

Examining Student Characteristics, Self-Regulated Learning Strategies, and Their Perceived Effects on Satisfaction and Academic Performance in MOOCs

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Abstract: The ultimate goals of education and training are the development of learners' learning outcomes. The prospect of achieving high academic results should function as a driving force for students to be engaged in learning. Recognition of the factors affecting their learning satisfaction should facilitate their learning process, especially in online learning environments such as Massive Open Online Courses (MOOCs). The purpose of this study was to examine the interactions among students' characteristics, their perceived values of self-regulated learning (SRL) strategies, satisfaction and academic performances. A mixed-methods design was employed to investigate the issue under exploration. The 227 surveyed responses were collected from English majors who had experience in MOOCs and were studying at a private university in Can Tho city in the Mekong Delta, Vietnam. Data from the survey was analysed with the Statistical Package for the Social Sciences (SPSS) 25 for the correlations between their characteristics and the quantitative variables, while Partial Least Squares Structural Equation Modelling (PLS-SEM) was performed to examine the perceived effects of self-regulated learning (SRL) strategies on their satisfaction and academic outcomes. Qualitative data was collected through open-ended survey questions and analysed based on thematic analysis guidelines. The results revealed that SRL strategies such as strategic planning, time management, environment structuring, and help-seeking positively influenced both student satisfaction and academic performance. Notably, the study identified flexible learning time, self-paced learning, and the ability to choose study locations as significant factors enhancing student satisfaction. Conversely, limited social interaction, poor internet connectivity, and low motivation were found to be demotivating factors. Additionally, the study highlighted the importance of gender and prior online learning experience in shaping students' satisfaction and performance in MOOCs. While gender showed no significant correlation with SRL strategies, satisfaction, or academic performance, prior experience in online learning environments, such as the number of completed MOOC courses, was significantly correlated with better academic outcomes. However, a weak negative correlation between students' academic years and their satisfaction was observed, suggesting that more advanced students might face increased academic pressure and higher expectations, leading to lower satisfaction levels. The research underscores the critical role of SRL strategies in facilitating effective learning in MOOCs, especially in the context of English major students who often lack direct interaction with instructors and peers. Training students in SRL strategies can help them better manage their learning processes, overcome challenges, and achieve their academic goals. This study contributes to the understanding of how student characteristics and SRL strategies affect learning in online environments and suggests practical implications for enhancing MOOC experiences. Future research should investigate additional SRL strategies and include a larger, more diverse sample to provide a more comprehensive understanding of their impact on student satisfaction and academic performance in MOOCs. Furthermore, exploring the specific challenges faced by different academic disciplines in MOOCs could offer more tailored solutions to improve online learning experiences.

Keywords: Self-regulated learning, MOOCs, Online learning, Satisfaction, Academic achievements

1. Introduction

Learning in MOOCs has become ubiquitous since 2012 (Waks, 2019). This kind of learning requires learners to complete all the tasks by watching video lessons, completing quizzes, doing assignments and giving feedback to their course-mates by a certain deadline. A MOOC's duration can range from 1 to 16 weeks depending on the course content, difficulty, and learners' expected time commitment (Bowden, 2021). Teacher-student(s) interaction is almost not a feature of this learning mode. The presence of peers during their learning is very limited. This learning mode is referred to as self-regulated learning (SRL). This is considered a skill that can be honed (Schunk, 2005; Zimmerman, 2015), especially in a virtual learning environment (Amiruddin, et al., 2023).

One of the ways to help learners to become self-regulated is to train them to use SRL strategies. These strategies have been proven to be beneficial to academic results (Broadbent and Poon, 2015; Santos and Alliprandini, 2023), and have helped students to direct their self-regulation during the online learning process (Arjaya, et al.,

2023). However, students' perceptions of the usefulness of these strategies would affect their use of them in their learning (Versteeg, et al., 2021).

Despite the acknowledged significance of self-regulated learning (SRL) strategies, there is a limited understanding of how these strategies interact with students' characteristics, such as gender, academic year, and prior MOOCs experience, and how they affect students' satisfaction and academic performance in MOOCs. This gap in knowledge hinders the development of targeted interventions that could enhance students' online learning experiences and outcomes.

The present study aims to a) examine the correlation among students' characteristics (gender, school year, background, and MOOCs experiences), online satisfaction, and academic achievements, and b) investigate the perceived effects of SRL strategies on students' satisfaction and academic results. To find the answer to these aims, we proposed two research questions:

- RQ1: Do differences in students' characteristics (gender, school year, background, and MOOCs experiences) correlate with their self-regulated learning strategies, student satisfaction, and academic achievement?
- RQ2: Do students' perceived values of self-regulated learning strategies affect their satisfaction and academic achievement in learning in MOOCs?

To achieve these objectives, this paper is structured as follows:

The Literature Review section discusses existing research on learning in MOOCs, student characteristics in online learning, and the impact of SRL strategies on satisfaction and academic performance.

The Methodology section outlines the mixed-methods design employed in the study, describes the data collection methods and how they were analysed.

The Findings section presents the results of the quantitative and qualitative analyses, highlighting key correlations and perceived effects.

The Discussion section interprets the findings in the context of existing literature, offering insights into theoretical and practical implications for MOOCs and online learning environments.

The Conclusion and Limitations section summarizes the study's major findings and contributions, acknowledges its limitations, and suggests directions for future research.

2. Literature Review

2.1 Discrepancy of Learning Styles in High School and University

Secondary and high school education requires teachers to teach their students set curriculum subjects to meet certain levels of completion of compulsory education standards. The students' academic achievements are reflected in their grades. Therefore, students' learning results seem to be put on the teachers' shoulders, and so the teachers' roles are quite dominant in the teaching and learning process.

Consequently, higher demands on self-regulated learning at tertiary levels, challenged students who had just transferred from high school to university (Vosniadou, 2020). This raised a need for further exploration of SRL values among first year students.

2.2 Learning in MOOCs

In MOOCs, study courses were pre-designed with prepared video lessons with transcriptions alongside (Mor and Warburton, 2016). Learners, regardless of age or educational background, can gain access to these courses for free, with the exception of earning certificate needs (Glass, Shiokawa-Baklan and Saltarelli, 2016).

MOOCs learners are required to complete their registered courses within 3 months (Chavez, 2020). During the study, they are required to watch the recorded video lessons, then complete some quizzes related to the lessons (Comer and White, 2016). They can also post a query in the discussion forum to ask for help (Ortoleva and Bétrancourt, 2016). After each week, normally, they have to do an assignment which requires them to apply the knowledge gained from the lessons, and do peer-grading for their course-mates' work as well (Comer and White, 2016). When all these things are done, the course administrators would issue them a certificate for the recognition of their course accomplishment.

It can be seen that learning in MOOCs requires students mainly to self-regulate their learning as well as socialize with course-mates to study.

2.3 Student Characteristics and Online Learning

Pintrich (2000) postulated that SRL processes can help mediate students' characteristics and external contexts to enhance their academic outcomes. Moreover, understanding the goodness of fit or match between the learner's characteristics and the characteristics of their learning contexts is important for academic emotions and motivation (Webster and Hadwin, 2015).

Previous studies indicated contradictory findings of the roles of gender in students' academic outcomes as well as their satisfaction in online learning. The study by Yu (2021) found that there were no statistically significant differences in the level of satisfaction based on gender, age, or level of study. A similar study also showed no difference in learning satisfaction among males and females in online learning (Harvey, Parahoo and Santally, 2017). Nevertheless, a recent study by Dinh, et al. (2022) found a correlation between gender and satisfaction when university students studied in asynchronous and synchronous online environments from various universities in the Mekong Delta in Vietnam, but no correlation with SRL strategies. However, Virtanen and Nevgi (2010) confirmed the interrelations of gender and SRL components. This finding was supported by other studies in the field of SRL writing for English as a Foreign Language (EFL) students (Bai, Shen and Mei, 2020) and online SRL for high school students (Liu, et al., 2021).

Given the correlation between gender and learning outcomes, female students who study at fixed times and locations tend to have higher overall grades when studying online (Du, et al., 2019), whereas another study reviewed no significant difference in academic achievement regarding students' gender (Adigun, et al., 2015). Similarly, Lim, et al. (2009) indicated that course outcomes, instructional, and learner variables were not significantly different between male and female learners. Given these contradictory findings, we proposed null and alternative hypotheses as follows:

Hypothesis 1. *The gender of learners is not correlated with online learning satisfaction.*

Hypothesis 2. *The gender of learners is significantly correlated with online academic performances.*

Hypothesis 3. *The gender of learners is significantly correlated with online SRL strategies.*

Prior experiences in online learning have been well documented in online achievements (Cho and Kim, 2013; Jan, 2015). However, the role of this factor has been shown inconclusive in an online environment. Yukselturk and Bulut (2009) reported that gender, educational level, and the previous number of online courses taken do not statistically significantly predict the current online course satisfaction or students' achievement. In addition, Cho and Kim (2013) found that previous online experience was not related to the ability of students to self-regulate for interaction with others. Nonetheless, Wang, Shannon and Ross (2013) signposted that previous online learning experience directly influences self-regulated learning. Holcomb, King, and Brown (2004) found that previous experience with online learning has a significant impact on students' self-regulation skills. From the above literature review, the following hypotheses were proposed:

Hypothesis 4. *Learners' prior experience (academic school years, numbers of finished MOOC courses) in MOOCs is significantly correlated with online learning satisfaction.*

Hypothesis 5. *Learners' prior experience (academic school years, numbers of finished MOOC courses) in MOOCs is significantly correlated with online academic performances.*

Hypothesis 6. *Learners' prior experience (academic school years, numbers of finished MOOC courses) in MOOCs is significantly correlated with self-regulated learning skills.*

2.4 Self-Regulated Learning Strategies in MOOCs

Self-regulated learning (SRL) is a fundamental skill for succeeding in MOOCs, but many learners do not know how to self-regulate their learning or face various obstacles in the MOOC environment (Vilkova, 2022). In MOOCs, previous research has found seven SRL strategies that work for students, including setting goals, time management, self-evaluation, strategic planning, task strategies, elaboration, and help seeking (Littlejohn, et al., 2016; Kizilcec, Pérez-Sanagustín and Maldonado, 2017). In addition, Jansen, et al. (2017), from their developed tool based on previous studies, found that the other two strategies, persistence and environmental structuring in particular, also contributed to effectively measure students' SRL strategies in MOOCs.

SRL strategies include components which are categorized into four domains, namely cognitive engagement, metacognitive knowledge, resource management (Zimmerman and Martinez-Pons, 1986), and motivational beliefs (Pintrich, 1999).

Recently, Wan, Compeau and Haggerty (2012) proposed two types of SRL strategies, namely, personal and social SRL strategies. They argued that personal SRL strategies were intrapersonal strategies where learners utilized their cognitive, metacognitive, and motivational efforts to consciously manage their own learning processes, while social SRL strategies involved social interactions with others such as peers, instructors, managers, and IT professionals to navigate learners' SRL strategies during their learning.

2.5 Effects of Online SRL Strategies on Satisfaction

Student satisfaction is considered one of the important subjective measurements to measure students' non-academic outcomes, and can be calculated by self-report questionnaires (Bowyer and Chambers, 2017). Identifying student satisfaction is essential since it helps educators to assist students with their learning progression (Anthonyamy, Koo and Hew, 2020).

An empirical study by Ejubović and Puška (2019) showed that metacognitive strategies had a significantly positive impact on student satisfaction in an online environment, while the goal-setting variable ran counter to student satisfaction. This result echoed a study by Puzziferro (2008) asserting that metacognitive self-regulation was positively correlated with levels of satisfaction. However, metacognitive self-regulation was found not correlated with students in a study by Kuo, et al. (2013). The possible explanation for this may originate from the time constraint. Students with more time online were more self-regulated, resulting in better knowledge comprehension.

Not many studies have revealed the impact of cognitive strategies on student satisfaction. Cho and Heron (2015) revealed that cognitive strategies did not predict student achievement and satisfaction while rehearsal, elaboration, and time and study environment showed a significantly positive correlation with levels of satisfaction (Puzziferro, 2008). Dinh, et al. (2022) identified significant correlations of SRL strategies with students' satisfaction and academic achievements in higher education contexts in Vietnam. However, the study did not show how SRL strategies impacted these two essential factors and what types of online learning.

Although empirical studies of SRL strategies on student satisfaction are small in number to date, the role of student satisfaction in the teaching and learning process cannot be overlooked since student satisfaction is one of measurement to evaluate the effectiveness of blended learning adoption in general (Wu, Tennyson and Hsia, 2010).

2.6 Other Factors Affecting Students' Satisfaction and Dissatisfactions in MOOCs

Previous studies have revealed several other key factors affecting students' satisfaction with MOOCs. First, the flexibility, such as self-paced learning and flexible timing, allows students to fit their studies into their schedules, greatly enhancing their satisfaction (Watted and Barak, 2018). The quality of course content and interactive components also determine if students will continue to engage in the course and their learning satisfaction in MOOCs (Margaryan, Bianco and Littlejohn, 2015; Wang, et al., 2022; Díez-Arcón, 2023). Similarly, support systems in the form of availing opportunities for peer interaction and instructor's timely feedback are pivotal to a supportive learning environment for students, which enhances their engagement and satisfaction (Strom, Margolis and Polat, 2019; Wang, et al., 2022).

However, limited interactions with instructors and peers also lead to feelings of isolation, disengagement, and dissatisfaction (Zhang, Chen and Phang, 2018; Garg and Goel, 2021; Wang, 2021). Additionally, rigid deadlines that do not accommodate students' varying schedules also contribute to stress and dissatisfaction (Ihantola, et al., 2020). Moreover, low motivation and a lack of engaging content can hinder students' ability to stay focused and committed, leading to higher dropout rates and dissatisfaction (Azhar, et al., 2023; Cilliers, Twinomurizi and Murire, 2023). Therefore, rectification of these factors is important for enhancing the overall experience of MOOCs and ensuring a higher degree of satisfaction from the students.

2.7 Effects of Online SRL Strategies on Academic Achievements

In the study by Kizilcec, et al. (2017), a large population number of 4,831 participants were surveyed by an adapted OSLQ instrument by Barnard, Paton, and Lan (2008), and Littlejohn and Milligan (2015). The results indicated that the more learners become involved in goal setting and strategy planning, the more they attain their course goals.

In 2020, Kizilcec and his team conducted a study on the effects of plan-making interventions and “value-relevance” interventions on course completion. The results showed that there was no significance in both interventions and that SRL interventions had short-lived effects and that continuous support is needed. They also suggested integrating context-specific information into the SRL interventions so as to induce variation in the effects of the interventions (Kizilcec, et al., 2020).

An investigation into the relationship between self-regulated learning skills and achievement was researched by Turan and Demirel (2010). The findings indicated that learners’ self-regulated learning skills are beneficial for students’ understanding of a subject area and the improvement of their learning self-efficacy. What is more, the results of a recent study by Tadesse, et al. (2022) showed that SRL strategies significantly predicted students’ perceived learning, with the help-seeking component being the most influential. In particular, the use of SRLs by undergraduate students was found to be moderate, indicating average performance.

However, there was no significant relationship between the use of SRL strategies and English achievement (Mahmoodi, Kalantari and Ghaslani, 2014). In the same vein, Kim, Park and Cozart (2014) found no significant correlation between cognitive strategy and metacognitive self-regulation and student achievement in an online mathematics course.

In light of the previous studies presented in the literature review section, we proposed the following hypotheses of the effects of SRL strategies on satisfaction and academic achievements:

Hypothesis 7: Environmental structuring directly affects students’ satisfaction (SS) in MOOCs

Hypothesis 8: Environmental structuring directly affects students’ academic achievements (AA) in MOOCs

Hypothesis 9: Help-seeking directly affects students’ satisfaction (SS) in MOOCs

Hypothesis 10: Help-seeking directly affects students’ academic achievements (AA) in MOOCs

Hypothesis 11: Strategic planning directly affects students’ satisfaction (SS) in MOOCs

Hypothesis 12: Strategic planning directly affects students’ academic achievements (AA) in MOOCs

Hypothesis 13: Time management directly affects students’ satisfaction (SS) in MOOCs

Hypothesis 14: Time management directly affects students’ academic achievements (AA) in MOOCs

Hypothesis 15: Students’ satisfaction directly affects their academic achievements (AA) in MOOCs

The proposed research model and hypotheses are illustrated in Figure 1 below.

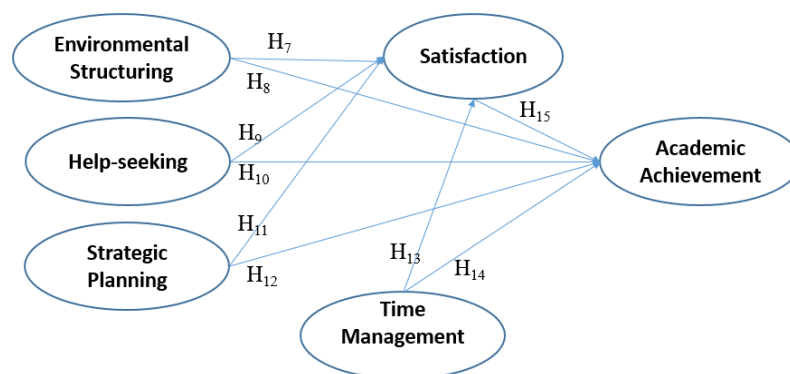


Figure 1: The hypotheses of the effects of SRL strategies on satisfaction and academic achievements

3. Method

3.1 Research Design

This study utilized a convergent mixed methods design, in which quantitative and qualitative data were collected at the same time. The data analysis was performed separately, and then combined in order to provide a more compressive view on the research problem (Creswell and Creswell, 2018).

In this study, a questionnaire survey with 24 five-point Likert scale items used to measure the perceived effects of SRL strategies on students’ satisfaction and academic achievement, ranging from “1-Strongly Disagree” to “5-Strongly Agree”, and two open-ended questions to investigate how other factors affect their satisfaction or dissatisfaction in MOOCs learning, for example, “What factors are you not satisfied with in online courses?”, and “What factors are you satisfied with in online courses?”

3.2 Participants

Two hundred and twenty-seven participants of the current study were English major students who were required to study one specialization (including at least three courses) in MOOCs, via Coursera platforms, per semester, roughly three months long, at a private university in Can Tho city in the Mekong Delta, Vietnam. They are first year, second year, and third year English major students, aging from 18-20. Data collection was performed from October 10th to December 14th, 2023. A link to the Questionnaires and a Consent Form were sent to these participants.

For an acceptable data analysis in the PLS-SEM model, according to Kock and Hadaya (2018), to obtain a significant level of 5% with a minimum path coefficient (pmin) of 0.2, the minimum sample size (nmin) is estimated by the following equation: $nmin > ((2.846/pmin)^2) \rightarrow nmin > ((2/0.2)^2) = 154.505$, so the minimum sample size is 155. Among 238 received responses, 227 were qualified for further data analysis. Table 1 below provides a detailed description of the participants.

Table 1: Participant demographics

Categories	Characteristics	N	Percentage (%)
Gender	Male	72	65.64
	Female	149	31.72
	Rather not to say	6	2.64
Age	18-22	227	100
Academic School Year	1st year	16	7.05
	2nd year	131	57.71
	3rd year	46	20.26
	4th year	34	14.98
Number of MOOCs Courses	Fewer than 3	50	34.36
	3-5	78	22.03
	More than 5	99	43.61

3.3 Research Instruments

The study instrument included two sections in which quantitative survey items were adapted from previous studies. In particular, Part 1 of the questionnaire comprised self-devised items featuring the participants’ demographic information, such as gender, age, academic school year, and factors causing them to feel satisfied or dissatisfied with their learning in MOOCs; Part 2 included SRL strategy items which were documented in the literature, and were presumed to have an impact on students’ satisfaction and academic achievements in the MOOCs environment. The items related to students’ satisfaction, and academic achievement were adapted from Ejubović and Puška (2019); those related to students’ environment structuring, help-seeking, and time management were adapted from Barnard-Brak, Paton and Lan (2010), and a strategic planning item from Kizilcec, Pérez-Sanagustín and Maldonado (2017). This section consisted of 24 modified items, using the 5-point Likert scale, coded from 1 “Strongly Disagree” to 5 “Strongly Agree”. The questionnaire survey was translated into Vietnamese, and was bilingual, i.e. English-Vietnamese. To ensure the accuracy and credibility of the data, the two authors cross-checked the translation. In addition, the study also employed qualitative data from open-ended questions, which students could answer in Vietnamese or English at their convenience. In this study, students entered only English, so the authors used their English version without any further translation. The qualitative data was coded independently by the two researchers in order to figure out other factors affecting student satisfaction and dissatisfaction in MOOCs. The inter-rater agreement percentage between the two coders should be above 75% (Mackey and Gass, 2022). Any cases of disagreement were resolved through further discussion. If no agreement was reached on certain themes, they were excluded from the analysis. In our case, the agreement was 85%.

3.4 Data Collection Procedures

3.4.1 Piloting phase

Prior to official data collection for analysis, a pilot test was conducted with sixty-five students who have studied online courses at the same university as the participants of the current study. This phase is essential to ensure the internal reliability of the items of the instrument and to help evaluate the respondent's comprehension as well. The content of the email, in Vietnamese, included information about the research purpose, the specific time of the data collection, and their consent to voluntarily participate in the research. After completion of the questionnaire, the data was automatically saved in the Google Sheets application which could only be accessed by the research team.

The Cronbach's Alpha of variables used in the piloting phase were all above 0.7 (Item 5 of Variable Help-seeking_HS5 was deleted since its corrected item-total correlation = $-0.097 < 0.3$ (Hajjar, 2018), indicating that the instrument was reliable (Table 2).

Table 2: Construct reliability of the piloting phase

Variables	Cronbach's Alpha	N of Items
Environment Structuring (ES)	.825	4
Time Management (TM)	.912	3
Strategic Planning (SP)	.836	4
Help Seeking (HS)	.707	4
Satisfaction (SS)	.904	4
Academic Achievement (AA)	.858	4

3.4.2 The actual research data collection procedures

Questionnaires were administered to the participants via their emails which were obtained from the university open access website for its personnel. Data were collected from March 9th - 26th, 2023. In order to obtain students' voluntary participation, an email of research introduction and information related to the study, a link to the questionnaire and a Consent Form were sent to them. The items in Section 2 were bilingual (i.e., in English and Vietnamese) to facilitate the participants' understanding of the items. After the data collection completion, the data was automatically saved in the Google Sheets application which could only be accessed by the researcher.

After the screening and filtering process for duplication and items needing revision, 227 out of the 238 responses obtained qualified for data analysis. The internal consistency of all variables was re-tested.

Table 3 below indicates the reliability of the questionnaire in the actual data collection phase.

Table 3: Reliability of the instrument in the actual phase

Variables	Cronbach's Alpha	N of Items
Environment Structuring	.854	4
Time Management	.858	3
Strategic Planning	.818	4
Help Seeking	.724	4
Satisfaction	.905	4
Academic Achievement	.860	4

3.5 Data Analysis

To examine the correlation between the qualitative and quantitative variables and the impact of the endogenous variables on the exogenous ones, SPSS 25 and PLS-SEM 4 were utilized. The use of the partial least squares-based structural equation modelling (PLS-SEM) has proved to be helpful in explaining causal-predictive relationships between dependent and independent variables (Hair Jr, et al., 2021).

For qualitative data analysis, we employed thematic analysis (Braun and Clarke, 2006) to identify codes, and then generate themes based on these codes in relation to factors affecting their satisfaction and dissatisfaction when learning in MOOCs.

4. Findings

4.1 Quantitative Results

4.1.1 The reliability and validity of the instrument

In order to test the research constructs' reliability and convergent validity, Composite Reliability (CR), Cronbach's Alpha, Average Variance Extracted (AVE), and the factor loadings of each indicator were performed as indicated in Table 4 below:

Table 4: Measurement model parameter estimation

Dimensions	Items	Factor loading	Cronbach's Alpha	CR	AVE
Time management (TM)	TM1	0.735	0.845	0.844	0.644
	TM2	0.813			
	TM3	0.855			
Environmental structuring (ES)	ES3	0.734	0.719	0.719	0.526
	ES4	0.765			
Help seeking (HS)	HS1	0.766	0.807	0.806	0.581
	HS2	0.805			
	HS3	0.713			
Strategic planning (SP)	SP2	0.742	0.772	0.775	0.634
	SP3	0.847			
Satisfaction (SS)	SS1	0.783	0.898	0.899	0.689
	SS2	0.824			
	SS3	0.855			
	SS4	0.857			
Academic achievement (AA)	AA3	0.884	0.795	0.801	0.670
	AA4	0.747			

Table 4 indicated the proposed model constructs obtained reliability and convergent validity: the indicator reliability (factor loading > 0.7), internal consistency reliability (Cronbach's Alpha > 0.7, and CR > 0.7) and the convergent validity (AVE > 0.5) (Hair Jr, et al., 2021). Other items, namely ES1, ES2, HS4, SP1, SP4, AA1, and AA2, were removed since they incurred collinearity with other variables.

What is more, in order to test the constructs' discriminant validity, Heterotrait–Monotrait Raito (HTMT) was performed (Table 5). All values are below 0.85, thus the discriminant validity of the constructs is affirmed (Henseler, Ringle and Sarstedt, 2015).

Table 5 below shows that the research constructs are distinct from each other.

Table 5: Discriminant validity

Dimension	AA	ES	HS	SP	SS
Academic achievement (AA)					
Environmental structuring (ES)	0.136				
Help seeking (HS)	0.324	0.518			
Strategic planning	0.326	0.677	0.475		
Satisfaction (SS)	0.819	0.351	0.422	0.594	

Dimension	AA	ES	HS	SP	SS
Time management (TM)	0.395	0.538	0.591	0.531	0.493

4.1.2 Collinearity analysis

The variance inflation factor (VIF) should be below 3 to avoid extreme multi-collinearity (Hair Jr *et al.*, 2019). Table 6 below indicated that all constructs' VIFs are smaller than 3. Hence, the collinearity was not a problem of the structural model.

Table 6: Evaluating the collinearity of the structural model

Dimension	AA	SS
Academic achievement (AA)		
Environmental structuring (ES)	2.154	2.075
Help seeking (HS)	1.723	1.693
Strategic planning	2.499	1.99
Satisfaction (SS)	1.724	
Time management (TM)	1.918	1.818

4.1.3 Structural Equation Modelling Analysis

According to Hair Jr *et al.* (Hair Jr *et al.*, 2019), the coefficient of determination R-square (R²), which should vary from 0.25 - 0.9), and the path coefficients which is tested by bootstrapping technique should be considered for the structural model evaluation.

As can be shown in Table 7, the adjusted R² values of Satisfaction and Academic Achievement are equal to 0.409 and 0.713, respectively indicating moderate and substantial explanatory relationships among dependent and independent variables of the study.

Table 7: R² Values

Dimension	R ²	R ² Adjusted
Satisfaction (SS)	0.42	0.409
Academic achievement (AA)	0.719	0.713

4.1.4 Hypotheses testing

Tables 8 below shows the path coefficients and p-values of each hypothesis. All hypotheses were supported since p-value < 0.05.

Table 8: Hypotheses Testing Results

Hypothesis	Paths	Path Coefficients	p-value	Results
H6	ES -> SS	-0.214	< .001	Supported
H7	ES -> AA	-0.13	< .001	Supported
H8	HS -> SS	0.131	< .001	Supported
H9	HS -> AA	0.047	< .001	Supported
H10	SP -> SS	0.543	< .001	Supported
H11	SP -> AA	-0.193	< .001	Supported
H12	SS -> AA	0.916	< .001	Supported
H13	TM -> AA	0.086	< .001	Supported
H14	TM -> SS	0.242	< .001	Supported

The statistics presented in Table 8 reveal a negative relationship between ES and both SS and AA, estimated at -0.214 and -0.13, respectively. This indicates that an over-emphasized structuration of the learning environment might detract from actual learning and enjoyment because of increased cognitive load or stress. In a similar manner, strategic planning (SP) has a negative impact on academic achievement, as represented by the path

coefficient of -0.193, which points out that overemphasizing planning without sufficient execution can negatively affect academic performance.

On the other hand, help-seeking positively relates to student satisfaction and academic achievement: 0.131 and 0.047, respectively, although correlation to academic achievement is relatively small. Strategic planning (SP) is greatly related to the satisfaction of students: 0.543, pointing out that effective planning plays a critical role in creating a satisfying experience of learning. Student satisfaction was found to be a powerful predictor of academic achievement: 0.916. This strongly suggests that it increases academic performance quite a lot.

Time management had positive relations with both student satisfaction and academic achievement: 0.242 and 0.086, respectively, and a more significant association with satisfaction. This suggests that effective time management is crucial for both enjoying the learning process and achieving good academic results.

Table 9 below indicated the effect size (f-square) of the independent constructs on the dependent ones, namely Satisfaction and Academic Achievement. The results from Table 9 reveal that the effect size of Satisfaction (SS) on Academic Achievement (AA), and of Structuring Planning on Academic Achievement were substantial, while the effects of Environmental Structuring (ES) on AA, ES on SS, SP on AA, and Time management (TM) on SS were small.

Table 9: The effect size of the independent constructs on the dependent ones

	f-square		f-square
ES -> AA	0.028	SP -> SS	0.256
ES -> SS	0.038	SS -> AA	1.732
HS -> AA	0.005	TM -> AA	0.014
HS -> SS	0.017	TM -> SS	0.055
SP -> AA	0.053		

In order to visualize the results of hypotheses testing and the coefficient of determination R-square (R2) of the model, Figure 2 is showcased below:

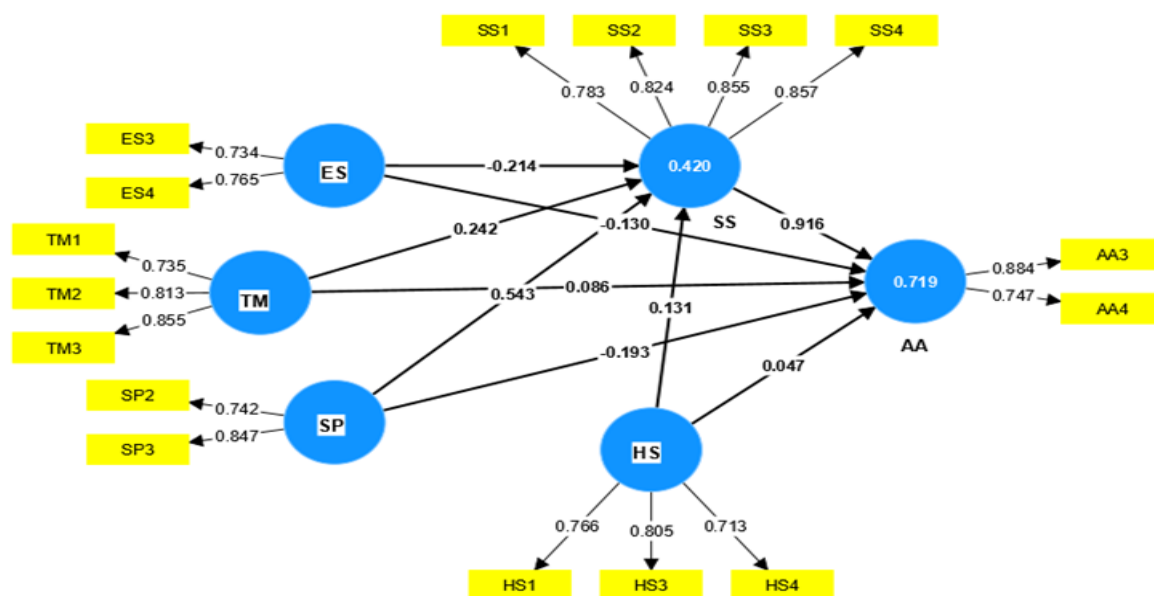


Figure 2: The results of path coefficients

Correlations among students' characteristics, SRL strategies, satisfaction and academic achievements

In order to delve into the correlations among students' characteristics, namely gender, academic school years, number of MOOCs, and SRL strategies, as well as satisfaction and academic achievement, the Pearson correlation coefficient (or Pearson's r) was performed to test these relationships. The result shows that gender does not significantly influence online learning satisfaction, academic performance, or self-regulated learning (SRL) strategies ($p > .05$). These confirm Hypotheses 1, 2, and 3.

Regarding the correlation between prior educational experience and satisfaction, measured by the number of school years and numbers of MOOCs, the findings are more conflicting. The correlation between school years and online learning satisfaction was supported ($r=-.181, p<.001$), while the number of MOOCs and satisfaction were not correlated ($p>.05$), therefore Hypothesis 4 was partially conformed.

Regarding the correlation between prior educational experience and academic achievements, the results presented an interesting contrast. While there is a positive correlation between numbers of MOOCs with academic performance ($r=.149, p<.05$), a significant negative correlation is observed between the number of school years and online academic performances ($r=-.264, p<.01$).

Details can be seen in Table 10 below:

Table 10: Correlations among students' characteristics, SRL strategies, satisfaction and academic achievements

		Pearson Correlation Coefficients					
		ES	TM	HS	SP	SS	AA
Gender	Pearson Correlation	0.067	0.055	-0.026	0.072	-0.045	-0.075
	Sig. (2-tailed)	0.324	0.413	0.699	0.283	0.509	0.263
	N	222	222	222	222	222	222
School years	Pearson Correlation	0.005	-0.116	-0.088	-0.012	-.181**	-.264**
	Sig. (2-tailed)	0.937	0.082	0.190	0.853	0.006	0.000
	N	226	226	226	226	226	226
Number of MOOCs courses	Pearson Correlation	0.013	0.100	0.104	0.080	0.129	.149*
	Sig. (2-tailed)	0.851	0.134	0.118	0.230	0.053	0.025
	N	227	227	227	227	227	227
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

4.2 Qualitative Findings

Other factors affecting students' satisfaction and dissatisfaction in MOOCs

The results from the open-ended questionnaires of the 227 participants were analysed using thematic analysis (Braun and Clarke, 2006). Three overarching themes related to students' satisfaction emerged from the data, namely Flexibility and Convenience, Quality of Learning Experience, and Collaboration and Interaction. In particular,

Flexibility and Convenience

This theme involves students' preferences for self-paced learning (124 out of 227 responses), flexible time (146 responses), opportunities for multitasking (92 responses), and learning where they want to (151 replies). This theme reflects how online learning adapts to individual lifestyles and preferences.

Quality of Learning Experience

This theme encompasses codes such as multitasking opportunities and knowledge enhancement. For opportunities to multitask in learning, 92 of them explained that learning in MOOCs helped them engage more in multiple activities simultaneously, such as watching the clips and reading the transcripts at the same time; this enhanced their learning efficiency. Moreover, 54 out of 227 participants noted that this learning mode enriched much of their knowledge.

Interactivity and Support

This theme was developed from codes such as collaborative opportunities, mentor-student interaction, and student-student interaction. Fifty-nine students noted that they had opportunities for co-learning with their peers, especially when they decided to choose a place to study together. Although recognizing the importance

of support from mentors and peers, not many of them confirmed that learning in MOOCs benefited their interactions with these sources (22 and 33 out of 227 responses respectively).

Figure 3 below depicts these codes to emphasize the weight of significant factors regarding students' satisfaction when learning in MOOCs:

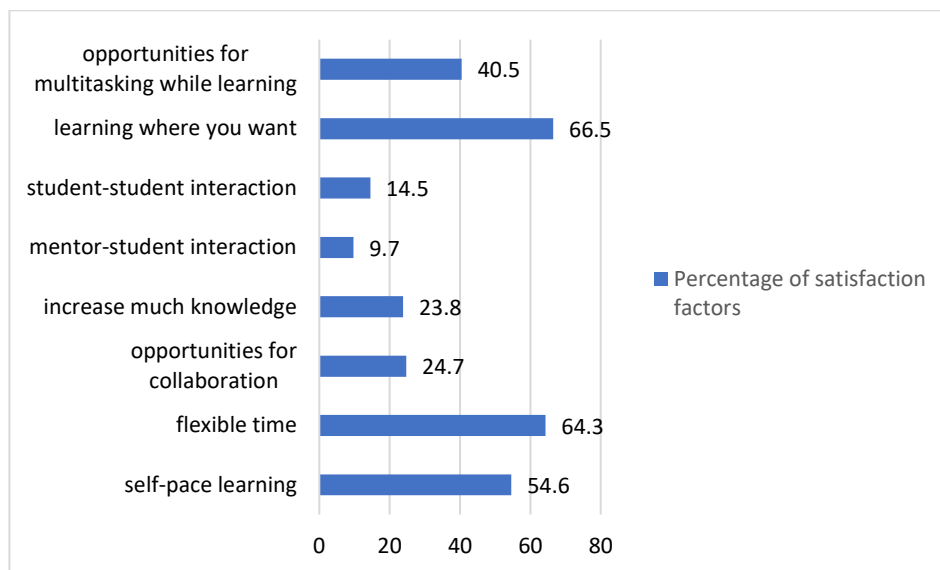


Figure 3: Satisfaction factors

Nevertheless, learning in MOOCs also caused hindrance for students. We conducted a thematic analysis of the data from the open-ended questionnaire survey and developed themes that encapsulate factors that hinder students' learning in MOOCs. Six themes emerged from the analysis, including Technological Challenges, Course Design and Structure, Interpersonal Dynamics, and Ethical and Motivational Concerns.

Technological Challenges

This theme was generated from the codes Internet Connection Issues and Technology Proficiency. Internet connection issues refer to the internet accessibility or stability which can impact course participation. Ninety out of 227 responses shared this view while complaints on the ability to use computers and related technologies on their course experience was just 22 out of 227 responses.

Course Design and Structure

Many students agreed that the tasks to be done in their MOOC courses were challenging and demanding compared to their levels (89 comments). Thirty of them shared that they face difficulties in the course contents and 15 responses admitted their insufficient language capacities, and so they often consulted Google translation. They wrote:

"I asked the teacher or Google search to find information or translate it into Vietnamese when I don't understand what the lesson is about." (Student 25)

"I can't catch the clip if I don't watch it, but if I don't read it, it's a bit difficult to understand" (Student 31)

In addition, one third of the total surveyed students complained about the time limit constraints set by the school. They said:

"Deadlines on MOOCs are for a total of 3 months, but the school will give deadlines for each course and we usually have to complete them 1 week before the deadlines for courses on Coursera, so we have to rush up for deadlines, which is quite tiring" (Student 2).

Some students also expressed discontent with the MOOCs they took:

"After the lesson, there is no summary like in the classroom, so sometimes I cannot summarize the lesson completely. In addition, there is no review like when I took basic English courses" (Student 125).

Interpersonal Dynamics

Similar to previous research interaction deficiency in online learning (Wu, Tennyson and Hsia, 2010), 136 researched participants indicated that the quality and frequency of interactions between mentors/ instructors and students are not as high as their expectation. Also, peer learning is not highly appreciated when they learned in MOOCs:

“I rarely ask mentors because I feel shy, or sometimes when I text to ask, I’m only given suggestions on which article or course to find the answer in, but I don’t get a straight answer” (Student 50).

“I don’t often ask my friends but usually find more information online. Sometimes I watch clips and read transcripts to understand the lesson better” (Student 67).

It can be seen that MOOCs created chances for students to self-regulate their learning, especially when they had to manage their learning time, or find out appropriate and effective learning strategies for themselves. Although students considered this was a limitation on their interactions with mentors and peers, this sharing has once again emphasized the crucial role of students’ self-regulated learning in higher education (Yen, Nhung and Le, 2024) and in MOOCs (Littlejohn, et al., 2016; Al Mulhim, 2020).

Motivational Concerns

This theme was a significant feature that most students acknowledged when being asked “What factors are you not satisfied with in online courses?” Low motivation is a common consensus among students about difficulties they encountered while learning in MOOCs. Approximately 55% of surveyed students said that they felt isolated in learning.

“I don’t feel very motivated when I have to study alone, sometimes I forget that I have a course on Coursera.” (Student 3)

“I remember there was a course I was taking on Coursera. If it weren’t for a classmate asking me how far I was studying, I probably wouldn’t have finished it on time (Student 11).

This is not a surprising finding since learning in MOOCs requires a high self-motivation to achieve learning outcomes (Aljaraideh, 2019; Watted, 2023).

Figure 4 below illustrates these codes to highlight the weight of significant factors regarding students’ dissatisfaction when learning in MOOCs:

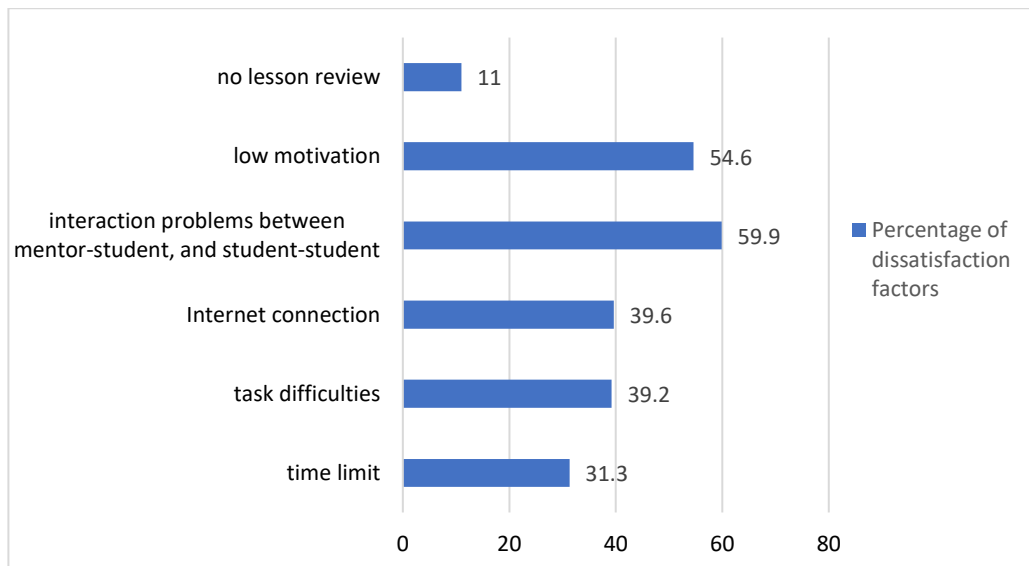


Figure 4: Dissatisfaction factors

5. Discussions

This study supported previous studies indicating that gender did not affect students’ satisfaction in online learning (Harvey, Parahoo and Santally, 2017; Yu, 2021), hence Hypothesis 1 was confirmed. However, it was

inconsistent with a study by Dinh, et al. (2022) in which the participants came from non-English majors, hence the difference may come from students' disciplines.

In examining the correlation of gender and academic performances, the result revealed that English major students did not believe the influence of gender on their learning results. This finding was also supported by Adigun, et al. (2015) and Lim, et al. (2006). However, it ran counter to the study by Du, et al. (2019) which found that female students majoring in Science and Sports, and Liberal Arts performed better in online learning environments.

Gender issue in relation to SRL strategies was also found in previous research (Virtanen and Nevgi, 2010; Bai, Shen and Mei, 2020; Liu, et al., 2021), but was not supported by the current study or Dinh, et al. (2022). A plausible explanation for this dichotomy may be from the learning mode and students' characteristics per se. The participants from other studies are non-English majors (Liu, et al., 2021; Virtanen and Nevgi, 2010), while the study by Bai, Shen and Mei (2020) was conducted in conventional settings. It can be inferred from these findings that gender is not a concerning matter of satisfaction, academic outcomes, and SRL strategies for English disciplines in MOOC modality.

Turning to the interrelations between prior knowledge and other study constructs, the current study confirmed the correlation of school years and numbers of MOOC courses and satisfaction and academic achievements. This finding was not in line with other previous studies (Yukselturk and Bulut, 2009). In addition, the number of students' academic years and satisfaction were also correlated, but weakly and negatively ($p=0.006$, $r=-.181$). This means that, as the number of academic years increases, the students' satisfaction with MOOCs tends to decrease, but the relationship is weak. A plausible explanation for this is that MOOCs often lack the personal interaction that traditional courses offer. For senior students who may value more in-depth discussions and interactions with peers and instructors, the limited interaction in MOOCs might negatively impact their satisfaction. Surprisingly, the number of previous MOOC courses was not correlated with satisfaction. This finding sounds conflicting since school years and numbers of MOOCs are quite interrelated. Examining this in more detail showed that the participants studied different courses and their MOOCs courses were also different due to a change in curriculum, although they were all English majors. It is probable that course difficulty levels affect their satisfaction.

In contrast to previous studies (Holcomb, King and Brown, 2004; Wang, Shannon and Ross, 2013), the current study and the work by Cho and Kim (2013) found no correlations between prior knowledge (i.e., number of school years and numbers of MOOCs) and SRL strategies. A possible reason for this may be that they were not trained in these skills. This may well explain the reason why they perceived the positive effects of SRL strategies on their satisfaction and academic achievements in the algorithm and bootstrapping analyses.

In particular, the investigated SRL strategies, namely environmental structuring, help-seeking, strategic planning, and time-management were perceived having positive effects (see Table 9 on students' satisfaction and academic achievements in MOOCs. Although these were students' perceived effects, this would affect their use of them in their learning (Versteeg, et al., 2021).

This study did not support a study by Kuo, et al. (2013) indicating that metacognitive strategies did not predict student satisfaction and achievement. Differences may come from the students' characteristics as, for example, most are over 25 in Kuo, et al. (2013). However, it was in line with Puzifferro (2008) showing time management and environmental structuring having a positive correlation with levels of satisfaction or metacognitive strategies having a positive impact on student satisfaction in online learning (Ejubović and Puška, 2019).

The study was supported by prior research (Jansen, et al., 2017; Kizilcec, et al., 2017; Littlejohn, et al., 2016), showcasing that SRL strategies, such as time management, strategic planning, and help seeking were significant positive predictors of student satisfaction and attainment, particularly academic achievement in MOOCs. However, it contradicted a study by Mahmoodi, Kalantari and Ghaslani (2014) which indicated no significant relationship between the use of SRL strategies and English achievement. Interestingly, the participants of the study by Mahmoodi, Kalantari and Ghaslani (2014) were from on-campus classes.

The qualitative findings reveal several new insights into factors affecting students' satisfaction and dissatisfaction with MOOCs, adding depth to previously identified factors and providing a more comprehensive understanding of the student experience. First, the theme of flexibility and convenience is reinforced, confirming previous studies that highlight the importance of self-paced learning and flexible timing in enhancing student satisfaction (Watted and Barak, 2018). The current study adds that the ability to multitask and learn from any

location further enhances the convenience of online learning, allowing it to adapt to individual lifestyles and preferences.

The quality of the learning experience remains a critical factor. Previous studies emphasized the quality of course content and interactive components as crucial for engagement and satisfaction (Margaryan, Bianco and Littlejohn, 2015; Wang, et al., 2022; Díez-Arcón, 2023). The current study confirms these findings and highlights that the ability to engage in multiple activities, such as watching video clips and reading transcripts simultaneously, significantly boosts learning efficiency and satisfaction.

Support systems and feedback are also pivotal. Strom, Margolis and Polat (2019) and Wang, et al. (2022) noted the importance of peer interaction and timely instructor feedback for creating a supportive learning environment. The current study supports these findings, emphasizing that collaborative opportunities and co-learning with peers are valuable, although many students did not feel that MOOC learning significantly benefited their interactions with mentors and peers.

New insights from the study highlight technological challenges, such as internet connection issues and difficulties using technology, as significant barriers to course participation. These challenges were not highlighted in previous studies but are crucial in understanding the full range of factors affecting student satisfaction.

The design and structure of courses also emerged as important factors. While previous studies pointed to rigid deadlines contributing to stress and dissatisfaction (Ihantola, et al., 2020), the current study provides more nuance, identifying challenging tasks, demanding course content, language barriers, and institution-set deadlines as additional sources of dissatisfaction.

Interpersonal dynamics remain a significant concern. Previous studies indicated that limited interactions with instructors and peers lead to isolation and disengagement (Zhang, Chen and Phang, 2018; Garg and Goel, 2021; Wang, 2021). The current study confirms this, further detailing that the quality and frequency of interactions often did not meet student expectations, resulting in significant feelings of isolation.

Lastly, motivational concerns are a recurring theme. Low motivation and lack of engaging content were highlighted by previous studies as factors that hinder focus and commitment, leading to higher dropout rates (Azhar, et al., 2023; Cilliers, Twinomurinzi and Murire, 2023). The current study echoes these concerns, noting that many students struggle to stay motivated without the structure of a traditional classroom environment.

Some theoretical and practical implications can be drawn on the above findings in the context of MOOCs and similar online learning environments. First, the more students experience MOOCs, the more they perceive positive correlations with their academic achievements. However, this perception goes in the opposite direction (see Table 8, the correlations of school year and satisfaction and academic achievements were negative, $r = -.181$ and $r = -.264$ respectively) among English majors when they faced difficult MOOCs. It can be inferred that if students are not supported or do not know how to tackle task difficulties when learning in MOOCs, their learning outcomes can be fruitless. In this case, SRL skills can help enhance their academic outcomes (Pintrich, 2000).

Second, although the students showed a contradictory correlation between years of studying and satisfaction and academic achievements, their perceptions of the perceived values of the effects of SRL strategies on their academic performances and satisfaction are positive. This can be postulated that training students to use these SRL skills would benefit their learning in MOOCs.

6. Conclusions and Limitations

The present study explored the correlations between students' characteristics (gender, school years, and numbers of MOOCs) and satisfaction and academic performances, and investigated the influence of SRL strategies on these two endogenous variables in MOOC learning modality. The quantitative results showed that SRL strategies were perceived to have a positive impact on satisfaction and learning results. Particularly, the perceived effect of strategic planning on satisfaction was fairly large ($f\text{-square} = 0.256$). The proposed research model has confirmed the significant contributions of SRL strategies, namely environmental structuring, help-seeking, strategic planning, and time management to students' satisfaction and academic outcomes in MOOC learning environments in higher education contexts in the Mekong Delta of Vietnam. Most of the surveyed students in this study are experienced in learning in MOOCs (177 out of 237 have learned three MOOCs), but none of them have been trained for SRL strategies before. Hence, this study has implications for an SRL training program for MOOC learners, integrating self-regulated learning strategies into MOOCs, for example. This could

involve designing course materials and activities that encourage and support these strategies. Additionally, the study emphasizes the benefits of flexible learning times, self-paced study options, and the ability to choose study locations, while also identifying challenges such as limited social interaction, poor internet connectivity, and low motivation. These insights contribute to the broader field of education by underscoring the crucial role of SRL strategies in the success of MOOCs.

Pedagogically, the study provides valuable implications for integrating SRL strategies into MOOC design and instruction. It suggests that incorporating these strategies into course materials and activities can enhance student satisfaction and performance. Training students in SRL techniques can help them manage their learning processes more effectively, overcome challenges, and achieve their academic goals. This is particularly relevant for English major students who often lack direct interaction with instructors and peers, making SRL strategies essential for their success in an online learning environment.

Methodologically, the study employs a mixed-methods design, utilizing both quantitative (SPSS and PLS-SEM) and qualitative (thematic analysis) approaches to provide a comprehensive analysis of the data. This approach allows for a deeper understanding of the effects of SRL strategies on student outcomes. Furthermore, the study proposes future research directions, including investigating additional SRL strategies and incorporating a larger, more diverse sample. It also suggests exploring the unique challenges faced by different academic disciplines in MOOCs to offer more tailored solutions for improving online learning experiences. These methodological contributions provide a solid foundation for further research and practical applications in the field of online education.

The research acknowledges some shortcomings. The first limitation is that it is based on a sample of English majors from a single private university. Hence, the generalization to other contexts should be cautious although the participants' detailed demographics have been clearly depicted. Second, even though the study has successfully indicated the perceived effects of SRL strategies on satisfaction and academic results, a round-up of students' actual use of these SRL strategies in their learning in MOOCs would help to confirm these effects. For instance, longitudinal studies to track the long-term effects of SRL strategies on learning outcomes in MOOCs might also be a promising direction for future research. Last, but not least, other SRL strategies with a larger sample size from diverse universities should be included so that a clearer picture of students' perspectives of the effects of SRL strategies on their learning outcomes can be mapped.

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