

Students' self-regulated learning in open and distance learning for Mathematics course

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Abstract

The paper presents the study on self-regulated learning (SRL) using open and distance learning (ODL) for Mathematics course in Universiti Teknologi MARA (UiTM), Perak Branch, Tapah Campus. Some concerns with ODL mode are students' academic performance, mathematical knowledge acquired, self-regulated learning when applying ODL alone throughout the entire semester. A sample of 347 among undergraduate students were collected at the end of March – July 2020 academic semester to measure level of self-regulated learning. Descriptive analysis was used to analyze the data. The findings indicated that the level of agreement for ODL has positive contributions to the students' SRL.

Keywords: Mathematics, Self-Regulated Learning, Open and Distance Learning

INTRODUCTION

Open and distance learning (ODL) is referring to a condition or method of learning that should be available to everyone, under any situation, at any place and at any time. ODL is one of the methods to get an education without having to attend class. This method connects students and educators with geographical barriers by using different audio-video aids or other technologies [1]. ODL is an education system model which all the teaching learning activities between students and educators who are living different geographically location are conducted via various electronic media and traditional postage service [2]. Moreover, the fact that ODL is more flexible, student-centred, and autonomous than face-to-face learning, it requires the students to organize themselves and use self-regulated learning (SRL) skills more frequently [3]. The consequences of ODL as a teaching method is the university's concern to improve students' academic performance, SRL and motivation of learning [4]. However, some students have a negative perception towards ODL because of challenges faced by students in performing their task as mentioned in [5]

During the ongoing outbreak of coronavirus disease (COVID-19), all levels of education schools including higher education institute have decided to introduce teaching and learning using ODL method. Teaching mathematics through ODL has become a challenge for educators because of the way of interactions with students and the delivery of teaching materials during instructions [6]. The issue is, whether or not the present ODL modes have allowed the learner to acquire adequate mathematical knowledge, skills and abilities [7]. There are also some ODL critics doubt whether ODL method can improve students' mathematical critical thinking, skills in demonstrating their abilities to apply creative, imaginative, and innovative thinking ideas to problem solving, and demonstrate the abilities to investigate problems and provide effective solutions as required in face-to-face class [7]. In addition, low achievement

in mathematics has been of concern and the challenge facing mathematics educators was to find out whether ODL modes could be used against conventional approach of face-to-face interaction for successful teaching and learning [6].

Information, communication and technologies (ICTs) gave significance impact in teaching and learning process, coupled with the worldwide pandemic of COVID-19. Various ODL implementation strategies can be put in place to ensure that learning will proceed. The term 'Open and Distance Learning' is also interchangeably used with a term like e-learning [8]. Hence, mathematics can be learned through many different platforms, such as social media or web 2.0, voice message, video conferencing and other media technologies. Students received instructional contents, submitted assignments, took tests, and interacted directly using online or virtual platforms. However, the approaches used need to take into account about the constraints faced by students and lecturers themselves - either synchronous or asynchronously [9].

Most of the lecturers in UiTM, Tapah Campus chose low data consumption messenger applications such as WhatsApp and Telegram as social media tools to interact with their students during the COVID-19 period. This platform delivers low bandwidth contents to everyone with smartphones – even to those with poor internet connection or limited data. The lecturers used these tools to send short messages, voice notes, PDFs or slide notes, pictures, video recordings, and YouTube links. Video conferencing platform is another concept that is best for ODL teaching and learning. The strength of video conferencing tools lies in their ability to attract the viewers through the use of visuals, interactive features and synchronous communication. While lecturers may not require their students to attend live meetings due to concerns about access, connectivity, and availability, these sessions can be recorded.

Recent studies recommend mathematics educators to use learning technologies [10], [11],[12] to encourage students to boost their levels of self-regulation learning in online environment. Mathematics is a subject where student need to memorize formulae and visualize the picture so that it can be understood the theory. In today-classroom scenario, educators prefer computer-based technology to teach mathematics when teaching. In the reviews, many researchers believed that motivational, metacognitive and behavioral process are important to enhance cognitive process in learning mathematics [13]. These processes embody the students' self-regulated learning (SRL), which emphasizes the active roles of the learners [14]. Students good in SRL are more successful in distance learning [3]. They plan, set goals, organize, self-evaluate during acquisition process [15]. SRL is generally defined as a variety of learning attributes that enable students to be active, constructive and highly motivated. Students with SRL strive to manage their cognition, intentions and learning objectives effectively. In addition, SRL has been recognized as one of the important factors of student success in the online learning environment. Therefore, the implementation of ODL is expected to help the students to improve their abilities by applying self-regulated learning strategies.

For mathematics, metacognitive knowledge is not only about the students' ideas regarding the nature of mathematics, since it also refers to mathematical processes and techniques that are acquired by them [16]. As mentioned in [17], student-centered method is more preferable than the traditional approach. It allows students to be actively involved in the learning process with the guidance of the lecturer as the facilitator. Furthermore, the students will eventually learn the relationship between mathematical concepts in a creative manner.

Therefore, this study conducted to meet objective in investigating the SRL of students using the ODL for mathematics course. Being a self-regulated student is important when learning with mathematics [18].

METHODOLOGY

This study aims to find out level of SRL for mathematics courses offered for undergraduate students at UiTM, Perak Branch, Tapah Campus through ODL. An online set of questionnaires was provided to gather the information of the students' perceptions and comments on SRL with ODL for mathematics

course. The questionnaire contained a set of queries combination and modified version with reference to [19] and [20]. The population of this study comprises of 347 undergraduate students from semester 1 until semester 4, who enrolled for mathematics course in UiTM, Tapah Campus, for March to July 2020 session

The questionnaire for students was generally divided into three sections. Section A comprised information about the respondents' demographic such as student ID, gender, and CGPA. Section B asked their perceptions towards SLR with ODL for mathematics course. For this paper, six SRL items are reported: i) self-defined goal setting, ii) environment structuring, iii) time management iv) help-seeking, v) self-evaluation, vi) task responsibility. The students were asked to rate each question based on their agreement levels of SRL: strongly agree/agree/moderately agree/disagree and strongly disagree.

RESULT AND DISCUSSION

There were 25 questions in total which were expected to measure students' perception on SRL. Reliability test and descriptive statistics analysis were used to analyse the data. Cronbach's Alpha is the most common analysis when we have multiple likert questions in questionnaire to determine whether the scale is reliable. Data is considered to have a good reliability if Cronbach alpha is greater than 0.7.

All items showed that the value of Cronbach alpha is exceed 0.7, including for the item self-define goal and help seeking which value alpha close to 0.7 which is 0.692 and 0.687 respectively was also acceptable.

Table 1: Cronbach alpha

Item	Cronbach Alpha	no of item
A-Self-Define Goal	.692	5
B-Environment Structuring	.744	4
C-Time Management	.737	3
D-Help Seeking	.687	4
E-Self Evaluation	.733	4
F-Self-Responsibility	.813	5

The descriptive statistics such as maximum, minimum, means, standard deviation was obtained. The result of questionnaire is shown in Table 2

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
A-Self-Define Goal	347	1.00	5.00	3.7637	.58985
B-Environment Structuring	347	1.00	5.00	3.7089	.77925
C-Time Management	347	1.00	5.00	3.5802	.72894
D-Help Seeking	347	1.00	5.00	4.0922	.55720
E-Self Evaluation	347	1.00	5.00	3.9164	.57388
F-Self-Responsibility	347	1.00	5.00	3.9977	.61878
Valid N (listwise)	347				

Overall, item for help seeking contribute for the highest mean score compared to other items. The result showed that most of the students rated 'agree' in seeking necessary help. For example, they would

approach their lecturers or learn from their peers when necessary. Then, the remaining five items with above-average agreement levels managed to score above the mean rating of 3.0. In contrast, item for time management has lower mean score. It showed that, they were facing difficulties in organized and planned their study time and task during ODL. Therefore, it can be concluded that, majority of students agreed that ODL has developed their SRL.

CONCLUSION

SRL encouraged students to pursue specific academic tasks and learning strategies. As a result, many students can attain a better academic achievement. Throughout the COVID-19 period challenge, it is necessary to understand how students can best practice SRL to achieve academic success from ODL. SRL emphasises even more learning independence. This research paid attention to the identification of self-regulated learning levels in Mathematics course. The result showed that most of the students rated 'agree' in seeking necessary help. For example, they would approach their lecturers or learn from their peers when necessary. This shows that, in some cultures, asking for help and receiving help can be seen as a sign of weakness. In contrast to ODL, asking for help is indispensable to validate their learning and understanding and it requires student and lecturer to maintain a consistent online presence. This also suggests that blended learning could be the best practice for learning method in Mathematics course, rather than doing ODL alone throughout the entire semester.

It shows that self-regulated students are not passive learners – yet they actively try to seek out information and assistance when needed. In adapting to the new norm, the implementation of ODL helped the students to become more aware of their responsibilities for their own learning, making them more active, and motivated to formulate their own learning strategies. Generally, it is believed that ODL was designed for purposeful and disciplined students, which may increase the demand for them to work independently. Based on our findings, a further study can be undertaken to measure the relationship of ODL in developing SRL in term of improving students' achievement.

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