Student Self-Regulated Learning in Physics at a Higher Education Institute

Nur Izzaty Abdul Rahim, Maizatul Nadwa Che Aziz, Fatin Aliah Phang, Nor Farahwahidah Abd Rahman, Jaysuman Pusppanathan

Abstract: ***This study aims to identify the level of self-regulated learning between high achieving and low achieving students in physics at a local university in Malaysia. This study involved the first and second year students of pure physics with a total of 70 students. The instrument used is the Self-Regulatory Strategy Inventory (SRSI). The student's self-regulatory learning level was assessed based on self-regulated learning theory (SRL) with three constructs: management of learning and behavioral environment, acquiring and learning information, and controlling inappropriate behavior. In general, high achieving students show high mean scores in the SRSI but the difference is not significant. Nevertheless, self-regulated learning plays an important role for students in learning and achievement of physics.***

Index Terms**: Keywords: Physics Education, Self-Regulated Learning, Academic Achievement.**

I. INTRODUCTION

Education in Malaysia aims to produce successful individuals . The future careers become an indicator as the determination success for students after receiving formal education reported that students' self-esteem in science and mathematics often influences by their interest towards the future careers. Adding to this, claimed that self-esteem in physics is a significant contributor to the differences in students' self determination and performance in physics. The need to understand the indicator for students' self-determination and self-esteem has brought this study attention towards self regulatory strategy among students in physics lessons. To ensure that students have a clear view to achieve their future career, the main intend is to understand the force behind their determination and self-esteem. stressed the importance of understanding self-regulated learning in terms of attitudes because it affects how students responded to learning activities in physics. The nature of physics learning at higher institutes is known for its abstraction since it is focusing at solving structured and tough problems. Therefore, there is an urgency to understand about students' self-regulated learning because according to Lai and Hwang (2016) it contributes to academic achievement.

II. LITERATURE REVIEW

Student achievement in physics is often associated with their learning strategies and metacognition. Good achievement in sciences, especially in physics, requires students to become actively engaged in learning and highly self-regulated. With a sophisticated self-regulated strategy, students are able to control learning behavior to stay focus when learning physics . In contrast, students who attain only low level of self-regulated learning are expected to perform poorly in their physics class reported when students have weak self-regulated learning, they showed less interest in acquiring and learning knowledge, improperly doing things and also inappropriately managing environment during revision.also explained that students tried to avoid from doing the difficult tasks and acted negatively when learning was conducted. They also often lose notes and do not prepare the notes and the materials required during the study. In addition, also agreed that it is important to eliminate these behaviors especially for students with weak self-regulated learning and other associated personal problems including family and financial issues. This is because these negative behaviors can affect student's learning in physics which also contributes to the deterioration of student achievement in physics . Student self-regulated learning can also be seen from various aspects including the difference in learning between high achieving and low achieving student in physics. Students with high levels of self-regulated learning are more prepared and likely to perform better in physics.

From those finding, studies about self-regulated is claimed as an attempt to fill in the gap between students' self-determination and academic achievement with the self-regulated learning strategies. There are several self-regulated learning strategies that influence students' learning and academic achievement which are determined by students' motivational belief . Self-regulated learning is described as ability to learn systematically by controlling the individual inner interest in self-regulated learning . explained that there are three factors in self-regulatory strategies that followed self-regulated learning theory (SRL) (i) the management of situation and behavior; (ii) acquiring and learning information;

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Nur Izzaty Abdul Rahim, Faculty of Education, Universiti Teknologi Malaysia, Johor, Malaysia

Maizatul Nadwa Che Aziz, Faculty of Biosciences and Medical Engineering, Universiti Teknologi Malaysia, Johor, Malaysia

Fatin Aliah Phang, Faculty of Education, Universiti Teknologi Malaysia, Johor, Malaysia and Centre for Engineering Education, Universiti Teknologi Malaysia, Johor, Malaysia, p-fatin@utm.my

Nor Farahwahidah Abd Rahman, Faculty of Education, Universiti Teknologi Malaysia, Johor, Malaysia

Jaysuman Pusppanathan, Faculty of Biosciences and Medical Engineering, Universiti Teknologi Malaysia, Johor, Malaysia

and (iii) controlling inappropriate behavior. proposed the self-regulated learning theory which emphasized on the environment, self-esteem and behavior. The management of situation and behavior and environmental elements are very much similar because it is aims to describe when students are often disturbed during the learning session. These factors are directly related to the academic achievement and assessment of students because the projection of learning process is controlled by their attitude and behavior of self-regulatory .

Therefore, this study attempts to describe self-regulated learning among physics students at tertiary level of education to understand the interplay between self-regulated learning and students' achievement. Hence, following SRL, it is aims to identify the differences of the level of self-regulated learning used between high achieving and low achieving students in physics.

III. METHOD

This is a quantitative study that uses a set of questionnaire which is the SRSI to measure SRL in physics among undergraduate physics students. A population is a group of individuals with similarity depending on the study conducted while the sample of the study is the individual involved in the study to represent the population of the study conducted (Bernard, 2017). The population for this study was physics undergraduates from a university in Malaysia, which is 103 students. Therefore, a total of 70 respondents were chosen to represent the population. The Self-Regulatory Strategy Inventory (SRSI) using SRL theory (Cleary, 2006), is encompass of three constructs which are management of learning and behavioral environment, acquiring and learning information, and controlling inappropriate behavior. The three sections contained in the SRSI meet the dimensions described by Zimmerman (1989). The SRSI questionnaire consists of 28 items as tabulated in Table 1. The questionnaire uses a 5-point scale to measure the students' perception on their own learning. A pilot study was conducted to obtain the reliability index of the questionnaire items. Based on the pilot study conducted, the Alpha Cronbach value representing reliability item of SRSI forms is 0.75. The data collected from the respondents was analyzed using Statistical Packages for the Social Sciences (SPSS).

Table I: Constructs of the SRSI items

Construct	Sub-Construct	Item No.
Environmental & Behavioral Management	Arrangement of environment & learning materials	1,2,8,16,25
	Behavioral management	8,27,28
	Self-regulated strategy	6,7,21,24
Acquiring & Finding Information	Strategy to acquire information	3,4,15,17,22
	Strategy to manipulate & learning information	5,14,18
Controlling of Inappropriate Behavior	Avoiding difficult learning environment	11,13,19,23
	Skills to self-manage inappropriate behavior	10,12,20,26

IV. RESULTS AND DISCUSSION

The mean values and standard deviations for each constructs are tabulated in Table 2. The first two constructs which are environment andbehaviour management and acquiring and finding information showed obtained the highest mean with 4.220 and 4.240. The construct of acquiring and learning information is also an important aspect of the self-regulatory strategy in physics learning. also agreed that seeking and learning information is a self-regulated strategy used by students in academic study. also added that obtaining and learning information are not only available through teachers but also involve friends and adults. also pointed out that the way of learning is also important part of student learning.

Yet, The last construct which is controlling of inappropriate behaviour received the lowest mean with 1.835. Items for controlling of inappropriate behaviour are all negative items that begin with 'I forget', 'I avoid' and 'I lost'. It is also stated that students with poor self-regulated learning management resulted in students not giving fully attention in physics learning. Thus, the lowest mean indicates that students are able to understand that these inappropriate behaviour are not accepted if they want to pursue for better performance in physics. Overall, students showed that they have an average mean of 3.432 which is interpreted as high. The inappropriate and less favorable of learning atmosphere while in the classroom becomes the source of the students to make their self-study . Therefore, from the findings it shows students' self directive process is well balanced between the constructs.

The score in the third construct suggests that the students are capable to control inappropriate actions during physics learning. described such behavior like losing the physics notes and forgetting the problematic topics.

Table II: Mean scores of SRSI

Construct	Mean	Standard Deviation
Environmental & Behavioral Management	4.220	0.903
Acquiring & Finding Information	4.240	0.855
Controlling of Inappropriate Behavior	1.835	0.815
Overall	3.432	0.858

From Table 3, it shows that high and low achieving students shared a similar pattern with their mean scores for all constructs. Generally, both group of students obtained high mean for the environmental and behavioural management (high=4.270, low=4.201) and acquiring and finding information (high=4.400, low=4.230). From the mean scores, it shows that high achieving students have a slightly higher mean if compared to low achieving students. The third construct indicates that low achieving students obtained a slightly higher mean if compared to the opposite group (high=1.760, low=0.760).

This result means implied that the high achieving students has a slightly better SRL if compared with the low achieving students. To determine if the difference is significant or not, a t-test was carried out as shown in Table 4.

Table III: Comparison of SRSI mean scores between high and low achieving students

Construct	High Achieving Students		Low Achieving Students		Difference
	Mean	Std. Dev.	Mean	Std. Dev.	
Environmental & Behavioral Management	4.270	0.870	4.210	0.920	0.060
Acquiring & Finding Information	4.400	0.780	4.230	0.860	0.170
Controlling of Inappropriate Behavior	1.760	0.760	1.950	0.880	-0.190
Overall	3.477	0.803	3.463	0.887	0.014

For this comparison, a null hypothesis is constructed that there is no significant difference in the level of self-regulated learning used by high and low achieving students to study physics. Based on the results in Table 4, the significant p-value is higher than 0.05 which means the hypothesis stated is rejected .

Table IV: t-test results between high and low achieving students

Construct	p-value
Environmental & Behavioral Management	0.504
Acquiring & Finding Information	0.555
Controlling of Inappropriate Behavior	0.316
Overall	0.458

Based on the analysis of the study, there was no difference in the level of self-regulatory learning by both groups of students. This finding is in contrast with previous studies by . In their studies, they found a significant difference between these two groups when they did an intervention by comparing control and experimental group. However, in this study, there is no intervention were done hence the finding is specified to describe students' current state of SRL. Hence, it can be said, when students are not given the freedom to self-evaluate themselves or estimate their competencies , despite of their differences in academic performance, students' SRL will likely to be very similar. Thus, the learning strategy itself if according to Zimmerman (2002) has high possibility lacking in their self-awareness, self-motivation and behavioural skill to implement that knowledge. This explains why in the actual setting of physics learning, there is no significant difference of SRL between both groups. What this finding can agree is, that both group have used similar specific process of learning that they personally adapt to learn physics. Due to this, their motivation to excel is stemmed from the learning task itself like examination rather than SRL.

V. CONCLUSION

The overall study has succeeded in identifying the differences between the levels of student self-regulated learning with different performance in physics based on self-regulatory learning theory (SRL). Students with high levels of self-regulated learning tend to leave negative things while a handful of students with low self-regulated learning will do these things occasionally. Generally, students have a high level of self-regulated learning despite of their different performance in physics. These findings bring this study with an essential question whether students who have no understanding about SRL is aware with their own SRL. For this reason, further study must consider students initial understanding about their own SRL and how the SRL is guiding them with the learning process. This research will allow further clarification and justification in what way students with different academic performance employed their SRL during learning.

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