A pilot study on SRL awareness among Electronic Engineering Students in the COVID-19 Pandemic Era

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ABSTRACT – Under the circumstances of remote learning for university students due to the Covid-19 outbreak, the sudden transition from traditional face-to-face teaching to fully online teaching has brought great challenges to student learning. Students rely entirely on their self-regulated learning (SRL) abilities to ensure that learning objectives are achieved. This study investigates the awareness of undergraduate students in regulating their online learning during the pandemic period. Self-regulated online learning questionnaire was applied to collect information of the SRL's ability among electronic engineering students that can be divided into two categories: junior and senior students. Each item of the questionnaire was design with a scale of 1 to 5 (from "strongly disagree" to "strongly agree") and included the aspects of goal setting, task strategies and evaluation. The results indicate that all students have relatively average SRL awareness and abilities. Thus, assistance and mentoring are needed to ensure SRL can be improved and learning objectives can be well achieved.

1. INTRODUCTION

One of the keys to student academic success is the ability and effectiveness of self-regulated learning (SRL). SRL is defined as the process whereby students monitor and adapt their learning progress using strategies including cognitive, metacognitive, behavioural, motivational, and emotional to achieve learning objectives [1]. The coronavirus disease (Covid-19) has caused an unprecedented crisis in which teaching and learning at universities has undergone a sudden transition to fully online. This situation has pushed all respective parties to adapt quickly in ensuring continuity of learning. At this stage, SRL has become one of the main learning methods for students who have limited access to facilities and less contact with peers and lecturers, while at the same time being exposed to more autonomy.

Several studies highlighted motivation and cognitive strategies as vital components in SRL. The component of motivation includes element of self-efficacy, value of task and anxiety [2-4]. Self-efficacy can be defined as learners' belief, perceptions, and expectation about their performance in class. This factor helps them to set goals and plan strategies to improve their performance.

The element of cognitive learning strategies takes place after the attribute of self-efficacy occurs in a learner. The awareness of improving oneself opens up the possibility of developing a variety of creative cognitive strategies that influence their academic performance. Various cognitive strategies in learning have been discussed by previous researchers such as explanatory concepts where the learner has to explain the book after reading it [5].

Zimmerman [6] invented the SRL models in 1986. The researcher has developed three SRL models known as Triadic Analysis, Cyclical Phases of SRL and Multi-level model. These models emphasize on the socio-cognitive perspective that examined from the researcher career development. Meanwhile, in [7] the SRL model focuses on the psychology frameworks and emotion regulation. In this model, it is emphasized that a learner's goal setting is influenced by emotions, which ultimately determine the learning strategy.

According to [8] Cyclical Phases, the SRL model incorporates three main phases that the learner must perform, namely planning, practice and evaluation as shown in Figure 1. Within each phase, learners have several opportunities to evaluate and improve their performance. The modifications are necessary because factors such as behaviour, and environment are constantly changing during the learning process.

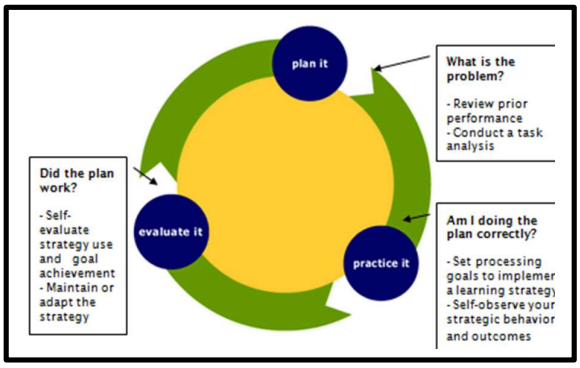

Figure 1 Zimmerman's SRL model [8]

Zimmerman's SRL has been shown to share common features with most SRL definitions, that describe it as a goal-oriented process with strategic planning and monitoring towards self-reflection. Therefore, this work incorporates the three aspects of SRL that correspond to Zimmerman's SRL cycle model as displayed in Section 2, Table 1. The analysis of the SRL aspects will be discussed in Section 3. Finally, the students' SRL awareness and the future work direction are summarised in Section 4.

2. METHODOLOGY

A survey form has been distributed online to 81 students of the Faculty of Electronic and Computer Engineering (FKEKK), UTeM. The respondents were then divided into TWO different categories of students. The first group consisted of 60 "junior students" who were in their first year of study, while the second group consisted of 21 "senior students" who were already in their third or final year of study and had experience of both face-to-face and online learning at UTeM. Each item of the questionnaire was design on a scale of 1 to 5 (from "strongly disagree" to "strongly agree") and included the aspects of goal setting, task strategies and evaluation. Table 1 shows the matrix for each aspect and item of SRL.

Table 1 Questionnaire Matrix

Aspect	Item	Statements
Goal setting	[1]	I set goals to help me manage studying time for my online courses and keep track on my progress toward my goals
	[2]	I am usually well prepared for class.
	[3]	I plan a schedule which have enough time for studying each subject of my online courses.
Task Strategies	[1]	I try to make more thorough notes for my online courses during the class**.**
	[2]	I set standards for my assignments in online courses.
	[3]	I work extra problems for my online class in addition to the assigned one.
	[4]	I find an extra resource other than lecture notes to increase my understanding.
Evaluation	[1]	I usually examine the quality of my learning tasks based on my understanding
	[2]	I feel a sense of accomplishment when I get everything done on time.

Numerical data collected in the study were analyzed quantitatively using analytic technique namely descriptive statistics. The measurements provide an understanding of collective properties on an element in the data sample. The descriptive data (mean and standard deviation) were then used for each item to compare the group of students**.**

3. RESULTS AND DISCUSSION

The analysis obtained from the sample data as depicted in Table 2 reveals SRL profiles for group of students for each aspect. The result clearly shows that each item for both groups have a relatively good score (more than 3.0) with standard deviation between 0.4 – 0.8. This implies that the student's awareness of SRL on online learning is evenly distributed. Remarkable difference can be seen for senior students in task strategies aspect, where each item scored more than junior students except for item 2. In addition, senior students have scored above 4.0 (Mean value) for at least 1 item in each aspect. This indicates that senior students seem to have more awareness and strategies to manage their studies. This may be due to their experience in adapting to university's education and collaborative learning between peers. Worth to mention that first year students usually take time to be more comfortable with peers, let alone on remote learning. However, significant differences between number of sample data might affect the statistics.

Table 2 Descriptive statistics

Aspect	Item	Student	N	Mean	Std.
Goal setting	[1]	Junior	60	3.9333	0.493
		Senior	21	3.8571	0.827
	[2]	Junior	60	3.7833	0.471
		Senior	21	4.0476	0.879
	[3]	Junior	60	3.7333	0.463
		Senior	21	3.3333	0.727
Task Strategies	[1]	Junior	60	3.8500	0.480
		Senior	21	3.9048	0.839
	[2]	Junior	60	4.0000	0.504
		Senior	21	3.8571	0.827
	[3]	Junior	60	3.7167	0.462
		Senior	21	3.8571	0.827
	[4]	Junior	60	3.9500	0.496
		Senior	21	4.2857	0.956
Evaluation	[1]	Junior	60	3.9333	0.493
		Senior	21	3.2857	0.721
	[2]	Junior	60	-	-
		Senior	21	4.0000	0.866

Figure 2 shows the average of the mean scores of the rated aspects under SRL for this study. Overall, senior students are aware when it comes to setting goals and strategically planning assignments, in each course when undergoing SRL. However, the results are still not satisfactory as the mean score is below the threshold. Meanwhile, the junior students focused on completing the task without setting better goals and having a better strategy for completing the task in SRL mode.

Briefly from this study, it appears that students still need assistance to improve their SRL. Most students in both groups have average SRL skills, including planning (goal setting), practice (task strategies) and reflection (evaluation). With inadequate SRL skills, students may fail to achieve objectives in online learning. SRL can be developed through a guided practice and feedback so that students will gain effective habits and create positive learning attitudes. Besides, the way the lecturers conducted online learning could have profound effects on the students on various outcomes. The effectiveness of SRL can be improve through corrective feedback as further information for students in accordance with the learning process of the course. In addition, SRL can be improved by providing students with specific cues when they need to explore relevant online information. Instead, collaborative learning can also have an efficient impact on students' SRL as it involves active discussion, reflective conversation, and contributing ideas to solve

problems. Another concern to improve SRL among students is learning based on experience activity. To achieve that, an integration of real-life examples should be appended in addition to the details of the course.

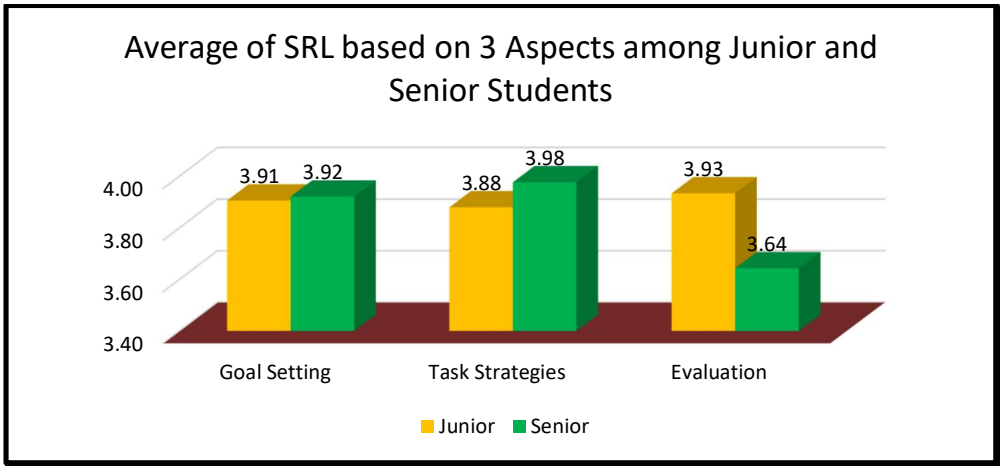

Figure 2 Average mean of evaluated aspects in SRL.

4. CONCLUSION

The sudden shift of higher education to fully online due to the Covid-19 pandemic has brought many challenges to students' learning. Students need to have an adequate SRL to ensure that the learning objectives are achieved. The results of this study show that although students have awareness about SRL abilities in their learning, students still need help and guidance to learn self-regulation. Several teaching strategies can be adapted in the learning design to enhance students' SRL. This will lead to long-term effects on student learning behavior and the outcomes of learning objectives. On the contrary, the results shown in this study are based on the questionnaire to the students. Addressing the limitations of this study, it is proposed to have a reliable build up questionnaire and number of samples to produce a better result.

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