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Impact of Self-Efficacy and Self-Regulated Learning on Satisfaction and Academic Performance in Online Learning

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Abstract: During the COVID-19 pandemic, universities widely adopted online and blended learning highlighting the need to investigate students' self-efficacy and self-regulation in such an environment. This study examines the impact of self-efficacy and self-regulated learning on students' satisfaction and academic performance in online learning contexts. Data were collected from 442 university students across various disciplines focusing on six dimensions of online learning self-efficacy and self-regulated learning. The findings reveal that both online learning self-efficacy and online self-regulated learning are at high levels for students in general, with no significant gender differences. Younger students, those in lower semesters and those with reliable internet connectivity exhibited higher levels of these attributes. Non-graduates demonstrated greater self-efficacy in social and academic interaction while management science social science and humanities students exhibited higher levels of online self-regulated learning. Further analysis shows that total online learning platforms used and online learning quality significantly predicted both self-efficacy and self-regulated learning. However, the total semesters using online learning and total online courses taken had no significant effect on these factors. Online self-regulated learning was strongly determined by self-efficacy. Self-efficacy in computer or internet, in the online learning environment, and in time management were significant predictors of online learning self-efficacy. In contrast, environment structuring, time management, goal setting and help-seeking were significant predictors in online self-regulated learning. Self-efficacy in time management and environment structuring were the highest contributing factors for online learning self-efficacy and online self-regulated learning respectively. However, only online self-regulated learning significantly influenced academic performance.

Keywords: *Online self-regulated learning, online learning self-efficacy, academic achievement, online learning satisfaction, online learning environment.*

1. Introduction

Self-efficacy and self-regulated learning have garnered significant attention in various research studies, with a substantial literature body dedicated to these areas. According to Bandura (1994), perceived self-efficacy is described as an individual believing in his or her capabilities to achieve a specific performance level, which influences things or their life circumstances. Such beliefs, according to Bandura (1994), will then shape the way of thinking people, their feeling, behavior and their motivation. It is a must for teachers to employ creative strategies when establishing effective learning environments that are useful for cognitive skill development, thereby motivating and also enhancing the cognitive self-efficacy of students (Bandura, 1994).

Zimmerman (2000) discovered the responsiveness of self-efficacy beliefs toward indefinite changes in the context of students' performance, that it interacts with self-regulated learning processes and mediates academic achievement. High self-efficacy levels are linked to an increased likelihood of task success with greater effort invested. Learner's self-efficacy beliefs, as Hodges (2008) suggests, may be influenced by learning mode changes, such as transitioning to sessions that are conducted online instead of physically. Researchers argue that self-efficacy plays a pivotal role in academic success within online learning's self-directed nature (Hodges, 2008), necessitating an exploration of its impact on online learning satisfaction along with academic performance.

The strategies for self-regulated learning involve measures and operations that are aimed at acquiring information or capabilities, characterized by learners' agency, purpose, and insight into instrumentality

(Zimmerman, 1990). From Chumbley et al. (2018), varying levels of self-regulation were identified in an online agriculture course, with environmental structuring and goal setting exhibiting the highest levels, while task strategies demonstrated the lowest. Stephen and Rockinson-Szapkiw (2021) established positive correlations of online learning self-efficacy, self-direction, and self-regulation, emphasizing the potential for successful online learning when these factors are present.

Based on Edisherashvili et al. (2022), education level is a factor that is critical in the study of self-regulated learning, with diverse learning approaches exhibited by learners of differing ages. Teachers play pivotal roles in children's self-regulated learning success, while instructional design is a driving factor for adult learners (Kellenberg et al., 2019). Demographic variables like the study semester, discipline, status of students, and connectivity of the internet must be put into consideration to understand how online learning self-efficacy and self-regulated learning are different through various groups.

The focus of past research was mainly on the technological aspect of self-efficacy about online learning, with limited exploration of its multi-dimensions (Alqurashi, 2016; Shen et al., 2013). Additionally, few studies have investigated the correlation between self-efficacy and self-regulated learning in an online learning context, particularly the post-COVID-19 phase. This study aimed to address these gaps by examining several three aspects of online learning self-efficacy (technology, learning, and interaction) along with their influence on the satisfaction towards online learning, and academic performance. Furthermore, exploring how the demographic variables impact online learning self-efficacy and self-regulated learning of students, as well as the correlations of experiences in online learning, and each dimension of self-efficacy and self-regulated learning. It is expected that the research outcomes will make a contribution to ongoing research on online learning, emphasizing how important self-efficacy and self-regulated learning are for continuous improvement involving online and blended learning activities. This study is essential since it examines the significance of online learning self-efficacy and online self-regulated learning in determining students' satisfaction and academic performance in online settings. This is an area that has become increasingly important in modern education.

Background of study: Self-efficacy and self-regulated learning' significances hold considerable importance for online learning settings, particularly during post- Covid-19 phase. As numerous universities have urged instructors to adopt online or blended learning approaches, addressing these factors becomes increasingly crucial.

Significance of study: These research results aim to offer valuable understanding for the future establishment of self-efficacy and self-regulated learning skills of students in learning virtually. Additionally, it is anticipated that the research will contribute to the understanding of enhancing the facilities and infrastructure that belong to universities in Malaysia, thereby improving the quality of learning delivery for both online and face-to-face deliveries of learning.

Research questions

The research questions below were formulated for the study:

- How do online learning experiences (total online courses taken, total semesters using online learning, online learning quality and total online learning platforms used) predict each online self-regulated learning and online learning self-efficacy?
- What online learning self-efficacy dimensions significantly predict overall online self-regulated learning?
- To what extent do online self-regulated learning and online learning self-efficacy predict online learning satisfaction?
- To what extent do online self-regulated learning and online learning self-efficacy predict academic performance?

2. Literature Review

The exploration of self-efficacy has been made by various research in online learning, with a predominant focus on its technological aspects (Shen et al., 2013; Alqurashi, 2016; Ithriah et al., 2020). Shen et al. (2013), the emphasis was made considering technology, learning, and social interaction as online learning's integral

features. Alqurashi (2016) highlighted the importance of learning, interaction, and collaborative skills in addition to computer and internet skills. This study focused on three key features that belong to self-efficacy in online learning. Online learning self-efficacy has five dimensions as outlined by Shen et al. (2013): completing courses, social interaction, handling tools, interaction with instructors, and collaborating with classmates. Ithriah et al. (2020) discovered a positive correlation between online learning self-efficacy and e-learning success, while Peechapol et al. (2018) identified various causes that influence online learning self-efficacy. Jan (2015) highlighted significant associations between academic self-efficacy, computer self-efficacy, and past online learning experiences. Ulfatun et al. (2021) and Santoso et al. (2022) discovered a strong positive correlation between online learning self-efficacy and self-regulated learning among 18-23-year-old students. Cho and Kim (2013) emphasized the significance of mastery goal orientation and instructor scaffolding for student self-regulation. Santoso et al. (2022) noted areas for improvement in students' confidence, help-seeking abilities, strategies for performing tasks, and allocation of time in online learning.

This study explored several 10 variables that affect the self-efficacy of students and self-regulated learning in online settings: gender, age group, semester of study, student status, discipline, internet connectivity, online learning experience, total courses taken, platforms used, and online learning quality. Shen et al. (2013) discovered gender differences among the various aspects of online learning self-efficacy, with female students generally exhibiting higher self-efficacy. Limiansi and Hadi (2022) reported variations based on gender, entry year, and discipline. Yavuzalp and Bahcivan (2020) found no significant gender or school-type differences. It was proposed by Shen et al. (2013) that students taking a higher number of online courses demonstrated higher self-efficacy. Liu et al. (2021) identified gender differences in self-regulated learning across three stages, while Mayda et al. (2020) observed gender differences but no variation across education departments. Nivenitha (2017) found no gender difference but noted age-related variations in self-regulated learning. Kamali and Bagheri-Nesami (2022) identified predictors of online self-regulated learning, including age, marital status, gender, the state of being a medical student, possession of another job, and acceptance of online learning. Zhao et al. (2014) highlighted male superiority in self-regulated learning dimensions among Chinese distance learners. Yot-Domínguez and Marcelo (2017) revealed that students continued using the Internet information search and communication instruments. This study contributes to exploring the disparities and correlations among demographic variables, self-efficacy, and self-regulated learning in online environments to existing literature, offering unique insights into this dynamic field.

Self-efficacy and self-regulated learning have both been identified as variables that are crucial in the prediction of students' learning satisfaction in online learning settings. (Aldhahi et al., 2022) found a positive correlation between high online learning satisfaction and online learning self-efficacy domains; time management, technology, and learning. Moreover, the conclusion made was online learning self-efficacy influences the satisfaction of students with online learning experience. Research by (Ithriah et al., 2020) investigated the impact of online learning self-efficacy on online learning success and a positive and significant influence on online learning usage was shown, but no significant correlation was found between online learning self-efficacy and user satisfaction, indicating that online learning site usage would increase if the level of self-efficacy was high. (Jan, 2015) showed a positive and significant correlation between prior experience in online learning and student satisfaction, but no significant correlation between computer self-efficacy and student satisfaction. From (Kamali & Bagheri-Nesami, 2022), a significant positive correlation between the variables was found when the correlation between e-learning acceptance and online self-regulated learning was investigated in 234 medical sciences students. Another study (Dinh & Nguyen, 2022) suggests positive impacts of internet self-efficacy, goal setting, help-seeking, and self-evaluation on academic achievement.

In a study (Young, 2006), effective online teaching practices are viewed by students in that the lecturer must show his visibility, participate actively in learning, demonstrate an effort to develop trust with students and assist in students' learning. (Gopal et al., 2021) suggest four factors for high satisfaction level and performance for online courses, to educational management which are the lecturers' quality, course design, prompt feedback by lecturers, and expectation from the students. According to (Nivenitha, 2017), a positive link was found between self-regulated learning and academic performance. (Keskin & Korkutata, 2018) who studied self-efficacy, self-regulated learning strategies use and biology achievement among ninth and tenth-grade high school students in Turkey found that greater self-efficacy level had a direct relationship with cognitive self-regulated learning, metacognitive self-regulated learning, time and study environmental management

strategies, and effort regulation strategies. (Koosha, 2020) studied the correlation of self-efficacy, self-regulated learning, and academic motivation on academic achievement and found that self-regulated learning was related significantly and directly with academic achievement and better predicted academic achievement. In another study (Dinh & Nguyen, 2022), internet self-efficacy, goal setting, and help-seeking were found to influence academic achievement directly and positively. However, (Dinh & Nguyen, 2022) found that elaboration, environment structuring, task strategies, and self-evaluation had no impacts on students' academic achievement. (Alegre, 2014) showed the positivity and significance of academic self-efficacy, self-regulated learning, and academic performance but had low correlations, while academic self-efficacy and self-regulated learning had a positive, significant and moderate relationship. In their systematic review study, (Honicke & Broadbent, 2016) reported that effort regulation, deep processing strategies, as well as goal orientation had a moderating effect on the correlation between academic self-efficacy and academic performance. In contrast, (Santoso et al., 2022) no significant link was found for online self-regulated learning and learning performance, as well as for online learning self-efficacy and learning performance.

3. Research Methodology

Participants: 442 public university students in Melaka, Malaysia, from eight faculties, were involved in the research. Information was gathered from students representing these faculties (refer to Table 1). To facilitate the analysis, three disciplines were used to categorize the faculties: social sciences and humanities, science and technology and management sciences.

Contexts of Learning: At the university, every course used the methods of online learning, with online classes held in various locations, including family homes in both urban and rural regions, rented houses and residential colleges. Asynchronous communication tools were used for student-lecturer and student-student interactions, which took place through social media (such as WhatsApp or Telegram), emails and discussion boards. Such communication could also be through in-person meetings, particularly for those residing in rented houses or residential colleges. Various learning activities involved the students which comprised discussions, individual projects with peer evaluation, final projects, final examinations, quizzes, group projects and also self-reporting.

Demographic variables: The researcher requested for the participants to provide the demographic details, for instance, online learning location, internet connectivity, semester of study, faculty, age group, gender and household monthly income.

Academic performance: In this current study, the measurement of student's academic performance was made by utilizing the actual grade point average (GPA) for the current semester.

Online learning experiences: The participants were also questioned about their online learning experiences including their total semesters experiencing learning through online medium, total online courses taken in the current semester, total online learning platforms used, and online learning quality.

Measures: This study employed three instruments. The first was utilized to measure online learning self-efficacy dimensions, while the second was employed to measure dimensions of online self-regulated learning and the third was to measure online learning satisfaction.

Online learning self-efficacy: Previous works by Shen et al. (2013) and W. A. Zimmerman & Kulikowich (2016) were used to derive the self-efficacy scales of online learning used in this study. The scale developed by W. A. Zimmerman & Kulikowich (2016) was adopted in the study into the dimensions of self-efficacy in computer/internet (9 items) and self-efficacy in the online environment (7 items) as well as self-efficacy in time management (6 items). Additionally, the scale introduced by Shen et al. (2013) was adopted in the study in self-efficacy to interact with online course lecturers (6 items), self-efficacy for social interactions with classmates (4 items), and self-efficacy for academic interactions with classmates (6 items). The assessment of these items used a 5-point Likert scale (1 – no confidence, 2 – low confidence, 3 – neutral, 4 – confidence, 5 – high confidence), which allowed the participants to express their confidence levels in various online course activities. Higher scores indicated elevated levels of online learning self-efficacies. The dimensions exhibited

from good to very good internal consistencies, while the range of Cronbach's alpha values was from 0.870 to 0.917. Finally, across all 38 items, the overall consistency was indicated as 0.972.

Online self-regulated learning: In this study, the use of online self-regulated learning scales was based on the work of Barnard et al. (2009). There were 22 items across several six dimensions: goal setting (4 items), environment structuring (3 items), task strategies (4 items), time management (3 items), help-seeking (4 items), and self-evaluation (4 items) in which the items were rated by the respondents using 5-point Likert scale (1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, 5 – strongly agree), indicating their agreement levels regarding their online learning behaviors. Higher scores indicated greater levels of online self-regulated learning. The dimensions exhibited acceptable to very good internal consistencies, with 0.725 to 0.842 Cronbach's alpha value range. It was found that the overall consistency that belongs to the 22 items was 0.948.

Online learning satisfaction: In this study, the online learning satisfaction scales used were based on (Gopal et al., 2021). 7 items were measured using a 5-point Likert scale (1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, 5 – strongly agree). Using the scale, enabled the students to report how satisfied they are in using online learning. High scores equal higher satisfaction in online learning. Online learning satisfaction factors depicted very good internal consistency with Cronbach's alpha value of 0.960.

Online learning quality: Online learning quality was adapted from (Bismala, 2022) which consisted of 5 items. The measurement of the items was made by using a 5-point Likert scale (1 – strongly disagree, 2 – disagree, 3 – neutral, 4 – agree, 5 – strongly agree). The Cronbach's alpha value was 0.860 which indicates a good internal consistency.

Data analysis: IBM SPSS Version 26.0 was utilized in this research to conduct an independent samples t-test, one-way analysis of variance (ANOVA), simple linear regression analysis, and multiple regression analysis.

Procedure: Initially, educators' leading online courses were purposefully chosen through researchers' judgments. Subsequently, these selected instructors were approached via email to seek approval for administering a survey within their online courses. Following their consent, a concise overview of the research's objectives and a link to the online survey were shared through WhatsApp with the selected instructors. They, in turn, disseminated the survey link to their respective online class WhatsApp groups. Student participation in the study was entirely voluntary. The survey spanned from September 12, 2022, to October 8, 2022.

4. Results

Demographic characteristics of participants: The demographic characteristics of the 442 participants are shown in Table 1. The respondents were majority female (72.6%), with around 63.8% falling into the age group below 20 years old. About 74.3% of the participants preferred to stay home for online learning, regardless of whether it was an urban or rural area. Additionally, 62.7% belonged to the household income group below or equivalent to RM4850 (B40), 52.3% were affiliated with the Business and Management faculty (FPP), and 92.1% were diploma students. Semester 2 accounted for 38.7% of the participants, and 48% reported having a good to very good internet connection at their residence. In terms of performance, academically, the majority (67.4%) achieved a grade point average (GPA) within the 3.00 to 3.74 range, indicating good results. Another 15.4% obtained a GPA of 3.75 to 4.00, signifying very good to excellent performance, while 14.7% received a 3.00 to 3.74 GPA, denoting average results. Only a small percentage (1.6%) had low-achieving results, as illustrated in Table 1.

Information on online learning: The majority of the students (60%) attended online learning sessions from the residences of their family in urban or suburban areas, while 20.8% attended classes at residential colleges on campus. Additionally, 14.3% participated in online learning from homes of their family located in rural areas, and 5% attended sessions from rented houses out of the campus (refer to Table 1). The majority of them also had two semesters of online learning (45.5%), took online courses of six or more (71.3%), and utilized three online learning platforms (74.2%). Notably, Google Meet was the preferred platform for "live" online learning (78.1%), while Google Classroom was widely used for notes, tutorials, and discussions (76.9%).

Students also expressed a preference for Google Classroom and Google Forms for assessments, with percentages of 45.2% each. Regarding the quality of online learning, 65.4% of students deemed it good, 32.1% thought it was average, and 2.5% deemed it as poor. Detailed outcomes on experiences of online learning can be found in Table 1.

Table 1: Online learning experiences of participants

Online learning experience	Category	Frequency	Percent
Number of semesters (including the current semester) taking online learning	1	87	19.7
	2	201	45.5
	3	64	14.5
	4	58	13.1
	5	32	7.2
Number of online courses taken in the current semester	1	38	8.6
	2	14	3.2
	3	23	5.2
	4	20	4.5
	5	31	7.0
	6	59	13.3
	7	115	26.0
	8	131	29.6
	9	9	2.0
Number of online learning platforms used	1	25	5.7
	2	89	20.1
	3	177	40.0
	4	98	22.2
	5	51	11.5
	6	2	0.5

Online learning experiences were measured using total semesters of online learning use, total online courses that they are taking in the current semester, total online learning platforms utilized, and online learning quality. These variables were all continuous quantitative and acted as predictors. In answering research question 1, two multiple regression analyses were conducted. The first analysis was made using a dependent variable of online learning self-efficacy while the second analysis was made using the dependent variable of online self-regulated learning. For the first multiple regression model, total semesters of online learning, total online courses in the current semester, total online learning platforms involved, and online learning quality together significantly predicted ($F(4, 437) = 112.101$, $p < 0.0005$) and 50.6% of the variance was explained in overall online learning self-efficacy. Number of online learning platform used ($t = 2.102$, $p < 0.05$) and online learning quality ($t = 20.873$, $p < 0.0005$) were significant predictors of online learning self-efficacy. The most contributing predictor of online learning self-efficacy was the quality of online learning. It was discovered from the results that as a 1 unit increase in the number of online learning platforms used and a 1 point increase in online learning quality score, it was estimated for students' online learning self-efficacy to increase by 0.04 points and 0.67 respectively. The outcomes are displayed in Table 2.

Table 2: Multiple regression analyses results of online learning experiences versus overall online learning self-efficacy and online self-regulated learning

Model summary		ANOVA		Coefficients					
R	R square	F (4, 437)	Sig	Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
					B	Std. Error	Beta		
				Overall online learning self-efficacy					
				(Constant)	1.023	0.164		**6.244****	**0.000**
				Number of semesters using online learning	0.009	0.019	0.018	0.490	0.625
				Number of online courses taken in the current semester	0.010	0.009	0.039	1.085	0.279
0.712	0.506	**112.101****	**0.000**	Number of online learning platforms used	0.040	0.019	0.071	**2.102***	**0.036**
				Online learning quality	0.669	0.032	0.703	**20.873****	**0.000**
				Overall online self-regulated learning					
				(Constant)	1.063	0.174		**6.099****	**0.000**
				Number of semesters using online learning	-0.010	0.020	-0.019	-0.501	0.617
0.685	0.469	**96.372****	**0.000**	Number of online courses taken in the current semester	0.002	0.010	0.008	0.203	0.839
				Number of online learning platforms used	0.053	0.020	0.093	**2.629****	**0.009**
				Online learning quality	0.658	0.034	0.675	**19.301****	**0.000**

**p < 0.05 **p < 0.01 ****p < 0.0005*

For the second multiple regression model, total semesters of online learning use, total online courses in the current semester, total online learning platforms used, and online learning quality together significantly predicted ($F(4, 437) = 96.372$, $p < 0.0005$) and explained 46.9% of the variance in overall online self-regulated learning. Number of online learning platforms used ($t = 2.629$, $p < 0.01$) and online learning quality ($t = 19.301$, $p < 0.0005$) were significant predictors of online self-regulated learning. Online learning quality was also the most contributing predictor for online self-regulated learning. From the result, it was shown that as a 1 unit increase in the number of online learning platforms used and a 1 point increase in online learning quality score, students' online self-regulated learning was estimated to increase by 0.05 points and 0.66 respectively. Table 2 details the results. Therefore, total online learning platforms utilized and online learning quality significantly influenced both students' online learning self-efficacy and online self-regulated learning. Moreover, online learning quality was the most contributing predictor followed by several online learning platforms used for

both students' online learning self-efficacy along online self-regulated learning while other online learning experiences like the total semesters of online learning involved and total online courses taken were not significant predictors for both online learning self-efficacy and online self-regulated learning.

In answering research question 2, multiple regression analysis was performed using six online learning self-efficacy factors as independent variables and overall, online self-regulated learning as an outcome variable in determining the six online learning self-efficacy belief factors and whether they predict online self-regulated learning. The total of six online learning self-efficacy dimensions significantly accounted for 69.9% of the variance in online self-regulated learning ($F(6, 435) = 168.477$, $p < 0.0005$). Self-efficacy in time management was the highest contributing significant predictor of online self-regulated learning ($t = 5.487$, $p < 0.0005$, Beta = 0.238), followed by self-efficacy to interact academically with classmates ($t = 3.827$, $p < 0.0005$, Beta = 0.231), self-efficacy in online learning environment ($t = 4.164$, $p < 0.0005$, Beta = 0.188), and self-efficacy in computer/internet ($t = 2.485$, $p < 0.05$, Beta = 0.117).

Table 3: Multiple regression analysis results of online learning self-efficacy dimensions versus overall online self-regulated learning.

Model summary		**ANOVA**		**Coefficients**					
R	R square	F (6, 435)	Sig	Variable	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
0.836	0.699	**168.477****	**0.000**	(Constant)	0.485	0.112		**4.311****	**0.000**
				Self-efficacy in computer/internet	0.116	0.047	0.117	**2.485***	**0.013**
				Self-efficacy in an online learning environment	0.173	0.041	0.188	**4.164****	**0.000**
				Self-efficacy in time management	0.213	0.039	0.238	**5.487****	**0.000**
				Self-efficacy to interact with lecturers for online courses	0.059	0.036	0.071	1.639	0.102
				Self-efficacy to interact socially with classmates	0.092	0.047	0.109	1.952	0.052
				Self-efficacy to interact academically with classmates	0.210	0.055	0.231	**3.827****	**0.000**

**p < 0.05 ****p < 0.0005 Dependent variable – Overall online self-regulated learning*

Self-efficacy to interact with lecturers for online courses ($t = 1.639$, $p > 0.05$) and self-efficacy to interact socially with classmates ($t = 1.952$, $p > 0.05$) did not predict online self-regulated learning significantly. Results also indicated that as self-efficacy in computer/internet, self-efficacy in the online learning environment, self-efficacy in time management, and self-efficacy to interact academically with classmates each showed an increase by 1 point, the estimation of increase for online self-regulated learning was by 0.116 points, 0.173 points, 0.213 points, and 0.210 points respectively. Table 3 shows the results. Additionally, the study also examined the correlation between overall online learning self-efficacy and online self-regulated learning by utilizing simple linear regression analysis. On regressing overall online learning self-efficacy and overall online self-regulated learning, the result revealed that 69.2% of the variance in overall self-regulated learning total score was significant ($F (1, 440) = 987.019$, $p < 0.0005$) and explained by overall online learning self-efficacy. About each 1-point increase in overall online learning self-efficacy, an increase of 0.853 points in overall online self-regulated learning was found. Table 4 details the result.

Table 4: Simple linear regression analysis result of overall online learning self-efficacy versus overall online self-regulated learning

Model summary		ANOVA		Coefficients					
R	R square	F(6, 435)	Sig	Variable	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
				(Constant)	0.526	0.109		**4.837****	**0.000**
0.832	0.692	**987.019****	**0.000**	Overall online learning self-efficacy	0.853	0.027	0.832	**31.417****	**0.000**

*****p < 0.0005 Dependent variable – Overall online self-regulated learning*

To investigate how online learning self-efficacy and online self-regulated learning correlate to online learning satisfaction, three separate multiple regression analyses were carried out the first one was conducted for online learning self-efficacy dimensions on online learning satisfaction; the second was for online self-regulated learning dimensions on online learning satisfaction, while the third was for overall online learning self-efficacy and overall online self-regulated learning on online learning satisfaction. In these three multiple regression analyses, the dependent variable was online learning satisfaction. In the first and second multiple regression analyses, the independent variables were online learning self-efficacy and online self-regulated learning dimensions while for the third multiple regression analysis, the independent variables were overall online learning self-efficacy and online self-regulated learning.

The six online learning self-efficacy factors together significantly accounted for 52.9% of the variance in learning satisfaction ($F(6, 435) = 81.539$, $p < 0.0005$). Self-efficacy in computer/internet ($t = 2.636$, $p < 0.01$), self-efficacy in the online learning environment ($t = 4.382$, $p < 0.0005$), and self-efficacy in time management ($t = 5.140$, $p < 0.0005$) predicted online learning satisfaction significantly. Out of all significant predictors, self-efficacy in time management was the most contributing predictor (Beta = 0.279) of online learning satisfaction, followed by self-efficacy in the online learning environment (Beta = 0.247), and self-efficacy in computer/internet (Beta = 0.156). For every 1-point increase in self-efficacy in computer/internet, self-efficacy in the online learning environment, and self-efficacy in time management, the estimation was that online learning satisfaction would increase by 0.165 points, 0.243 points, and 0.268 points respectively. Table 5 presents the results.

Table 5: Multiple regression analysis results of online learning self-efficacy and online self-regulated learning dimensions versus online learning satisfaction

Model summary		ANOVA		Coefficients					
R	R square	F(6, 435)	Sig	Variable	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
				Online learning self-efficacy					
				(Constant)	0.801	0.151		**5.321****	**0.000**
				Self-efficacy in computer/internet	0.165	0.063	0.156	**2.636****	**0.009**
				Self-efficacy in an online learning environment	0.243	0.056	0.247	**4.382****	**0.000**
				Self-efficacy in time management	0.268	0.052	0.279	**5.140****	**0.000**
0.728	0.529	**81.539****	**0.000**	Self-efficacy to interact with lecturers for online courses	0.050	0.048	0.057	1.043	0.298
				Self-efficacy to interact socially with classmates	0.034	0.063	0.038	0.544	0.587
				Self-efficacy to interact academically with classmates	0.044	0.074	0.046	0.603	0.547
0.723	0.522	**79.219****	**0.000**	*Online self-regulated learning*					

	(Constant)	0.957	0.143		**6.700******	**0.000**
	Goal setting	0.173	0.055	0.181	**3.157****	**0.002**
	Environment structuring	0.216	0.045	0.248	**4.838******	**0.000**
	Task strategies	0.096	0.050	0.107	1.943	0.053
	Time management	0.114	0.053	0.128	**2.127***	**0.034**
	Help-seeking	0.132	0.047	0.144	**2.803****	**0.005**
	Self-evaluation	0.038	0.057	0.041	0.674	0.501

**p < 0.05 ****p < 0.0005 Dependent variable – Online learning satisfaction*

The six online self-regulated learning factors together significantly accounted for 52.2% of the variance in learning satisfaction ($F(6, 435) = 79.219$, $p < 0.0005$). Goal setting ($t = 3.157$, $p < 0.01$), environment structuring ($t = 4.838$, $p < 0.0005$), time management ($t = 2.127$, $p < 0.05$), and help-seeking ($t = 2.803$, $p < 0.01$) predicted online learning satisfaction significantly. From these significant predictors, environment structuring was the most contributing predictor (Beta = 0.248) of online learning satisfaction, followed by goal setting (Beta = 0.181), help-seeking (Beta = 0.144), and time management (Beta = 0.128). For every 1-point increase in goal setting, environment structuring, time management, and help-seeking, online learning satisfaction was estimated to increase by 0.173 points, 0.216 points, 0.114, and 0.132 points respectively. Table 5 shows the detailed results.

Online learning self-efficacy and online self-regulated learning together significantly accounted for 55.3% of the variance in learning satisfaction ($F(2, 439) = 271.427$, $p < 0.0005$). Overall online learning self-efficacy ($t = 6.307$, $p < 0.0005$) and overall online self-regulated learning ($t = 7.209$, $p < 0.0005$) were both significant predictors of online learning satisfaction. Overall online self-regulated learning (Beta = 0.414) was the most contributing predictor of online learning satisfaction compared to online learning self-efficacy (Beta = 0.362). Results are detailed in Table 6.

Table 6: Multiple regression analysis results of overall online learning self-efficacy, overall online self-regulated learning versus online learning satisfaction

Model summary		**ANOVA**		**Coefficients**					
R	R square	F(2, 439)	Sig	Variable	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
0.744	0.553	**271.427******	**0.000**	(Constant)	0.669	0.144		4.646****	0.000
				Overall online learning self-efficacy	0.398	0.063	0.362	6.307****	0.000
				Overall online self-regulated learning	0.444	0.062	0.414	7.209****	0.000

*****p < 0.0005 Dependent variable – Online learning satisfaction*

To investigate the way online learning self-efficacy and online self-regulated learning correlate to academic performance, three separate multiple regression analyses were carried out the first multiple regression analysis was conducted for online learning self-efficacy dimensions on academic performance; the second was for online self-regulated learning dimensions on academic performance; while the third was for overall online learning self-efficacy and overall online self-regulated learning on academic performance. In these three multiple regression analyses, the dependent variable was academic performance. While, in the first and second multiple regression analyses, the independent variables were online learning self-efficacy and online self-regulated learning dimensions. Lastly, in the third multiple regression analysis, the independent variables were overall online learning self-efficacy and overall online self-regulated learning. In the first multiple regression analysis, all six dimensions that belong to online learning self-efficacy did not significantly predict academic performance ($F(6, 428) = 0.950$, $p > 0.05$). For the second multiple regression, online self-regulated learning dimensions together significantly accounted for 3.9% of the variance in academic performance ($F(6, 428) = 2.926$, $p < 0.01$). Goal setting ($t = 2.274$, $p < 0.05$) and self-evaluation ($t = 2.074$, $p < 0.05$) were significant predictors of academic performance. Goal setting (Beta = 0.185) was the most contributing predictor to predict academic performance compared to self-evaluation (Beta = 0.178). For the third multiple regression analysis, the result showed that overall online learning self-efficacy and overall online self-regulated learning together

significantly explained 2.2% of the variability in academic performance ($F(2, 432) = 4.751$, $p < 0.01$). The sole significant predictor of academic performance was online self-regulated learning. Table 7 shows the outcomes.

Table 7: Multiple regression analysis results of online learning self-efficacy and online self-regulated learning dimensions versus academic performance

Model summary		ANOVA		Coefficients					
R	R square	F	Sig	Variable	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
0.115	0.013	**F(6, 428) = 0.950**	**0.459**	*Online learning self-efficacy*					
				(Constant)	3.086	0.146		21.122****	0.000
				Self-efficacy in computer/internet	0.040	0.062	0.057	0.652	0.515
				Self-efficacy in an online learning environment	-0.019	0.053	-0.029	-0.350	0.726
				Self-efficacy in time management	-0.017	0.051	-0.026	-0.328	0.743
				Self-efficacy to interact with lecturers for online courses	0.003	0.047	0.005	0.061	0.952
				Self-efficacy to interact socially with classmates	0.072	0.061	0.121	1.184	0.237
				Self-efficacy to interact academically with classmates	-0.015	0.072	-0.023	-0.208	0.835
0.199	0.039	**F(6, 428) = 2.926****	**0.008**	*Online self-regulated learning*					
				(Constant)	2.903	0.136		**21.283******	**0.000**
				Goal setting	0.118	0.052	0.185	**2.274***	**0.023**
				Environment structuring	-0.003	0.042	-0.006	-0.079	0.937
				Task strategies	-0.045	0.047	-0.075	-0.964	0.336
				Time management	-0.063	0.050	-0.105	-1.240	0.216
				Help-seeking	-0.009	0.045	-0.015	-0.201	0.841
				Self-evaluation	0.111	0.054	0.178	**2.074***	**0.039**
0.147	0.022	**F (2, 432) = 4.751****	**0.009**	(Constant)	3.004	0.143		**20.977******	**0.000**
				Online learning self-efficacy	-0.055	0.062	-0.075	-0.881	0.379
				Online self-regulated learning	0.145	0.061	0.203	**2.378***	**0.018**

*$p < 0.05$ ****$p < 0.0005$ *Dependent variable – Academic performance*

Discussion

Regarding online learning experiences, it was found that total online learning platforms utilized and online learning quality significantly predicted online learning self-efficacy and online self-regulated learning. Online learning self-efficacy and online self-regulated learning were most influenced by online learning quality. This suggests that online learning quality is crucial for determining online learning self-efficacy and online self-regulated learning. Such a result is in line with (Shen et al., 2013) which concludes that learning experience influences online learning self-efficacy of students as opposed to demographic information, which includes gender and status of academic or total online courses taken by students. Another study (Cho & Kim, 2013) discovered that the scaffolding method used by instructors to interact most significantly explained the self-regulation of students when interacting with other people while gender and total online courses taken were unrelated to the self-regulation of students when interacting with others in online learning contexts. Moreover, the present study also reveals the significant predictor of both online learning self-efficacy and online self-regulated learning, which is the total online learning platforms used, supporting the research outcomes from (Yot-Domínguez & Marcelo, 2017) who reported that there was a limitation in the use of self-regulated learning strategies by the students with the presence of technology. According to the study, students used more digital technologies for basic activities to search, store or share information which are deemed as limited when there is no complementary with others that support understanding, monitoring or self-assessment throughout the learning process. However, it was revealed from the present study that the total semesters of online learning

use and total online courses taken were not significant predictors of online learning self-efficacy and online self-regulated learning. This is not in line with (Altun & Erden, 2013) in which previous online learning, instructor-acquired skill, instructor feedback, and online learning system anxiety were reported to influence the self-efficacy of students in an online learning context.

It was revealed from the present study that online learning self-efficacy dimensions explained almost 70% of the variance in online self-regulated learning. This shows that online learning self-efficacy dimensions are crucial in self-regulated learning development in online environments. Self-efficacy in time management was the most contributing predictor of online learning self-efficacy for online self-regulated learning, followed by self-efficacy in the online learning environment, self-efficacy to interact academically with classmates, and self-efficacy in computer/internet. However, self-efficacy in the interaction with lecturers for online courses and self-efficacy in social interaction with classmates were not significantly related to online self-regulated learning. In contrast, the findings of (Y. C. Kuo et al., 2014) found that self-efficacy in internet and self-regulated learning were insignificant predictors of online learning satisfaction. Results also showed that 69.2% of the variance in overall online self-regulated learning was explained by online learning self-efficacy indicating that students who have high online learning self-efficacy also showed high online self-regulated learning. This result is consistent with the study by (Stephen & Rockinson-Szapkiw, 2021) and (Ulfatun et al., 2021).

From six online learning self-efficacy dimensions, only three dimensions were found to significantly predict the online learning satisfaction of students. Out of the three significant self-efficacy dimensions, self-efficacy in time management had the most significant correlation with learning satisfaction, followed by self-efficacy in computer/internet and self-efficacy in online learning environments. From the outcomes, their self-efficacy in online course completion was perceived by the students as having more importance than other self-efficacies when it comes to online learning satisfaction. Self-efficacy in time management about online learning satisfaction is more important than other self-efficacies which is consistent with the findings by (Shen et al., 2013) and (Jan, 2015). Regarding online self-regulated learning, environment structuring was more important than goal setting, help-seeking, and time management in explaining students' online learning satisfaction. It was also found that both online learning self-efficacy and online self-regulated learning significantly influenced online learning satisfaction and online self-regulated learning was found as more predictive compared to online learning self-efficacy to online learning satisfaction. This finding concurred with the studies by (Aldhahi et al., 2022) and (Lim et al., 2020) which conclude that e-learning self-efficacy and online self-regulated learning influence the satisfaction of students with e-learning experience.

Regarding academic performance, no online learning self-efficacy dimensions showed significant predictors of academic performance. However, goal setting and self-evaluation of online self-regulated learning showed a significant relationship with academic performance. The result suggests that goal setting is the utmost contributing predictor to students' academic performance followed by students' capabilities to self-evaluate themselves. When considering overall online learning self-efficacy and overall online self-regulated learning together, overall online self-regulated learning was found as significantly most predictive for academic performance.

5. Conclusion

Self-efficacy in technology has been the focus of much research but little research has focused on self-efficacy in other factors apart from technological factors (Alqurashi, 2016) and he suggested developing research that includes not only the technology but also the rest of the dimensions like learning, interaction and collaborative skills since these aspects together are crucial to be put into consideration when self-efficacy is measured in online learning contexts. Nevertheless, in this study, the exploration only concerned online learning self-efficacy dimensions in the number of three online learning contexts aspects which were technology, learning and interaction.

From the outcomes of the study, the differences in age and internet connectivity in online learning self-efficacy along with online self-regulated learning were found, and this will contribute to the existing study that is relevant to online learning that involves self-regulated learning. It is also demonstrated from the present research that self-efficacy in time management and environment structuring most significantly explain

variances in online learning satisfaction. From the follow-up analysis, self-efficacy in time management was shown to have a significant and strong positive correlation with the environment structuring (Pearson's correlation coefficient, $r = 0.612$, $p < 0.0005$). These outcomes signify the crucialness of students' self-judgment on what they are capable of in completing an online course and environment structuring in their satisfaction with online courses. Additionally, lecturers must take a proactive approach when monitoring and giving encouragement for social interactions with classmates or lecturers, as well as in task strategy development, and self-evaluation establishment so that students can develop both online learning self-efficacy and online self-regulated learning.

This study provides findings that are evident to enhance the online learning self-efficacy of students, their online self-regulated learning and success academically. Since it was shown by the study that digital technology is significant in self-regulated learning, therefore university lecturers must ensure that digital technology is incorporated into learning. About improving online learning quality, it provides insights for future studies particularly in relevant areas regarding developing the online learning self-efficacy and online self-regulated learning abilities of students, along with improving the facilities and infrastructures in online and face-to-face learning contexts.

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