

Conference Paper

A Framework for Scaffolding Learners' Self-Regulation in a Flipped Classroom Learning Environment

Nurul Farhana Jumaat^{1*}, Noor Hidayah Che Lah²¹Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, 81310, Johor Bahru, Johor, Malaysia²Computing Department, Faculty of Art, Computing and Creative Industry, Universiti Pendidikan Sultan Idris, 35930, Tanjong Malim, Perak, Malaysia**ORCID ID**Nurul Farhana Jumaat: <https://orcid.org/0000-0002-4606-489X>**Abstract.**

Self-regulated learning is learning that is derived from a student's self-regulated thoughts and it is strategically oriented towards their learning goals. The need to guide and monitor students' self-regulation is crucial since it has become an integral part of their learning process. Throughout the process, technologies also have been integrated into the educational scene, and one of the approaches that exist nowadays is flipped classrooms. Previous research has proven that if a student's self-regulation is being monitored, their performance might as well increase, along with their self-regulation skills. As a result, this paper proposes a framework for scaffolding students' self-regulation in a flipped classroom learning environment. The proposed framework may be useful to practitioners and online learning instructors. The implication of a self-regulated flipped classroom approach towards students' self-regulation and students' achievement in learning have been discussed. Finally, the success factors for implementing the proposed framework and some future research directions have also been discussed.

Keywords: scaffolding; self-regulated; flipped classroom; performance

1. Introduction

Scaffolding plays a critical role in education as it provides support for reflective processes in learning. In the flipped classroom environment, students are able to take control of their own learning pace, and be responsible for their own learning process. Inability to have a self-directive process towards their own learning in a flipped classroom will lead to ineffective learning in which it could affect their performance.

Recent studies have been concerned with the challenges of conducting flipped classrooms with effective learning guidance [1]. Moreover, [2] and [3] discuss the challenges and strategies facilitating student's self-regulation in flipped classrooms. Without proper guidance, students might demonstrate low self-regulated behaviours in learning.

Corresponding Author: Nurul Farhana Jumaat; email: nfarhana@utm.my**Published** 21 December 2022

Publishing services provided by Knowledge E

© Nurul Farhana Jumaat, Noor Hidayah Che Lah. This article is distributed under the terms of the [Creative Commons](#)[Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICESRE Conference Committee.

OPEN ACCESS

According to [4], students might effectively focus and learn the learning materials if they exhibit better self-regulation in the learning process. In contrast, those with lower self-regulation might learn little before class, which could affect their performance in the in-class learning. It shows that out of class learning activities play an important role during the learning process. Hence, the instructional design and scaffolding mechanisms are regarded as a critical issue in flipped classrooms. Likewise, it is essentially important to encourage students to be self-regulated in this method of learning.

In this study, the researcher had proposed a conceptual framework to be used by practitioners and online learning instructors to integrate supported self-regulated flipped classroom learning environments to assist students' self-regulation skills and their performance. The study also discusses the implication of a self-regulated flipped classroom approach towards student's self-regulation and students' achievement in learning.

2. Literature Review

2.1. Flipped Classroom

In recent years, the educational paradigm has shifted from teacher-centered learning to student-centered learning. Throughout the process, technologies have integrated into the educational scene [5] and various learning approaches have been introduced to the students. Among them is the "flipped classroom". Flipped classroom is considered as a student-centered method of learning that aims at engaging self-regulated students, rather than receiving direct instruction from the teachers.

In a study conducted by [6], they have briefly explained the structure of flipped classrooms. Flipping the classroom simply means to replace after-lecture homework. Prior to class, students are expected to study the course material [7]. With the increasing ubiquitous access to learning resources, technology also provides enriched resources in which students are supplemented with internet resources, videos, and simulations. The course materials provided before class are mainly related to the knowledge levels of remembering and understanding [8]. During class, students are expected to do activities, assignments and aim for remedial help. After class, students are supposed to evaluate their own understanding. All these activities demand students to have a high sense of self-regulation.

Self-regulated students are those who are aware, plan, monitor and evaluate their own thinking. These students set goals for their own learning and plan their learning activities

before they embark on them. They also monitor what they do and learn throughout the learning processes (including cognitive, metacognitive, emotions, behaviour and physical settings). They also reflect on what they do and when the task is over, they will analyse whether their choices were effective and how they might do better next time by providing comprehensive reflections. The kind of learning that exhibits these skills, attitudes, and behaviour is known as self-regulated learning.

2.2. Self-Regulated Learning Strategy

Self-regulated learning was first studied by psychologists in the 1980's and 1990's. [9] define self-regulation as a self-directive process that transforms mental ability into academic skills. He believes that students should view learning as an activity they do for themselves proactively, not a covert event in relation to teaching. Self-regulation refers to self-generated thoughts, feelings, and behaviours that are oriented to attaining goals [9].

On a positive note, researcher consider self-regulated learning as a learning process that promote students' active learning [10]-[12], enhances students' engagement [13]-[16], motivation [17], contribute to their self-confidence [18] and increase performance in learning [19], [5]. A study by [9], has set up the three self-regulated learning processes namely: (i) the forethought phase, (ii) the performance phase, and (iii) the self-reflection phase. The forethought phase requires the student to analyze the learning task. They should also set specific learning strategies to achieve those goals. The performance phase is when the students implement a learning strategy. Lastly, it is a responsibility to evaluate their understanding in order to determine the effectiveness of the learning strategies.

However, there is this critical time when students are not able to acquire self-regulation learning. At this point of time, educators need instructional approaches that can offer direction and insight into the processes of self-regulated learning [9]. This can be done through the integration of scaffolding. Figure 1 shows the proposed scaffolding self-regulated flipped classroom learning environment.

Figure 1 indicated a conceptual framework of scaffolding self-regulated in a flipped classroom learning environment. In flipped classrooms, students are introduced to content and they are equipped with tasks such as pre-recorded video lessons and notes. The assigning tasks are to be completed independently by students at home. Then, they are asked to discuss the tasks given with the teacher at class. Teachers at this moment will facilitate student's understanding and scaffold students when in need.

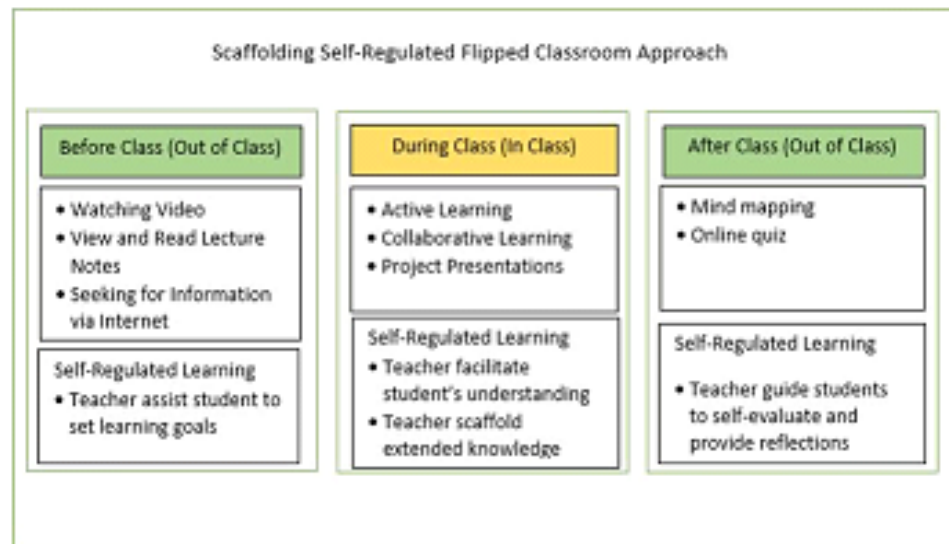


Figure 1: Conceptual framework of scaffolding self-regulated in a flipped classroom learning environment.

Later, students are asked to provide reflections and self-evaluate their work based on teacher's feedback. At this moment, the role of teacher is to guide the students to evaluate and provide reflections of their lesson.

3. Result and Discussion

3.1. Scaffolding self-regulated flipped classroom approach to improve students' self-regulation

A study conducted by [20] found that students who are supported by the teacher or instructor spend a lot of time on the given task. Students are more aware and able to monitor their own learning process. However, it implies only for online learning, as it is quite challenging to measure students' learning time in face-to-face learning. Due to this situation, it shows that scaffolding or support provided by teachers is able to improve students' self-regulated activities, as mentioned before they are able to monitor their own progress in learning. In turn, it enables them to learn efficiently.

Another study conducted by [21] highlights seven key attributes of self-regulated learners including: i) authenticity, ii) personalization, iii) learner-control, iv) scaffolding, v) interaction, vi) cues for reflection, and vii) cues for calibration. Scaffolded self-regulation such as cues for reflection is known to be effective in supporting students' self-regulation [22].

Another scaffold or prompt such as in the form of questioning students is found to motivate students to engage in self-regulated activities. All of these support act as an

encouragement to the students to engage in their learning process. In each phase of learning, they are aware to set goals and plan in the forethought phase, to monitor and control their learning, and to evaluate their own learning and set goals in the self-reflection phase [23]-[24].

3.2. Scaffolding self-regulated flipped classroom approach to improve students' performance

Self-regulated learning (SRL) intervention or support could possibly be related to a student's higher learning outcomes. Self-regulated learning intervention could be in the form of SRL instruction and SRL prompts [25]. Previous research had shown that these interventions can enhance students' SRL and in turn enhance learning outcomes [25]-[27].

Another study conducted by [20] found that SRL support is only beneficial for students' learning if it is being carefully designed. The reason is to avoid student's dissatisfaction in learning. In contrast with the study performed by [28], they found positive effects of the SRL support for the completion rate of the instructional videos (i.e., students in the SRL condition watched more videos), but not for other indicators like learning outcomes. In contrast to previous research from higher education, their results show that implementing SRL support in a flipped classroom is not directly effective in secondary education. This might be due to the fact that secondary education students need more assistance from teachers in a face-to-face environment. An experiment that was conducted in an elementary school math course by [29] found that the student's post-test score in the experimental group was significantly higher than in the control group. Their study also showed that integrating the self-regulated strategy into flipped classrooms can improve students' self-efficacy, their strategies of planning and using study time, and hence learning takes place effectively and they have better learning achievements.

Acknowledgements

The authors would like to thank University Teknologi Malaysia and Ministry of Higher Education Malaysia. This work was funded by the Universiti Teknologi Malaysia under Research University Grant Tier 2 (Q.J130000.2653.15J94).

References

- [1] Schultz D, Duffield S, Rasmussen SC, Wageman J. Effects of the flipped classroom model on student performance for advanced placement high school chemistry students. *Journal of Chemical Education*. 2014;91:1334–1339.
- [2] McLaughlin JE, Griffin LM, Esserman DA, Davidson CA, Glatt DM, Roth MT, et al. Pharmacy student engagement, performance, and perception in a flipped satellite classroom. *American Journal of Pharmaceutical Education*. 2013;77.
- [3] Sun JCY, Wu YT, Lee WI. The effect of the flipped classroom approach to Open CourseWare instruction on students' self-regulation. *British Journal of Educational Technology*. 2016;48:713–729.
- [4] Liu H, Lan K, Jenkins J. Technology-enhanced strategy use for second language vocabulary acquisition. *English Teaching & Learning*. 2014;38:105–132.
- [5] Lai CL, Hwang GJ. A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. *Computers & Education*. 2016;100:126–140.
- [6] Dean D, Davies R, Ball N. Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course. *Educational Technology Research and Development (ETR&D)*. 2013; 61:563–580.
- [7] Alvarez B. Flipping the classroom: Homework in class, lessons at home. *Learning First*. 2011. Available from: <http://www.learningfirst.org/flipping-classroom-homework-class-lessons-home>
- [8] Rahman AA, Aris B, Rosli MS, Mohamed H, Abdullah Z, Zaid NM. Significance of preparedness in flipped classroom. In Paper presented at the 3rd International Conference on Internet Services Technology And Information Engineering 2015 (ISTIE 2015), Kuta, Bali, Indonesia.
- [9] Zimmerman B. Becoming a self-regulated learner: An overview. *Theory into Practice*. 2002;41:64–70.
- [10] Long Y, Aleven V. Active learners: Redesigning an intelligent tutoring system to support self-regulated learning. Paper presented at European Conference on Technology Enhanced Learning EC-TEL 2013: Scaling up Learning for Sustained Impact. p. 490–495.
- [11] Jones JA. Scaffolding self-regulated learning through student-generated quizzes. *Active Learning in Higher Education*. 2017;20.
- [12] Ernesto P. A review of self-regulated learning: six models and four directions for research. *Frontiers in Psychology*. 2017;8:1–28.

- [13] Wolters CA, Taylor DJ. A self-regulated learning perspective on student engagement. *Handbook of Research on Student Engagement*. 2012:635–651.
- [14] Pizzimenti MA, Axelson RD. Assessing student engagement and self-regulated learning in a medical gross anatomy course. *Anatomical Science Education*. 2015;8.
- [15] Mutawah MA, Thomas R, Khine MS. Investigation into self-regulation, engagement in learning mathematics and science and achievement among bahrain secondary school students. *International Electronic Journal of Mathematics Education*. 2017;12:633–653.
- [16] Ellis JM, Helaire LJ. The effects of adolescent self-regulated learning on engagement in a college access program: An exploratory study. *AERA Open*. 2018;4.
- [17] Eom S. The effects of student motivation and self-regulated learning strategies on student'. 2015 Proceedings SIGED: IAIM Conference 2015, Association for Information Systems.
- [18] Stefanou CE, Lord SM, Prince MJ, Chen JC. Effect of classroom gender composition on students' development of self-regulated learning. *International Journal of Engineering Education*. 2014;30:1–10.
- [19] Jarvela S, Kirschner PA, Panadero E, Malmberg J, Phielix C, Jaspers J, et al. Enhancing socially shared regulation in collaborative learning groups: designing for CSCL regulation tools. *Educational Technology Research and Development*. 2015;63:125–142.
- [20] van Alten DCD, Phielix C, Janssen J, Kester L. Effects of self-regulated learning prompts in a flipped history classroom. *Computers in Human Behavior*. 2020;108.
- [21] van Laer S, Elen J. In search of attributes that support self-regulation in blended learning environments. *Education and Information Technologies*. 2017;22:1395–1454.
- [22] Devolder A, van Braak J, Tondeur J. Supporting self-regulated learning in computer-based learning environments: Systematic review of effects of scaffolding in the domain of science education. *Journal of Computer Assisted Learning*. 2012;28.
- [23] Moos D, Bonde C. Flipping the classroom: Embedding self-regulated learning prompts in videos. *Technology, Knowledge and Learning*. 2016;21.
- [24] Zimmerman BJ, Moylan A. Self-regulation: Where metacognition and motivation intersect. *Handbook of metacognition in education*. 2009; 299–315.
- [25] Dent A, Koenka A. The relation between self-regulated learning and academic achievement across childhood and adolescence: A meta-analysis. *Educational Psychology Review*. 2015;28.