

The Impact and Gender Difference of Learning Motivation and Self-Regulation on Academic Performance in Online Learning Environment

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Abstract—This study investigates the mutual influence among the different components of learning motivation, self-regulation, and Gender as well as their effect on the academic performance. The data is collected from 301 undergraduates enrolled accounting major. The results indicate that test anxiety has negative influence on academic performance and the use of cognitive strategies is a mediating factor between motivation and self-regulation strategies. Gender difference does exist in students' test anxiety but there is no evidence showing that this gender difference causes any differences in their academic achievements.

Keywords—Learning Motivation, Self-regulation, Structural Equation Model, Test Anxiety, Cognitive Strategies

I. INTRODUCTION

Due to COVID-19 pandemic, the traditional teaching environment and approach have been greatly changed. Learning online has become a universal and increasing trend. The first issues is how to make students achieve greater success in terms of their academic achievements with online courses. The situation of students in an unsupervised home learning environment is indeed worrying.

Self-regulated learning (SRL) has been believed to be very important for lifelong learning [1]. Learners who have good SRL skill usually are motivative and active in the learning process [4]. Many factors include cognition, motivation, metacognition, emotion, and behavior are considered as the constructs of SRL [2][3].

On the other hand, only some elements like the cognitive knowledge, the metacognitive strategies and self-regulation are usually not enough to promote student achievement. Students must be motivated to use the cognitive strategies and regulate their cognition and effort [6-9]. To this end, three issues need to be aimed and solve. First is to understand the relationship among intrinsic value, self-efficacy, self-regulation and psychological anxiety. Second is to construct a model that can maximize the positive effects of each element and reduce the negative impact. The last but not the least is to investigate whether gender difference exists in the use of constructive strategies and self-efficacy and self-regulation. If gender difference exists on the use of technologies in learning, will this difference be enlarged and affect their academic performance?

In this paper, our research team collected data for the analysis to verify some hypotheses and proposes a model for students' learning motivation and self-regulation based on the influence on academic achievement.

II. LITERATURE REVIEW

Researchers believe that motivation and SRL are the influential factors of learner's academic achievement [10][12][23]. Weinstein and Mayer (1986) defined learning strategies: "thoughts that a learner engages in during learning and that are intended to influence the learner's encoding process" [11]. Researchers claimed that learners will be success in the learning process if they can use SRL and learning strategies properly. This research therefore proposes the following hypothesis:

H1: The motivation has positive influence on the self-regulation.

Researchers have a consistent finding on the female students report higher levels of test anxiety in overall than their counterpart [16-21]. The Cognitive Interference Theory [22] posits that high levels of anxiety interfere with the recall of prior learning resulting in poorer performance. According to that, this research considers:

H2: Female students are more likely to suffer from test anxiety than male students.

Zhang and Li (2016) find that the self-regulated learning strategies positively influence academic achievement with Structural Equation Modeling (SEM) [23]. Motivation and academic emotions positively affect academic achievement through the mediating effect of learning strategies. It is deserved to further explore the relationships between the academic achievement and the components of motivational and self-regulation. Hence, this research has the following two hypotheses and would like to verify.

H3: The use of constructive strategies has a positive impact on the academic performance.

H4: Negative emotional factors (i.e., test anxiety in this research) have negative impact on the academic performance.

III. METHOD

The data is collected from 301 sophomores in eight classes of the School of Accounting at S University. The students do not have any online learning experience before the pandemic. The students include 219 (73%) female and 82 (27%) male students. The average age of the sophomores in the School of Accounting is 20 years old. During the COVID-19 pandemic, the online teaching and learning is adopted in the Tax Law courses for 16 weeks from March to June 2020. Students are all learning remotely through video conferencing software and completing home works in the learning management system.

The simplified version of MSLQ (Motivated Strategies for Learning Questionnaire) is adopted from Pintrich and De Groot's Questionnaire [5]. The questionnaire used in this research has 22 7-point Likert scale items focusing on student Intrinsic Value (IV, five items), Cognitive Strategy Use (CSU, five items), Self-Efficacy (SE, five items), Self-Regulation (SR, four items) and Test Anxiety (TA, three items). Students are instructed to respond to the items from "not at all true of me" (1) to "very true of me" (7). The questionnaire consists of two scales, which are motivation scale and cognitive self-management. Cronbach's alpha for the responses (n=301) of the 22-item questionnaire is .942.

Student's final academic performance is represented with his or her final exam's mark in the range of 0 to 100. This research uses the web version of SPSSAU¹ (version 20.0) which has exactly same kernel algorithm with SPSS to do the data analysis and modeling.

The research team does two data analysis, SEM and correlation analysis. The SEM analysis involves three steps: (1) conduct factor exploration for examining the relationship among variables; (2) use confirmatory factor analysis (CFA) test analysis to test the fitness of the measurement models; and, (3) use SEM to check the path for examining the structural model and casual relationship among the structural models. The correlation analysis is then done with (a) t-test to verify whether there is gender difference in motivation and self-regulation strategies; (b) Pearson and Spearman analysis on the academic performance and the five components of motivation and self-regulation strategies.

IV. RESULT AND DISCUSSION

According to existing research's recommendations on the evaluation of structural equation modeling (SEM) practice, the collected data is better to have a good convergent validity; which means, its average variance extracted (AVE) values need to be higher than 0.50, from 0.50 to 0.84. Moreover, it also needs to show a good internal consistency among constructs; which means its composite reliability (CR) needs to be higher than 0.70, from 0.70 to 0.97 [27-28].

After both of the collected data's reliability and validity are analyzed and satisfied, the validity of the proposed model for the structural equation modeling can then be checked with some fit indices, e.g., the absolute fit index, the relative fit index, and the parsimonious fit index. The results listed in Table I reveal that

the proposed model adequate fits to the empirical data. For small size sample, RMSEA is more important than Good Fit Index.

Table I. Summary of the goodness of fit indices of the model

Indices	Absolute fit index				Relative fit index	
	χ^2	χ^2/df	GFI	RMSEA	NFI	CFI
Acceptable range	Fewer better	< 3	> 0.9	< 0.1	> 0.9	> 0.9
Proposed Model	406.077	2.02	0.9	0.058	0.888	0.92

Table II summarizes the SEM results and shows that Self-Regulation (SR) has a significant impact on the Cognitive Strategies Use (CSU), while the CSU has an inhibitory negative effect on the Test Anxiety (TA). The CSU is an intermediary factor can reduce test anxiety. Since Self-Efficacy (SE) in Motivation scale has the positive effect on the Self-Regulation (SR), Hypothesis H1 is supported. Through the causality of the effective path in the SEM model, it can be found that the use of cognitive strategies (CSU) can be enhanced through self-regulation (SR), and the CSU is a suppressor of TA because they are significantly negatively correlated. Meanwhile, Table II indicates Self-Efficacy (SE) is an effective factor to enhance SR. In other words, it is obviously and confirms people's intuition on enhancing students' self-efficacy will have effect on reducing their test anxiety.

Table II. Summary of the goodness of fit indices of the model

Path	Non-St. path	SE	Z	p	St. path
SR→CSU	0.867	0.096	9.006	0.000	1.001
IV→SE	2.069	1.169	1.771	0.077	1.474
CSU→SE	-1.195	1.398	-0.855	0.393	-0.924
IV→TA	0.196	3.722	0.000	0.480	0.196
CSU→TA	0.181	-4.292	0.000	-0.554	0.181
SE→SR	0.890	0.095	9.325	0.000	0.996

For the correlation analysis on the students' reported five motivation and self-regulation components and their final exam marks, only Test Anxiety and Self-Efficacy have significant relation with the Final Exam – where Test Anxiety has negative correlation and Self-Efficacy has positive correlation to the final exam outcome. Therefore, Hypothesis H3 is not supported but Hypothesis H4 is confirmed as expected.

The research team does find that there is signification gender difference on their Test Anxiety ($M_{\text{male}} = 4.50$, $M_{\text{female}} = 4.88$, $t = -1.971$, $p < 0.05$). It is clearly to be told that male students have lower test anxiety than female students, therefore Hypothesis H2 is supported.

To summarize, the empirical results support three hypotheses (i.e., H1, H2, and H4) as below.

- H1: The motivation has positive influence on the self-regulation.

¹ <https://www.spssau.com/en/index.html>

- H2: Girls are more likely to suffer from Test anxiety than boy.
- H4: Negative emotional factors (Test-anxiety) have a negative impact on academic performance.

The following hypothesis H3 which is disputable in literature, is not supported by the enough evidence.

- H3: The use of constructive strategies has a positive impact on academic performance.

This research has several limitations. First, the data only has 301 responses from students and the students are all belonging to sophomores who are majoring in accounting. Further research is needed for students in other disciplines including science and engineering and humanities. Second, although online teaching and learning with video conference software and learning management system are used in the courses due to the pandemic, the use of cognitive strategies with innovated technology (e.g., cloudy note, mind-map, video conferencing filters), brought by the software/platform, has not properly collected and analyzed yet.

Finally, the gender issue is controversial. Although this research has statistically result found that female students are more likely to suffer from test anxious than their counterpart, the potential reasons still need to be investigated. Future research should explore to see whether different genders have more or less sensitive perceptions, would stress be caused by intrinsic value, and would test anxiety be caused by prior learning or assessment experience. This research has not done much nor in-depth research, but it lays a common ground for researchers to explore further in the future.

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