights as to where future efforts need to be directed, especially in the areas related to the development of students' self-regulated learning (SRL) abilities.

Index Terms—Self-Regulated Learning (SRL), online learning satisfaction, academic disciplines, private university

I. INTRODUCTION TO BLENDED LEARNING ENVIRONMENT

Blended learning designs were one of the short term forces driving technology adoption in higher education in the context of higher learning [1]. Online Learning Consortium has 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.

Blended learning lends itself to a flipped classroom model where traditional face-to-face delivery and homework elements are reversed and students engage with interactive content focusing on key concepts allowing more meaningful use of face-to-face time for collaborative activities through application, analysis, planning, and problem solving.

In a typical blended learning environment, online instruction which consists of (i) synchronous and asynchronous e-activities, (ii) e-Learning objects and resources as well as (iii) e-assessments are often used to complement the weekly face-to-face lectures and in class peer discussion. A summary of key elements in a blended learning environment was adopted from Baragash & Al-Samarraie [2] as shown in Fig. 1. In order to ensure diversity of blended learning activities in the delivery, course instructions are recommended to make full use of LMS tools, covering key components such as resources, activities and 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. Key elements of blended learning environment

Manuscript received December 13, 2019; revised March 15, 2020.

The common blended learning activities include online lectures and tutorials created using lecture capture system; discussion forums using Taylor's Integrated Moodle e-Learning System (TIMeS) or Learning Management Systems (LMS) as well as social networking sites such as Facebook and Google Plus; interactive content such as gamification, simulation and animation, online collaboration using third-party tools such as Wikis, Google Docs, and Google Classrooms; the use of multimedia videos, podcasts and vodcasts as a teaching strategy to deliver lectures, presentations and instructions for students; the use of virtual simulation, augmented reality and virtual reality in content delivery; "Bring Your Own Device" (BYOD) concept in classroom teaching and the use of audience response system to enhance student's engagement.

In addition, the introduction of micro-credentials and digital badges to motivate participation and achievement; the use of online surveys to gauge student feedback and the creation of, assembling and publishing of student eportfolios using LMS or third-party tools are also used as blended learning delivery. Online consultation and supervision, the use of interactive iBooks, e-marking and other education applications (apps) from various operating systems such as iOS, Android, and Windows are also considered as guided blended learning activities.

II. ONLINE LEARNING SATISFACTION

Online learning satisfaction is defined as fulfillment and pleasure level of the students about different aspects of learning service which they received in an online learning program. It also refers to the student's perception pertaining to the online course experience and the perceived value of the education received while attending courses online [3].

In the context of blended learning in Malaysia, Al-Rahmi et al. [4] 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 [5] 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, which is an official platform used in blended learning delivery. Roslina et al. [6] 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.

A. SRL & Online Learning Satisfaction

In blended learning environments, it is more critical to understand the effects of self-regulated learning on the learners' satisfaction. This is because the nature of the blended learning requires learners to be self-motivated and self-disciplined. Previous studies found that learners who portray a high level of SRL contributed positively to online learning satisfaction [7]. Similarly, Puzziferro [8] found self-regulated learners from the high tier of the SRL group are more satisfied with online learning as compared to students in the low SRL group. This type of learners are better in regulating and adjusting their learning process and adapting to different learning environments. This is further affirmed by Peterson [9] who investigated high school students taking online courses from various subjects and found that self-regulatory attributes to subject specific self-efficacy course satisfaction.

B. Theoretical Moderator: Academic Discipline

To date, research has shown that academic disciplinary differences have a significant influence on learning strategies and performance in blended learning environments. Students display different abilities to monitor and practise different levels and quality of SRL strategies under different subject areas [10]. In other words, the uses of SRL related strategies are likely to vary from one discipline to another. However, there are other SRL researchers that have also proven that students are consistently using certain learning strategies such as organizing information and help seeking regardless of the subject domain. In order words, learning strategies may also not be highly contextualized according to the academic disciplines.

In the blended course context, Terry [11] suggested that courses such as Accounting, Economics, Computer Information Systems, Marketing, and Management were potentially more conducive to be conducted online. On the contrary, Lab Science, Health Care, and Mathematics courses were also identified as academic disciplines that are not well-suited for online course delivery. However, there is a scarcity of research examining the direct and indirect effect of academic discipline on satisfaction in online learning courses.

Differences in learning satisfaction across different academic disciplines in higher education are also evident in online courses. Finnegan et al. [12] revealed significant differences in student online participation, persistence, and achievement across different academic disciplines. In a study conducted by Gorsky et al. [13] to determine the relationship between academic disciplinary difference (Natural Sciences versus Humanities) and the activeness in online course forums, they found that active participation in the Science forums was much higher than in the Humanities forums. This finding was further confirmed by Ku and Chang [14] who investigated the effects of academic disciplines in web-based learning environments. They found that active learners in Liberal Arts are statistically less significant than Management, Foreign Language and Education. Based on the above findings, the current study hypothesized that academic discipline is a moderator between students' SRL ability and their academic achievement in blended learning courses.

III. MOTIVATION AND PROBLEM STATEMENT

The motivation for this research arose from the researcher's own interest as a director of the e-Learning

Academy at a private university in Malaysia. The name 'academy' reflects the department's core purpose which primarily promotes 'learning how to teach with technology'. Since the introduction of e-Learning Strategic Plan in 2012 in the university, this department has been given the mandate to drive the various campus-wide blended learning initiatives and to support the academics to incorporate blended learning as a disruptive technology in reshaping the learning of 21st century learners. In general, blended learning is used to enrich the quality of the student learning experience through interactive learning activities, beyond those attainable through face-to-face classroom interactions.

Since satisfaction is one of the most critical ROIs for the department, especially to this private higher learning institution which depends on the students' enrollment as the main source of income, therefore, this research focuses on measuring the impacts of SRL and peer learning on students' online learning satisfaction and academic achievements in blended learning environments.

Online learners' satisfaction is one of the most important factors in understanding the quality of online learning. Indeed, the degree of learner satisfaction is often used to evaluate the effectiveness of online learning. Without investigating what satisfies learners in online courses, it is difficult to improve their learning. While many studies on the effects of self-regulation in online learning often focused on learning outcomes such as academic achievement or performance, little research focuses on how self-regulation is related to affective outcomes such as student satisfaction [8]. Hence, this study measures affective (satisfaction) dimension of learning outcomes when evaluating the effectiveness of blended learning courses.

Existing literature suggests that self-regulated learning (SRL) strategies have positive impacts on students' satisfaction in blended courses [15], while results pertaining to the effect of academic disciplines on SRL have been mixed. Some researchers discovered students' academic disciplines have been linked to learning strategies in blended learning environments with mixed results. Therefore, this research explores the effect of academic disciplines on students' self-regulated learning (SRL) ability and their online learning satisfaction in blended learning courses as recommended by several reviews.

A. Research Questions

To achieve the objectives of this study, the following research questions are addressed.

- 1. Does students' self-regulated learning (SRL) ability influence their online learning satisfaction in blended learning courses?
- 2. What are the differences in students' online learning satisfaction across multiple academic disciplines?

Based on the research questions, a hypothesized model of the current research is developed as shown in Fig. 2 below:



Figure 2. Hypothesized model of current research

IV. METHODOLOGY

This study was conducted at a private university at Klang Valley. The target population for this study comprises of 7,515 undergraduate students from 4 different academic disciplines (business & law, social science & leisure management, health & medical science and innovation & technology) at a private university at Klang Valley. These students are currently taking at least a credit-bearing module offered in blended learning mode.

A. Data Collection Procedure

A set of online self-reported questionnaire was created and administered using SurveyMonkey.com, and the survey links were then distributed through Taylor's Integrated Moodle e-Learning System (TIMeS) portal, the University's official Learning Management System (LMS) in the March 2019 semester. This was done to reduce possible bias in competency levels among learners in a particular academic discipline, as 45 blended courses across 4 different academic disciplines were selected, including engineering, business, engineering, biosciences, medicine, and others.

All these blended courses selected for this study have similar characteristics, (a) students were undergraduates, (b) the courses are the top 3 most active blended learning courses- which were measured by students participation rates in their respective schools for the March 2019 semester, (c) each course has various learning objectives or activities for each blended learning component as defined by the university, which includes Resource, Activity and Assessment, and (d) the instructors used TIMeS portal as their platform for blended learning delivery.

The survey links were posted in the announcement section of each blended course 4 weeks before the end of the semester. A recruitment message was to instructors via email at the middle of the semester and respondents did not have any direct contact with the researcher. Data was checked for duplicate responses by comparing participating student ID, and duplicate responses were removed. The link for the survey was closed once it reached the desired number of proportionate sample size according to the proportional stratified sampling method explained. A total of 497 completed questionnaires were received as shown in Table I below:

TABLE I. DESCRIPTION OF PARTICIPANTS

Demographic Variables	Ν	%
Gender		
Male	197	39.6
Female	300	60.4
Academic Disciplines		
Business & Law	228	45.9
Social Sciences & Leisure Management	89	17.9
Health & Medical Sciences	57	11.4
Innovation & Technology	123	24.8
Total	497	100

B. Instrumentation

The questionnaire employed in this study was adapted from pre-existing reliable and valid multi-item instruments derived according to the literature review and objectives of the study. Online Learning Satisfaction was adapted from Sloan Model of Student Satisfaction in Asynchronous Learning Networks (ALN) developed by Dziuban et al. [16] while Self-Regulated Learning (SRL) was adapted from Online Self-Regulated Learning Questionnaire (OSLQ) established by Barnard et al. [17] These instruments are widely used and fairly tested for their reliability and validity. Permissions have also been obtained from the authors to use and adapt their instruments for the purpose of this study.

V. RESULTS

A. Multiple Regression Analysis

A multiple regression analysis was performed using SRL as the independent variable and online learning satisfaction (OLS) as the dependent variable to detect whether SRL predict OLS of students.

TABLE II. MULTIPLE REGRESSION ANALYSIS RESULTS FOR ONLINE LEARNING SATISFACTION

Model	F	\mathbb{R}^2	Adjusted R ²	β	t	Sig
Overall	334.470	.403	.402	1.925	9.767	.000
SRL				.667	18.289	.000

Table II shows the full model statistics that SRL was significantly predicted OLS, F(1. 495) = 334.470, p < .0005. SRL explained 40.2% of the variability in online learning satisfaction (adj. $R^2 = .402$). The general form of the equation to predict the online learning satisfaction is: OLS = 1.925 + .667 SRL.

B. One-Way ANOVA

A one-way ANOVA was conducted to determine if the online learning satisfaction (OLS) was different for academic disciplines of Business & Law (n=228), Social Science & Leisure Management (n=89), Health & Medical Science (n=57) and Innovation & Technology (n=123).

TABLE III. ONE-WAY ANOVA ANALYSIS RESULTS FOR ONLINE LEARNING SATISFACTION ACROSS FOUR DIFFERENT ACADEMIC DISCIPLINES

OLS								
			Std.		95% Confidence Interval for Mean			
	N	Mean	Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
FBL	228	5.5219	.91438	.06056	5.4026	5.6413	1.00	7.00
FSLM	89	5.4263	.91413	.09690	5.2338	5.6189	3.06	7.00
FHMS	57	5.7524	.80665	.10684	5.5384	5.9665	3.94	7.00
FIT	123	5.3207	1.02162	.09212	5.1383	5.5030	1.00	7.00
Total	497	5.4814	.93661	.04201	5.3989	5.5640	1.00	7.00

As shown in Table III, the OLS level increased from the innovation & technology discipline (5.3207 ± 1.0216), to Social Science & Leisure Management discipline (5.4263 ± 0.9141) , to Business & Law discipline (5.5219) \pm 0.9143), to Health & Medical Science discipline $(5.7524 \pm 0.8066).$ ANOVA

OLS					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.009	3	2.670	3.081	.027
Within Groups	427.098	493	.866		
Total	435.107	496			

The OLS level was statistically significantly different for different academic disciplines, F(3, 493) =3.081, p = .027. The results showed that students in different academic disciplines have different levels of satisfaction when they study online. In other words, differences in online learning satisfaction across different academic disciplines in higher education are evident in this private university. Post Hoc Tests

Dependent Variable: OLS							
			Mean Difference (I-			95% Confidence Interval	
	(I) Faculty	(J) Faculty	J)	Std. Error	Sig.	Lower Bound	Upper Bound
Tukey HSD	FBL	FSLM	.09559	.11633	.844	2043	.3955
		FHMS	23051	.13783	.339	5858	.1248
		FIT	.20124	.10413	.216	0672	.4697
	FSLM	FBL	09559	.11633	.844	3955	.2043
		FHMS	32609	.15790	.166	7331	.0809
		FIT	.10566	.12953	.847	2282	.4396
	FHMS	FBL	.23051	.13783	.339	1248	.5858
		FSLM	.32609	.15790	.166	0809	.7331
		FIT	.43175	.14914	.021	.0473	.8162
	FIT	FBL	20124	.10413	.216	4697	.0672
		FSLM	10566	.12953	.847	4396	.2282
		FHMS	43175	.14914	.021	8162	0473

Multiple Comparisons

Tukey post hoc analysis revealed that there was an increase of 0.4317 (95% CI, .0473 to .8162) in OLS scores from Health & Medical Science discipline to Innovation & Technology discipline, which was statistically significant (p = .021). In other words, students in health & medical science discipline and innovation & technology discipline were different in their online learning satisfaction.

VI. THE SIGNIFICANCE OF THE STUDY

From the practical perspective, this study provides insights as to where future efforts need to be directed for Taylor's University, especially in the areas related to the development of students' self-regulated learning (SRL)

abilities as well as the improvement of facilities and infrastructure in both face-to-face and virtual learning environments, and subsequently improve the quality of blended learning delivery. Since SRL is found to influence students' online learning satisfaction, then universities should focus on providing students a more comprehensive training on various SRL strategies that lead to improved metacognitive understandings, task performance, and use of learning strategies for a better academic performance. Universities need to promote the learning approach where students are encouraged to take ownership and control of their learning process and the role of the teacher changes from supplier of knowledge to facilitating the process of learning [18].

In conclusion, the finding is useful for the university to efficiently plan out the development roadmap for blended learning courses as part of the "Teach Less, Learn More" initiative under Taylor's Curriculum Framework project (2017-2021). These findings may also serve as guidelines for other universities to redesign their blended learning courses in line with learner-centred and 21st century pedagogies. By investigating what satisfies learners in online courses, it helps the universities to improve their quality in the online learning delivery [19].

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Lim conducted the research, analyzed the data and wrote the paper under the guidance of another 3 coauthors; and all authors had approved the final version.

ACKNOWLEDGMENT

The authors would like to thank the permission obtained from Faculty of Educational Studies, University Putra Malaysia (UPM) to carry out this research at Taylor's University.

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