STUDENTS' SELF-REGULATED LEARNING STRATEGIES IN THE ONLINE FLIPPED CLASSROOM

Syaiputra W. M. Diningrat, Universitas Negeri Surabaya
Victoria I. Marín, University of Lleida
Bachtiar S. Bachri, Universitas Negeri Surabaya

ABSTRACT

The online flipped classroom model (OFC) is increasingly being adopted in higher education. However, little is known about the effect of OFC on students' self-regulated learning (SRL). The current study explored the students' SRL strategy in the OFC. A quantitative method with multiple linear regression analysis based on online survey data was used to assess how 111 first-year, English literature students at a university in Indonesia used SRL strategies after implementation of the OFC. The results indicated that the students' experience in relation to the OFC was positive and their self-regulation of goal setting, environment structure, and help seeking were developed. Based on the results of correlation analysis it was found that the OFC experiences significantly correlated to the students' SRL skill. Suggestions for effectively designing OFC approaches to develop students' SRL are proposed and areas needing future research are discussed.

Keywords: *online flipped classroom, self-regulated learning, higher education*

INTRODUCTION

The extent and importance of online learning environments in higher education has increased tremendously in the last decade (EDUCAUSE et al., 2020), triggered by the continued use of digital technologies and the pandemic era. Allen and Seaman (2015) defined online learning as a course modality in which most or all the content is delivered online and without face-to-face meetings. Although various benefits of online learning have been reported (Arbaugh et al., 2009; Tsai et al., 2013), previous studies have also mentioned drawbacks for online learning. For example, students' feeling of isolation may lead to students' dropping out due to the lack of interaction between teachers and students, both synchronously and asynchronously, which is considered one of the main problems within the online learning environment (Yuan & Kim, 2014).

In the context of the pandemic, higher education institutions worldwide implemented an emergency remote teaching approach to quickly move to use fully online formats to keep teaching and learning going (Hodges et al., 2020). The use of synchronous collaborative tools, especially videoconference systems, in teaching and learning processes was the most common situation in the first semester of the pandemic (Bond et al., 2021).

One of the instructional approaches within the online modality that has gained relevance in this context has been the online flipped classroom (OFC). The OFC is defined as a combination of asynchronous and synchronous activities that are implemented in a fully online setting (Stöhr et al., 2020). While slightly different from the conventional flipped classroom approach (see Table 1), the OFC holds potential advantages in optimizing learning (Chen et al., 2014; Hew et al., 2020). For example, Lin et al. (2019) focused on students' engagement in an OFC and found that students who more actively engaged in the asynchronous learning activity tended to participate more actively

in the synchronous activity as well. Although the OFC seems to be gaining traction in higher education, there are still limited studies focusing on examining such an instructional approach (Chen et al., 2014; Stöhr et al., 2020) and, therefore, it needs more research in order to fully explore its potential and its challenges.

Table 1.
The differences Between FC and OFC

Learning Model	Learning Session	Mode
Flipped Classroom (FC)	Preclass learning activity	Online
	In-class learning activity	Face-to-face classroom
Online Flipped Classroom (OFC)	Asynchronous learning activity	Online
	Synchronous learning activity	Online face-to-face (Zoom/Google Meet)

As a course is pivoted to an online learning setting, students are required to adapt their learning activity through different forms of monitoring, regulation, and assessment. Successful online learning depends upon an ability to take control of the learning process, and this has been conceptualized in relation to self-regulated learning (SRL) (Zimmerman, 2002). Therefore, SRL is an essential skill that supports student learning within an online learning environment (Huh & Reigeluth, 2018). Pintrich (2004) defined SRL as an active, constructive process in which students set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior. Thus, SRL holds a more significant role within an online learning environment due to its demand of autonomous thought and action from students (Rivers et al., 2021).

According to a recent systematic literature review focusing on SRL in flipped classroom settings, SRL is also an essential skill that potentially helps students succeed in this kind of instructional approach (Rasheed et al., 2020). Additionally, another study pointed out that integrating SRL principles in flipped classroom learning activities could improve students' SRL (Ng, 2018). In line with this, the flipped classroom strategy has also potential benefits to enhance students' SRL (Kustandi et al., 2020). However, although the aforementioned examples of flipped classroom suggest potential benefits in optimizing students'

SRL, studies exploring SRL within the flipped classroom, even in the OFC context, are still limited (Rasheed et al., 2020), and SRL deserves further exploration.

This paper aims to bridge this gap in the literature by investigating students' SRL in the OFC through a questionnaire survey that focuses on SRL aspects including goal setting, environment structuring, task strategies, time management, help-seeking, and self-evaluation. Therefore, the study explores how the SRL strategies of the students are developed after they experienced the OFC approach.

FLIPPED CLASSROOM

The flipped classroom model is based on the idea that traditional teaching is inverted by delivering the course concepts before the class and allowing teachers to use class time for active learning through practice and application of the course concepts (Bergmann & Sams, 2012; Nouri, 2016). Diningrat et al. (2020) defined the flipped classroom model as an instructional model that consists of two parts of learning activity, namely preclass and in-class. While preclass learning activity is designed for students to work individually at home, in-class learning activity is designed for active and collaborative learning to solve problems arising from practice. Moreover, Lin et al. *2019) called the preclass learning activity an online asynchronous activity and the in-class learning activity an online synchronous activity.

The number of studies implementing the flipped classroom in different educational fields has grown notably over the past few years (Al-Samarraie et al., 2020). The findings from the review by Al-Samarraie et al. (2020) revealed that the use of this instructional model in a university context and in various disciplines can promote students' engagement, attitude, and performance. Recently, Birgili et al. (2021), who conducted a study to reveal trends and outcomes of the flipped classroom, also showed that this instructional model increases students' performance and has a positive influence on their soft skills and attitudes.

Moreover, in the field of English language teaching, Turan and Akdag-Cimen (2020) found in their systematic review that the flipped classroom is a more effective instructional model than the conventional model. They also indicated the

advantages of this instructional model, such as enhancing engagement, learning achievement, and higher order thinking skills of students. Despite the aforementioned examples of its advantages, studies exploring SRL within the flipped classroom are still limited (Rasheed et al., 2020).

ONLINE FLIPPED CLASSROOM

In line with the flipped classroom, the OFC encourages students to prepare for the synchronous session by completing the learning activity in the asynchronous session (e.g., reading texts, discussing content, completing quizzes). However, unlike the flipped classroom in the synchronous session, students in the OFC do not meet face-to-face but online (Hew et al., 2020). Similar to this, Lin et al. (2019) stated that the OFC has the same asynchronous learning activities of watching prerecorded video lectures like a flipped classroom; however, the synchronous learning activities are conducted online in the asynchronous session and not in a physical classroom. In other words, the learning activities in the OFC are carried out in two phases of learning activities, namely online asynchronous and synchronous, as seen above in Table 1.

Although the OFC is a new form of online learning and an adaptation of the flipped classroom, several previous studies have revealed the effectiveness of this model before and during the Covid-19 pandemic. For example, in their prepandemic study on the OFC, Lin et al. (2019) showed that students who completed and were more engaged in the asynchronous learning activity not only gained a higher final grade but also had better comprehension of the learning concept. Meanwhile, Tang et al. (2023) investigated the efficiency of the OFC during the pandemic and their study revealed that this instructional model improved students' learning, attention, and results in the course assessment. In another study, Ma and Luo (2022) highlighted the potential of the OFC to foster English as a foreign language (EFL) students' engagement and learning outcome. Although the OFC seems to be gathering momentum in higher education, very few studies have examined its effectiveness (Hew et al., 2020).

To drive the learning activity in synchronous and asynchronous sessions, an instructional strategy of reciprocal teaching was integrated. The reciprocal teaching strategy is designed to promote the self-regulated learning strategy. Schünemann et al. (2013) found that the reciprocal teaching strategy could help students develop self-regulated learning. In the next section, an overview of reciprocal teaching is discussed.

## INTEGRATED RECIPROCAL TEACHING STRATEGY INTO OFC LEARNING SESSIONS

A reciprocal teaching strategy is a procedure in which small groups of students are explicitly instructed in how to use comprehension-fostering and comprehension-monitoring strategies to improve their reading comprehension performance (Palinscar & Brown, 1984; Schünemann et al., 2013). These strategies are predicting, questioning, clarifying, and summarizing. Furthermore, the strategy of prediction refers to the assumptions made about what topics may be discussed in the session that follows (Palinscar & Brown, 1984; Tarchi & Pinto, 2016; Yang, 2010). While students are making predictions, they must activate their previous knowledge related to the topic in the text. Through practicing this strategy, students' ability to monitor their reading comprehension is increased. The strategy of questioning asks the students to generate questions about the main idea and to view their peers' perspectives on the same issues (Palinscar & Brown, 1984; Tarchi & Pinto, 2016; Yang, 2010). This strategy requires students to master supporting information and to draw inferences from the reading text. Students' ability to read and to understand the text increases effectively by practicing this strategy.

The strategy of clarification refers to clarifying any misunderstanding concerning the text (Palinscar & Brown, 1984; Tarchi & Pinto, 2016; Yang, 2010). In this strategy, students are asked to clarify their own comprehension and to identify whether the text is difficult to comprehend due to, for example, new concepts and vocabulary, unfamiliar concepts, and reference words. Additionally, the purpose of this strategy is to ensure students' comprehension in reading the text. The strategy of summarization is a process that involves deleting unimportant information and identifying or constructing general or main idea statements that summarize many details (Palinscar & Brown, 1984; Tarchi & Pinto, 2016; Yang, 2010). This strategy also entails students identifying the main idea and important details within the reading, synthesizing ideas across paragraphs, and summarizing

based on a single paragraph, a section of the text, or the entire passage. Figure 1 shows the pedagogical design of the OFC implementation as well as the class activities for the reciprocal teaching strategy.

Figure 1.
Pedagogical Design for OFC
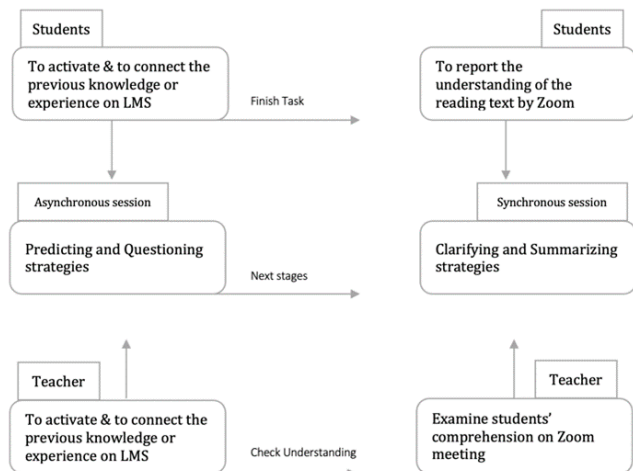
SELF-REGULATED LEARNING

According to Panadero (2017), SRL "is a core conceptual framework to understand the cognitive, motivational, and emotional aspects of learning" (p. 1). Established SRL models refer to Zimmerman, Boekaerts, Winne, and Pintrich, and new models include the ones from Efklides and Hadwin, Järvelä, and Miller (Panadero, 2017).

According to Zimmerman (2002), SRL is cyclic and based on three phases: forethought, performance, and self-reflection. In the phase of forethought, which usually takes place before the learning task, learners analyze the task to perform, set goals, and plan how to reach them. Self-motivation beliefs influence this phase. In the phase of performance, learners conduct their self-control and observe their tasks during learning. Finally, the phase of self-reflection refers to learner' self-judgement and self-reaction. Similarly, Pintrich's (2000) model is also considered cyclical and composed of four phases: forethought, planning and activation; monitoring; control; and reaction and reflection. Each phase has four areas for regulation: cognition, motivation/affect, behavior, and context. This makes Pintrich's model complex, with a considerable higher number of self-regulated tasks, compared to Zimmerman's model.

A number of studies have considered the relationship between SRL and the use of digital technologies. For instance, the scoping review conducted by Urbina et al. (2021) identified the characteristics of studies of SRL that used digital technologies in higher education. In this study, the different SRL models mentioned above were linked to studies where technological resources were used to promote self-regulation in learning. This way, virtual learning environments or learning management systems (LMSs) appear in studies where each of the reference models were present. Also, more technological tools were mentioned in studies based on Zimmerman's model, as it is the most popular one (Urbina et al., 2021).

Dabbagh and Kitsantas (2012) proposed a pedagogical framework that uses social media to create personal learning environments (PLEs) to support student SRL. In this framework, the authors established three levels: (1) Personal information management, (2) Social interaction and collaboration, and (3) Information aggregation and management, each of them directly connected to the three phases of Zimmerman's SRL model. Technological tools linked to the three levels described by the authors are blogs, wikis, Google Calendar, Youtube or Flickr, social networking sites, and social bookmarking.

In the study by Pérez et al. (2018), Dabbagh and Kitsantas' framework was used to design a pedagogical strategy in preservice teacher education to enhance students' SRL skills in information management. In that context, other technological tools were referred to that depended on the level and the Zimmerman's model phases. For instance, CmapTools was relevant for the forethought phase and Twitter for the performance and self-reflection phases. The self-regulatory learning cyclical phases of Zimmerman's model have also been applied in the context of formative assessment, considering that this type of assessment facilitates the acquisition of SRL strategies. For instance, in the study by Marín and Pérez Garcias (2016) in the context of a preservice teacher education course, a correspondence between the phases of coassessment, the steps in the Moodle Workshop plugin, and the self-regulated learning process in the assessment cycle by Reinholz (2016) was reached.

In addition, abilities for SRL are considered a must in digital learning so learners can manage their learning progression. These include "effort regulation, critical thinking, peer learning, task value beliefs, and help-seeking strategy" (Anthonysamy et al., 2020, p. 2397). In addition, as the same authors remark, these strategies are essential to develop digital literacy skills. Different instruments exist to evaluate students' SRL. For instance, the Online Self-Regulated Learning Questionnaire (OSLQ) developed by Barnard et al. (2009). A previous study indicated that self-report questionnaires such as OSLQ may give a relatively accurate insight into students' level of SRL (Rovers et al., 2019). Additionally, Barnard et al. (2009) indicated that the OSLQ was acceptable to measure the SRL strategy in the online and blended learning environment. Therefore, measuring the students' SRL strategy through the OSLQ will be done after the OFC implementation in this study.

SELF-REGULATED LEARNING IN THE FLIPPED CLASSROOM

Since the flipped classroom is a student-centered approach that requires students to activate and control their own learning process, it aligns with the SRL where students are required to motivate themselves to be actively engaged in their own learning. As Diningrat et al. (2020) stated, during the preclass and in-class session, promoting student SRL skills to monitor and evaluate their own learning is an important aspect in the flipped classroom learning environment. In line with Shih et al. (2019), during the preclass session, students mainly learn content knowledge in which they need to actively motivate and regulate themselves to complete their learning activity in the preclass session. Meanwhile, during the in-class session students participate in group-based activities, and thus they need to activate their self-efficacy to complete their collaborative learning. The relationship about perception of learning activities within the flipped classroom model and students' online SRL has been discussed in previous studies. For example, Sletten (2017) found that the overall students' perceptions of the flipped learning model significantly correlated to their SRL skills, metacognitive skills, and help-seeking skills. Another study by Shih et al.

(2019) also found that the learning activities in the flipped classroom were highly and significantly correlated to all six dimensions in the OSLQ. The findings from the previous studies are also supported by Al-Abdullatif (2020), where the students experiencing the flipped classroom model demonstrated a good-to-high level of practicing SRL skills.

The following research questions guided this research:

RQ1: What are students' experiences after the implementation of asynchronous learning activity in the OFC?

RQ2: What are students' experiences after the implementation of synchronous learning activity in the OFC?

RQ3: What is the students' perception of their goal setting in the OFC?

RQ4: What is the students' perception of their environment structuring in the OFC?

RQ5: What is the students' perception of their help-seeking in the OFC?

RQ6: What is the students' perception of their task strategy in the OFC?

RQ7: What is the students' perception of their time management in the OFC?

RQ8: What is the students' perception of their self-evaluation in the OFC?

RQ9: Is there any statistically significant correlation between students' experiences in the asynchronous learning activity, synchronous learning activity and students' perceptions of the six SRL?

METHOD

Research Design

The study had an explorative nature and used quantitative methods based on a questionnaire. The analysis involved descriptive and multiple linear regression statistics to examine the relationships between the independent and dependent variables as well as the impacts among them (Creswell & Guetterman, 2019). Students' experiences in relation to the OFC (RQ1 and RQ2) and their SRL

(RQ3–RQ8) were investigated using descriptive statistics after the implementation of the OFC. We also examined the relationships between the OFC method and students' SRL strategy through a multiple linear regression analysis (RQ9).

Participants

This study was conducted in the study program of English Literature in the Faculty of Culture Studies at an Indonesian university in the academic year 2021-2022. Two classes were involved in nine weeks of the OFC implementation. Participation in the study was completely voluntary and the participants were briefed about the purpose of the study and informed of their rights not to participate and to withdraw from completing the questionnaire at any time. Finally, the participants were 111 students (72 female and 39 male) from the first year of the undergraduate program, with an average age of 20 years old.

Instructional Context

This study was conducted in an OFC setting with a short functional reading course. The aim of this course was to enhance students' English language reading comprehension. These classes were composed of two phases of learning activities, including an online asynchronous phase and an online synchronous phase (see Table 2). These phases were integrated by the four reciprocal teaching strategies that included the activities of predicting, summarizing, questioning, and clarifying (Palinscar & Brown, 1984).

In this study, the first author offered a one-hour training workshop relating to the implementation of the OFC session for both synchronous and asynchronous activities. In the online asynchronous phase, the students carried out the predicting and questioning tasks through the learning management system (i.e., Google Classroom). For the predicting strategy, students accessed the knowledge they already had of ideas they will encounter making predictions about the topics using pictures and then checking their predictions (see Figure 2).

In the questioning strategy, students were encouraged to write and post questions and to answer questions from other students about the words or ideas that they did not understand by providing starter words such as who, what, when, and why, or how (see Figure 3).

Figure 2.
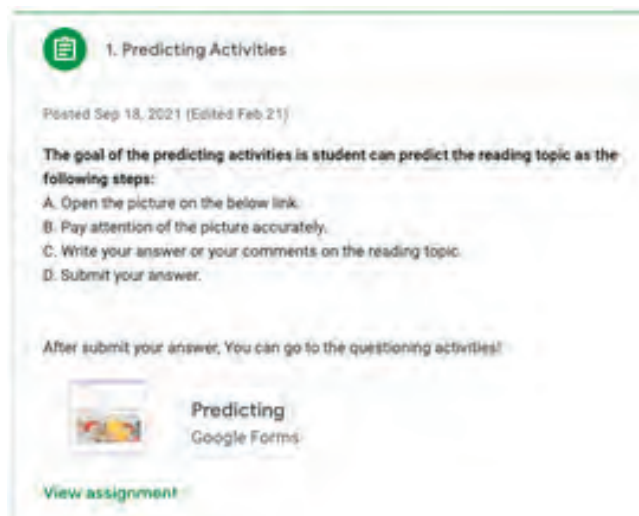Example of Predicting Activity

Figure 3.
Example of Questioning Activity

Meanwhile, for the online synchronous phase, the students conducted the clarifying and summarizing strategies through videoconferencing (Zoom and Google Meet). For the clarifying strategy, students were given a word or passage they did not understand and instructed to reread unknown words or passages and discussed them with the instructor in the Zoom room.

In the summarizing strategy, students were instructed to summarize a section of text, focusing on the main ideas and actively discuss them as a group in the breakout room in Google Meet. After finishing the discussion in the breakout room, they

Figure 4.

Example of Summarizing Activity Through the Breakout Room of One Group

went back to the Zoom room to present their work, with the instructor guiding them (see Figure 4).

A summary of the learning activities in the OFC is presented in Table 2.

Table 2.

Learning Activities in the OFC

Learning stages	Mode	Learning activities	Learning Media
Preclass	Online asynchronous	Predicting: students make a prediction from the picture. Questioning: students write a WH-Question based on the text and choose one question from a peer and answer it clearly. Quiz: Students complete the quiz.	Google Classroom
In-class	Online synchronous	Clarifying: students clarify any misunderstanding concerning the text by asking questions related to what is confusing for them. Summarizing: students interpret the text in small-group discussions and ask the leader of the group to present the results and allow the members of each group to give responses on behalf of their groups.	Zoom Breakout Room (Google Meet)

Instruments

Two instruments were used for the study: one to measure students' experiences in relation to the OFC and another to measure students' SRL strategy in the OFC. All measures were made on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Students' experiences in the OFC were studied based on their opinions about the preclass and in-class activities. Their attitude towards the preclass and in-class activities was measured by four and six items in the questionnaire based on a previous study (McNally et al., 2017). In addition, Cronbach's Alpha was performed to evaluate the reliability of the instrument and the results showed that the scale had high internal consistency for preclass activities (a = 0.83) and in-class activities (a = 0.85).

Students' SRL strategy in the OFC was measured using the Online Self-Regulated Learning Questionnaire (OSLQ) developed by Barnard et al. (2009). The OSLQ was selected due to its appropriateness to the instructional context that was fully online. The OSLQ consists of 24 items and includes six subscale constructs: environment structuring (a = 0.90); goal setting (a=0.86); time management (a = 0.78); help seeking (a = 0.69); task strategies (a = 0.67); and self-evaluation (a = 0.78). The scores of the OSLQ reveal adequate reliability on each subscale level.

The items of the questionnaire that were originally written for the context of online and blended learning were used for the OFC context. To ensure the content validity of the instruments for this study, the items of these questionnaires were validated by a professor of Educational Technology and a doctor in Educational Technology. The feedback and comments offered by the experts were revised to improve the instruments and make them well-formulated for the OFC context.

Data Collection and Analysis

After obtaining the research approval from the English Literature department at the University of Brawijaya (Indonesia), the links of the online questionnaires were sent through individual email to the students that participated in the course. The questionnaire had two main sections: demographic information and a descriptive section, where students could answer about their perceptions of their SRL strategies and experiences in relation to the

OFC. The questionnaire was distributed to the participants by the end of the semester, and they were given one month to fill it out.

As specified before, the analysis included descriptive and correlation statistics. The descriptive analysis involved frequencies and percentages calculated with SPSS 20 on demographic information. Meanwhile, the subscale scores from the asynchronous and synchronous learning activities, as well as subscale scores from the SRL strategies, involved the mean scores and standard deviations (RQ1–RQ8). Furthermore, due to the data being normally distributed for all variables (see Table 3), a parametric inferential test could be performed, thus linear regression analysis was employed using SPSS 20 to detect the effect of the asynchronous learning activity, the synchronous learning activity, and various aspects of OSRL strategy (RQ9).

Table 3.
Results of Normality Test for All Variables

Variables	Kolmogorov-Smirnov Z	p
Asynchronous Session	1.11	0.16
Synchronous Session	1.15	0.13
Goal Setting	1.12	0.16
Environment Structure	1.25	0.08
Task Strategy	1.08	0.18
Time Management	1.11	0.16
Help Seeking	1.24	0.08
Self-Evaluation	1.29	0.06

RESULTS

RQ1: What are students' experiences after the implementation of asynchronous learning activity in the OFC?

This question sought to learn the experiences of students in the OFC, whereby students indicated their level of agreement with particular statements from the asynchronous learning activities (see Table 4). For the asynchronous learning activities with an integration of the predicting and questioning strategy, the mean scores of all items were above 4, which means agreement with the statements. These include students agreeing that this learning session was helpful to their learning, prepared them for the in-class session, and motivated them to learn more.

Table 4.
Students' Experiences Related to the Asynchronous Activities

Statement	Mean	Std. Deviation
Asynchronous Session:		
Were helpful to my learning	4.54	0.58
Motivated me to learn more	4.28	0.70
Enabled me to learn at my own pace	4.17	0.92
Prepared me for in-class session	4.43	0.65
Clarified what I had learned in preclass activities	4.18	0.81

Note: 1 = strongly disagree to 5 = strongly agree

RQ2: What are students' experiences after the implementation of asynchronous learning activity in the OFC?

This question sought to learn the experiences of students in the OFC, whereby students indicated their level of agreement with particular statements from the synchronous learning activities (see Table 5). Concerning the synchronous learning activities with an integration of the clarifying and summarizing strategies through videoconferencing (with Zoom), students agreed that this learning session helped them to develop better learning and study skills, improve communication skills, and apply what they had learned in the asynchronous session, as well as to develop their comprehension skills.

Table 5.
Students' Experiences Related to the Synchronous Activities

Statement	Mean	Std. Deviation
Synchronous Session:		
Apply what I had learned in preclass session	4.36	0.71
Develop my comprehension skills	4.34	0.62
Develop better learning and study skills	4.59	0.52
Improve my group work skills	4.25	0.76
Improve my communication skills	4.39	0.65

Note: 1 = *strongly disagree* to 5 = *strongly agree*

RQ3: What is the students' perception of their goal setting in the OFC?

This question sought to investigate to what extent students agreed with particular statements from the goal setting strategy (see Table 6). For the goal setting strategies, the mean scores of four items were above 4.0, which means agreement with the statements. These include students keeping a high standard for their learning in the online course and setting goals to help them manage study time for activities in both the LMS and Zoom, as well as setting goals to help them manage study time during the implementation of the OFC. However, the mean score for the last item was 3.05, which

Table 6.
SRL Strategies

Statement	Mean	Std. Deviation
Goal Setting		
1. I set standards for my assignments in online courses.	4.27	0.68
2. I set short-term (daily or weekly) goals as well as long-term goals (monthly or for the semester).	4.05	0.87
3. I keep a high standard for my learning in my online courses.	4.36	0.80
4. I set goals to help me manage study time for my online courses.	4.17	1.03
5 I don't compromise the quality of my work because it is online.	3.05	1.26
Environment Structuring		
6. I choose the location where I study to avoid too much distraction.	4.31	0.94
7. I find a comfortable place to study.	4.11	0.81
8. I know where I can study most efficiently for online courses.	4.02	0.84
9. I choose a time with few distractions for studying for my online courses.	4.10	0.89
Task Strategies		
10. I try to take more thorough notes for my online courses because notes are even more important for learning online than in a regular classroom.	3.55	0.94
11. I read aloud instructional materials posted online to fight against distractions.	3.46	0.87
12. I prepare my questions before joining in discussion forum.	3.50	0.98
13. I work extra problems in my online courses in addition to the assigned ones to master the course content.	3.80	0.80
Time Management		
14. I allocate extra studying time for my online courses because I know it is time demanding.	3.71	0.90
15. I try to schedule the same time every day or every week to study for my online courses, and I observe the schedule.	3.82	0.72
16. Although we don't have to attend daily classes, I still try to distribute my studying time evenly across days.	3.73	0.92
Help-seeking		
17. I find someone who is knowledgeable in course content so that I can consult with them when I need help.	4.19	0.88
18. I share my problems with my classmates online, so we know what we are struggling with and how to solve our problems.	4.09	0.96
19. If needed, I try to meet my classmates online face-to-face.	4.03	0.96
20. I am persistent in getting help from the instructor through email.	3.75	1.02
Self-evaluation		
21. I summarize my learning in online courses to examine my understanding of what I have learned.	3.79	0.93
22. I ask myself a lot of questions about the course material when studying for an online course.	3.76	0.79
23. I communicate with my classmates to find out how I am doing in my online classes.	4.04	0.92

Note: 1 = *strongly disagree* to 5 = *strongly agree*

denotes undecidedness. In particular, students were undecided about compromising the quality of their work because it was online.

RQ4: What is the students' perception of their environment structuring in the OFC?

This question sought to investigate to what extent students agreed with particular statements from the environment structuring strategy (see Table 6). For the environment structuring strategies, the mean scores of all items were above 4.0, which means agreement with the statements. These include students choosing the location where they studied to avoid too much distraction and finding a comfortable place to study during the implementation of the OFC.

RQ5: What is the students' perception of their help-seeking in the OFC?

This question sought to investigate to what extent the students agreed with particular statements from the help-seeking strategy (see Table 6). For the help-seeking strategies, the mean scores of three items were above 4.0, which means agreement with the statements. These include students finding someone who is knowledgeable in course content so that they can consult them when they need help, sharing their problem with their classmates, and, if needed, trying to meet their classmates online. However, the mean score for the last item was 3.75, which denotes undecidedness. In particular, students were undecided whether they were persistent in getting help from the instructor through email.

RQ6: What is the students' perception of their task strategy in the OFC?

This question sought to investigate to what extent students agreed with particular statements from the task strategy (see Table 6). For the task strategies, the mean scores of all items were above 3.0, which means neither agreement nor disagreement with the statements. These include students trying to take more thorough notes for their activities in both Google Classroom and Zoom, preparing their questions before joining the discussion forum, and working extra problems in their online courses.

RQ7: What is the students' perception of their time management in the OFC?

This question sought to investigate to what extent the students agreed with particular statements from the time management strategy (see Table 6). For the time management strategies, the mean scores of all items were above 3.0, which means neither agreement nor disagreement with the statements. These include students allocating extra studying time for their online courses because they know it is time demanding and, although not having to attend daily classes, trying to distribute their studying time evenly across days.

RQ8: What is the students' perception of their self-evaluation in the OFC?

This question sought to investigate to what extent students agreed with particular statements from the self-evaluation strategy (see Table 6). For the self-evaluation strategies, the mean scores of two items were above 3.0, which means neither agreement nor disagreement with the statements. These include students summarizing their learning in the online course to examine their understanding of what they have learned and asking themselves a lot of questions about the course material when studying for an online course. However, the mean score for the last item was above 4.0, which means agreement with the statement that they communicate with their classmates to find out how they are doing in their online classes.

RQ9: Is there any statistically significant correlation between students' experiences in the asynchronous learning activity, the synchronous learning activity, and the students' perceptions of the six online SRL strategies?

In order to explore the relationships between the asynchronous session, the synchronous session, and various aspects of OSRL, multiple linear regression analysis was conducted using averages of all scales from both OFC and OSRL, with the results shown in Table 7. Moderate to weak correlations between students' experiences in the OFC and students' perceptions of various aspects of OSRL were found. While there was a significant positive correlations between the preclass session and five of the dimensions of SRL, such as GS ($r = .50$, $p < .001$), TS ($r = .49$, $p < .001$), TM ($r = .26$, $p < .001$), HS ($r = .38$, $p < .001$), and SE ($r = .34$, $p < .001$), as well as between in-class session and the six dimensions of SRL, such as GS ($r = .46$, $p < 0.05$), ES ($r = .46$, $p < .001$), TS ($r = .46$, $p < .001$), TM ($r = .34$, $p < .001$), HS ($r = .38$, $p < .001$), and SE ($r = .69$, $p < .001$), there was no significant

	GS	ES	TS	TM	HS	SE	Asynchronous session	Synchronous session
Asynchronous session	.50**	.17	.49**	.26**	.38**	.34**	1	.50**
Synchronous session	.46**	.46**	.46**	.34**	.38**	.69**	-	1

**p<.001; GS: Goal Setting, ES: Environment Structuring, TS: Task Strategy, TM: Time Management, HS: Help-Seeking, SE: Self-Evaluation.

positive correlations between the preclass session and the ES dimension of SRL. Additionally, there was also a significant positive correlation between the preclass session and the in-class session ($r = .50$, $p < .001$).

DISCUSSION

This study aimed to investigate the students' SRL strategy during the implementation of a course based on the OFC instructional approach, which was designed using reciprocal teaching strategies (Palinscar & Brown, 1984). As part of the course design, students had to use predicting and questioning strategies asynchronously during the preclass session through the LMS (i.e., Google Classroom), and clarifying and summarizing strategies synchronously through the web video-conferencing (Zoom).

The first research question concerned the students' experiences after the implementation of OFC. We found that, when a robust theoretical framework is used to design the learning activities within the OFC, students have a positive experience in relation to the instructional approach. For example, students agreed that preclass learning activities that were conducted asynchronously through the LMS were helpful to their learning, motivated them to learn more, and prepared them for the in-class session. In accordance with the in-class learning session, students also agreed that the in-class learning activities that were conducted synchronously through Zoom developed their learning and comprehension skills and improved their communication, as well as their group work skills. Consistent with previous findings, when the OFC activities were designed based on robust theoretical frameworks, students felt they had a positive experience and attitude, and they also achieved better grades in their learning assessments (Ma & Luo, 2022; McNally et al., 2017; W.-L. Shih & Tsai, 2016).

The second research question concerned to what extent students developed SRL strategies after the implementation of the OFC. We found that students perceived that the goal-setting strategies, environment-structuring strategies, and help-seeking strategies were developed during the OFC. For example, students were able to set goals to help them manage study time for their online courses (Goal Setting), to choose the location and a time with few distractions for studying the online courses (Environment Structuring), and when they needed help to find and to share their problems online with a classmate who was knowledgeable in the course content (Help-Seeking). The findings are consistent with previous studies showing that the use of the OFC classroom model created a learning environment that prompted the students to proactively seek help when they needed it and to be more aware of what they did not understand, thus effectively enhancing students' self-regulation of help-seeking (Sun et al., 2017; van Alten et al., 2020). However, we found that students' self-regulation of task strategies, time management, and self-evaluation needed to be enhanced. The findings are supported by a previous study that highlighted that more attention should be paid to management and motivation strategies to promote self-regulation (Eggers et al., 2021).

In regard to the third research question, this study sought to examine how students' SRL skills related to students' experiences in the OFC. The findings revealed that students' experiences in the OFC were significantly correlated to each dimension of SRL skill, except for the ES dimension. The findings also revealed that students' experiences in the preclass session were significantly correlated to students' experiences in the in-class session. This finding emphasized that the more positive students' experiences in the OFC, such as in the preclass and in-class session are, the more likely they are to engage in online SRL skills. The results seem

to be in line with those of previous studies, meaning that the more positive students' experiences in the OFC are the more active in regulating their learning they are (Al-Abdullatif, 2020; Shih et al., 2019). A possible explanation for these results may be related to the active learning strategy of reciprocal teaching integrated within the OFC activities, which required the students to actively engage in the preclass and in-class session and motivated them to self-regulate their learning toward successful learning. Supported by Schünemann et al. (2013), during the reciprocal teaching strategy students monitor and correct their own task behavior and use their newly acquired knowledge to guide the learning effort of their collaborator. During this peer-supported learning process, the students gradually develop from being co-regulated to self-regulated learners.

Finally, although the present study's findings imply that the OFC is beneficial to the students' SRL strategy development, this should not be taken to mean that other factors should not be considered in such an environment. As demonstrated in the above results, the students' perceptions about self-regulation of goal setting, help-seeking, and environment structuring need to be developed. However, instructor support will be needed to help students develop the self-regulation of task strategy, time management, and self-evaluation (Yoon et al., 2021).

Therefore, these findings have several important, practical implications for the design of OFC settings. Firstly, since self-regulation of task strategies received a rating below 4.0, asking the students to take more thorough notes during the preclass session so they can prepare before joining the discussion forum during the in-class session may contribute to the self-regulation of task strategy. Secondly, since self-regulation of time management received a rating below 4.0, helping students accurately monitor their schedule of studying time by providing an after-class session as a reflection activity every day or week may also contribute to the self-regulation of time management. Lastly, since self-regulation of self-evaluation received a rating below 4.0, encouraging students to do reflective thinking activities after the in-class session (e.g., an after-class session) to force students to ask themselves questions about the content and communicate with a peer, may contribute to the

self-regulation of self-evaluation. These practical implications can be more deeply explored through the careful consideration of three interdependent presences within OFC activities as part of an online Community of Inquiry (Garrison, 2019): social, cognitive, and teaching presence. Group cohesion (social presence) throughout the activities, progression to resolution beyond exploration (cognitive presence), but especially design and balance between facilitation and direct instruction (teaching presence) (Garrison, 2019; Marín & Salinas, 2022), might help students in developing their task strategies, time-management, and self-evaluation. This consideration needs to be further explored from both the students' and teacher's perspectives.

A limitation of the present study is that the sample size (N = 111) was comparatively small and only refers to a course in one university in Indonesia. Therefore, the findings might not be generalizable to other institutions or departments. Further research could predict the effect of the OFC on student's SRL strategy development with a larger number of samples. Another limitation is the attitude measure of SRL strategy within this study. Although the OSLQ is considered as a valid instrument of students' SRL strategy (Barnard et al., 2009), a current systematic review study has called for using other systems, for example, measuring students' SRL strategy in the LMS log (Araka et al., 2020).

CONCLUSION

This study presented insights into how students' SRL strategy developed during an OFC implementation that had integrated a reciprocal teaching strategy. Moreover, the findings provide some evidence that students perceived a positive experience within the OFC while the regulation of goal setting, environment structure, and help seeking were developed. However, the regulation of task strategy, time management, and self-evaluation needed to be enhanced through instructor support. This study also found that the OFC experience, in both the preclass and in-class sessions, significantly correlated to the students' SRL skills.

Recommendations

The study has implications for research and practice. In the case of research, the study contributes to the literature devoted to the research of OFC effects, which is still scarce. Furthermore, the

key implication of this study is for practice, in term of principles of instructor support, including asking students to take more notes during the preclass session, helping students accurately monitor their schedule studying time, and encouraging students to do reflective thinking activities after the in-class session. These may benefit researchers and practitioners who seek to design OFC approaches to develop student's SRL strategy in other contexts.

Given the growing use of OFC in higher education, further research could measure the students' SRL strategy in the LMS LOG and consider conducting qualitative research to delve deeper into students' and instructors' views regarding SRL and OFC.

References

Al-Abdullatif, A. M. (2020). Investigating self-regulated learning and academic achievement in an eLearning environment: The case of K–12 flipped classroom. Cogent Education, 7(1), 1835145. https://doi.org/10.1080/2331186X.2020.1835145

Al-Samarraie, H., Shamsuddin, A., & Alzahrani, A. I. (2020). A flipped classroom model in higher education: A review of the evidence across disciplines. Educational Technology Research and Development, 68(3), 1017–1051. https://doi.org/10.1007/s11423-019-09718-8

Allen, I. E., & Seaman, J. (2015). Grade level: Tracking online education in the United States. Babson Survey Research Group and Quahog Research Group, LLC.

Anthonysamy, L., Koo, A. C., & Hew, S. H. (2020). Self-regulated learning strategies in higher education: Fostering digital literacy for sustainable lifelong learning. Education and Information Technologies, 25(4), 2393–2414. https://doi.org/10.1007/s10639-020-10201-8

Araka, E., Maina, E., Gitonga, R., & Oboko, R. (2020). Research trends in measurement and intervention tools for self-regulated learning for e-learning environments—Systematic review (2008–2018). Research and Practice in Technology Enhanced Learning, 15(1), 6. https://doi.org/10.1186/s41039-020-00129-5

Arbaugh, J. B., Godfrey, M. R., Johnson, M., Pollack, B. L., Niendorf, B., & Wresch, W. (2009). Research in online and blended learning in the business disciplines: Key findings and possible future directions. Internet and Higher Education, 12(2), 71–87. https://doi.org/10.1016/j.iheduc.2009.06.006

Barnard, L., Lan, W. Y., To, Y. M., PotonV. O., & Lai, S.-L. (2009). Measuring self-regulation in online and blended learning environments. The Internet and Higher Education, 12(1), 1–6. https://doi.org/10.1016/j.iheduc.2008.10.005

Bergmann, J., & Sams, A. (2012). Flip your classroom: Rich every student in every class every day. ASCD.

Birgili, B., Seggie, F. N., & Oğuz, E. (2021). The trends and outcomes of flipped learning research between 2012 and 2018: A descriptive content analysis. Journal of Computers in Education, 8(3), 365–394. https://doi.org/10.1007/s40692-021-00183-y

Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. International Journal of Educational Technology in Higher Education, 18(1), 50. https://doi.org/10.1186/s41239-021-00282-x

Chen, Y., Wang, Y., Kinshuk, & Chen, N.-S. (2014). Is FLIP enough? Or should we use the FLIPPED model instead? Computers & Education, 79, 16–27. https://doi.org/10.1016/j.compedu.2014.07.004

Creswell, J. W., & Guetterman, T. (2019). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (6th ed.). Pearson Education.

Dabbagh, N., & Kitsantas, A. (2012). Personal Learning Environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. The Internet and Higher Education, 15(1), 3–8. https://doi.org/10.1016/j.iheduc.2011.06.002

Diningrat, S. W. M., Setyosari, P., Ulfa, S., & Widiati, U. (2020). Integrating PBI in the flipped classroom: A framework for effective instruction. World Journal on Educational Technology: Current Issues, 12(2), 117–127. https://doi.org/10.18844/wjet.v12i2.4662

EDUCAUSE. (2020, March 3). The Horizon Report: Trends. EDUCAUSE Review, 55(1).

Eggers, J. H., Oostdam, R., & Voogt, J. (2021). Self-regulation strategies in blended learning environments in higher education: A systematic review. Australasian Journal of Educational Technology, 37(6), 175–192. https://doi.org/10.14742/ajet.6453

Garrison, D. R. (2019). Online community of inquiry review: Social, cognitive, and teaching presence issues. Online Learning, 11(1). https://doi.org/10.24059/olj.v11i1.1737

Hew, K. F., Jia, C., Gonda, D. E., & Bai, S. (2020). Transitioning to the "new normal" of learning in unpredictable times: Pedagogical practices and learning performance in fully online flipped classrooms. International Journal of Educational Technology in Higher Education, 17(1), 57. https://doi.org/10.1186/s41239-020-00234-x

Hodges, C., Moore, S., Lockee, B., Trust, T., & Aaron Bond. (2020, March 27). The difference between emergency remote teaching and online learning. EDUCAUSE Review. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Huh, Y., & Reigeluth, C. M. (2018). Online K-12 teachers' perceptions and practices of supporting self-regulated learning. Journal of Educational Computing Research, 55(8), 1129–1153. https://doi.org/10.1177/0735633117699231

Kustandi, C., Wargahadibrata, H., Fadhillah, D. N., Suprayekti, S., & Nursetyo, K. I. (2020). Flipped classroom for improving self-regulated learning of pre-service teachers. International Journal of Interactive Mobile Technologies, 14(9), 110–127. https://doi.org/10.3991/ijim.v14i09.11858

Lin, L.-C., Hung, I.-C., Kinshuk, & Chen, N.-S. (2019). The impact of student engagement on learning outcomes in a cyber-flipped course. Educational Technology Research and Development, 67(6), 1573–1591. https://doi.org/10.1007/s11423-019-09698-9

Ma, W., & Luo, Q. (2022). Pedagogical practice and students' perceptions of fully online flipped instruction during COVID-19. Oxford Review of Education, 48(3), 400–420. https://doi.org/10.1080/03054985.2021.1994382

Marín, V. I., & Pérez Garcias, A. (2016). Collaborative e-assessment as a strategy for scaffolding self-regulated learning in higher education. In Formative Assessment, Learning Data Analytics and Gamification (pp. 3–24). Elsevier. https://doi.org/10.1016/B978-0-12-803637-2.00001-4

McNally, B., Chipperfield, J., Dorsett, P., Del Fabbro, L., Frommolt, V., Goetz, S., Lewohl, J., Molineux, M., Pearson, A., Reddan, G., Roiko, A., & Rung, A. (2017). Flipped classroom experiences: Student preferences and flip strategy in a higher education context. Higher Education, 73(2), 281–298. https://doi.org/10.1007/s10734-016-0014-z

Ng, E. M. W. (2018). Integrating self-regulation principles with flipped classroom pedagogy for first year university students. Computers and Education, 126, 65–74. https://doi.org/10.1016/j.compedu.2018.07.002

Nouri, J. (2016). The flipped classroom: For active, effective and increased learning—Especially for low achievers. International Journal of Educational Technology in Higher Education, 13(1), 33. https://doi.org/10.1186/s41239-016-0032-z

Palinscar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension monitoring activities. Cognition and Instruction, 1(2), 117–175. https://doi.org/10.1207/s1532690xci0102_1

Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. Frontiers in Psychology, 8, 422. https://doi.org/10.3389/fpsyg.2017.00422

Pérez, A., Marín, V. I., & Tur, G. (2018). Information management tools for the development of self-regulated learning skills in pre-service teacher education. @tic Revista d'innovació Educativa, 21, 31. https://doi.org/10.7203/attic.21.12134

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In Handbook of self-regulation (pp. 451–502). Elsevier. https://doi.org/10.1016/B978-012109890-2/50043-3

Pintrich, P. R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. Educational Psychology Review, 16(4), 385–407. https://doi.org/10.1007/s10648-004-0006-x

Rasheed, R. A., Kamsin, A., Abdullah, N. A., Kakudi, H. A., Ali, A. S., Musa, A. S., & Yahaya, A. S. (2020). Self-regulated learning in flipped classrooms: A systematic literature review. International Journal of Information and Education Technology, 10(11), 848–853. https://doi.org/10.18178/ijiet.2020.10.11.1469

Reinholz, D. (2016). The assessment cycle: A model for learning through peer assessment. Assessment & Evaluation in Higher Education, 41(2), 301–315. https://doi.org/10.1080/02602938.2015.1008982

Rivers, D. J., Nakamura, M., & Vallance, M. (2021). Online self-regulated learning and achievement in the era of change. Journal of Educational Computing Research, 60(1), 104–131. https://doi.org/10.1177/07356331211025108

Rovers, S. F. E., Clarebout, G., Savelberg, H. H. C. M., de Bruin, A. B. H., & van Merriënboer, J. J. G. (2019). Granularity matters: Comparing different ways of measuring self-regulated learning. Metacognition and Learning, 14(1), 1–19. https://doi.org/10.1007/s11409-019-09188-6

Schünemann, N., Spörer, N., & Brunstein, J. C. (2013). Integrating self-regulation in whole-class reciprocal teaching: A moderator–mediator analysis of incremental effects on fifth graders' reading comprehension. Contemporary Educational Psychology, 38(4), 289–305. https://doi.org/10.1016/j.cedpsych.2013.06.002

Shih, M., Liang, J.-C., & Tsai, C.-C. (2019). Exploring the role of university students' online self-regulated learning in the flipped classroom: A structural equation model. Interactive Learning Environments, 27(8), 1192–1206. https://doi.org/10.1080/10494820.2018.1541909

Shih, W. L., & Tsai, C. Y. (2017). Students' perception of a flipped classroom approach to facilitating online project-based learning in marketing research courses. Australasian Journal of Educational Technology, 33(5), 32–49. https://doi.org/10.14742/ajet.2884

Sletten, S. R. (2017). Investigating flipped learning: Student self-regulated learning, perceptions, and achievement in an introductory biology course. Journal of Science Education and Technology, 26(3), 347–358. https://doi.org/10.1007/s10956-016-9683-8

Stöhr, C., Demazière, C., & Adawi, T. (2020). The polarizing effect of the online flipped classroom. Computers & Education, 147, 103789. https://doi.org/10.1016/j.compedu.2019.103789

Sun, J. C. Y., Wu, Y. T., & Lee, W. I. (2017). The effect of the flipped classroom approach to OpenCourseWare instruction on students' self-regulation. British Journal of Educational Technology, 48(3), 713–729. https://doi.org/10.1111/bjet.12444

Tang, T., Abuhmaid, A. M., Olaimat, M., Oudat, D. M., Aldhaeebi, M., & Bamanger, E. (2023). Efficiency of flipped classroom with online-based teaching under COVID-19. Interactive Learning Environments, 31(2), 1077–1088. https://doi.org/10.1080/10494820.2020.1817761

Tarchi, C., & Pinto, G. (2016). Reciprocal teaching: Analyzing interactive dynamics in the co-construction of a text's meaning. Journal of Educational Research, 109(5), 518–530. https://doi.org/10.1080/00220671.2014.992583

Tsai, C.-W., Shen, P.-D., & Chiang, Y.-C. (2013). Research trends in meaningful learning research on e-learning and online education environments: A review of studies published in SSCI-indexed journals from 2003 to 2012. British Journal of Educational Technology, 44(6), 179–184. https://doi.org/10.1111/bjet.12035

Turan, Z., & Akdag-Cimen, B. (2020). Flipped classroom in English language teaching: A systematic review. Computer Assisted Language Learning, 33(5–6), 590–606. https://doi.org/10.1080/09588221.2019.1584117

Urbina, S., Villatoro, S., & Salinas, J. (2021). Self-regulated learning and technology-enhanced learning environments in higher education: A scoping review. Sustainability, 13(13), 7281. https://doi.org/10.3390/su13137281

van Alten, D. C. D., Phielix, C., Janssen, J., & Kester, L. (2020). Effects of self-regulated learning prompts in a flipped history classroom. Computers in Human Behavior, 108, 106318. https://doi.org/10.1016/j.chb.2020.106318

Yang, Y. F. (2010). Developing a reciprocal teaching/learning system for college remedial reading instruction. Computers & Education, 55(3), 1193–1201. https://doi.org/10.1016/j.compedu.2010.05.016

Yoon, M., Hill, J., & Kim, D. (2021). Designing supports for promoting self-regulated learning in the flipped classroom. Journal of Computing in Higher Education, 33(2), 398–418. https://doi.org/10.1007/s12528-021-09269-z

Yuan, J., & Kim, C. (2014). Guidelines for facilitating the development of learning communities in online courses. Journal of Computer Assisted Learning, 30(3), 220–232. https://doi.org/10.1111/jcal.12042

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. Theory Into Practice, 41(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2