EFFECT OF ONLINE FLIPPED CLASSROOM ON STUDENTS' SELF-DIRECTED LEARNING: A CASE OF SOME UNIVERSITIES IN INDONESIA

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ABSTRACT

This study investigated the effect of the online, flipped classroom model on learners' self-directed learning using the descriptive correlation design. A total of 181 students from three public universities that applied the online flipped classroom approach participated in the study. The finds reveal that students did very well in their self-management through the online flipped classroom. They were methodical, self-disciplined, and confident in their ability to search out new information. Furthermore, they were systematic in organizing their learning activity. The students were able to access the lecture notes on their own time, which increased their understanding of the material. The synchronous aspect of the flipped classroom had a positive correlation with student desire for learning and self-control. This suggests that the more students are exposed to synchronous activities, the greater their desire for learning and their self-control in the process of learning. Therefore, synchronous experiences are essential for students to be self-controlled and for them to have a desire for learning.

INTRODUCTION

Online teaching and learning have gained in popularity and reputation in the 21st century, especially in higher education. Recently, the total number of Indonesian universities that implement the online teaching and learning has increased due to the Covid-19 pandemic (Yarrow & Bhardwaj, 2020). This new learning environment has changed the role of students from passive to active learners, thus paving the way for a learner-centered teaching and learning approach and self-directed learning (Howell et al., 2003). Researchers have argued that self-directed learning (SDL) plays a vital role in a successful learning (Hartley & Bendixen, 2001; Heo & Han, 2018; Zhu et al., 2020). The advantages of online learning include learning at one's own pace, learners playing an active role in the teaching and learning process, engaging in interactive learning as well as adapting, reflecting, and evaluating the learning process.

Self-directed learning is a fundamental component for effective learning in the modern world (Morris, 2019). Although students in higher education use self-directed learning, Morris (2019) argued that there are challenges facing the self-directed learning approach. A study among Asian countries has suggested that SDL is a major concern that requires serious attention (Bozkurt et al., 2020). Facilitating SDL not only has potential to improve the quality of learners' achievement, but it can significantly predict learners' academic performance whether in a face-to-face or online setting

(Chou & Chen, 2008; Khiat, 2017; Zimmerman & Kitsantas, 2005). Therefore, fostering self-directed learning competence should be a foremost goal within many higher education institutions.

Higher education institutions need to offer online learning environments that promote a student's active learning. Although there has been increased attention on the traditional flipped classroom as an effective approach to create a more student-centered and active learning environment (Lee & Kim, 2018; Nouri, 2016), the online flipped classroom seems to be the most appropriate instructional model that offers the learning activity fully online, hereafter referred to as the online flipped classroom. The online flipped classroom (OFC) is similar to the conventional flipped classroom in which learners are encouraged to complete preclass asynchronous activities (e.g., watching video lectures, reading lecturer notes, and completing quizzes) (Hew et al., 2020; Stöhr et al., 2020).

The OFC also seems to be a promising pedagogical approach because it combines both asynchronous and synchronous online activities. Previous studies on the pedagogical models showed that the learning activities can be successfully implemented and conducted through an online course with flexible time and space for learners (Hew et al., 2020; Lin et al., 2019). Furthermore, (Lin et al., 2019) revealed that learners who attend asynchronous learning activities (e.g., watched prerecorded video lectures) had a better understanding of the learning concepts and those who attended synchronous online activities (e.g., class discussions) had greater engagement with peers and teachers. However, research on learner's self-directed learning in the online flipped classroom is relatively rare. For this reason, this study aimed to investigate the effects of the online flipped classroom on learners' self-directed learning in an Indonesian university context.

Online Flipped Classroom

Typically, online learning refers to the use of online communication networks for education and includes applications such as course delivery, support of access to resources, and group collaboration that is mediated by the web (Harasim, 2012). Online learning includes the content delivered online or in face-to-face meetings with the support of technology (Allen & Seaman, 2015). There are two types of online interactions: asynchronous

discussion forums in which users communicate via email or through a learning management system and synchronous chatrooms in which users communicate in real time (Dabbagh & Bannan-Ritland, 2005). Studies indicated that while asynchronous forms of online learning received much more attention than synchronous or mixed modes of education delivery, asynchronous online learning has higher levels of attrition than traditional face-to-face learning (Siemens et al., 2015). Yuan & Kim (2014) indicated that the cause for this attrition is the lack of interaction between students and teachers (. Therefore, it is important to understand the various ways students interact and participate in both asynchronous and synchronous modes to decrease attrition rates and increase academic success in the online environment (Nieuwoudt, 2020).

The conventional flipped classroom has become popular and is strongly advocated for students' learning in higher education. Johnson et al. (2015) identified the flipped classroom as an important development in educational technology. Recent studies have examined the impact of the flipped classroom in terms of meta-analyses (Cheng et al., 2019; Shi et al., 2019; Strelan et al., 2020), systematic review (Karabulut-Ilgu et al., 2018; Lundin et al., 2018), and literature review (Al-samarraie et al., 2019; Brewer & Movahedazarhouligh, 2018; Chung et al., 2021). Most of these studies have examined the students' cognitive learning, performance, engagement, metacognition, attitude, and achievement. Regarding the flipped classroom framework, researchers have proposed theoretical frameworks that combine the flipped classroom with problem-based learning (Diningrat et al., 2020; Strayer, 2017) and examined them (Çakiroğlu & Öztürk, 2017; Chis et al., 2018; Tawfik & Lilly, 2015). The results showed that most of the students had a positive perception and supported knowledge acquisition and engagement, but they also focused on the self-directed learning and students' self-regulated learning. However, findings on the innovative framework of OFC are limited (Hew et al., 2020; Stöhr et al., 2020), especially regarding learners' self-directed learning.

Moreover, only a few studies on OFC have been conducted so far. For example, Chen et al., 2014 and Lin et al., 2019 proposed that the flipped classroom pedagogy framework is built from the four pillars of F-L-I-P (Flexible learning

environment, Learning culture, Intentional content, and Professional educator) and added three extra letters: P-E-D (Progressive activities, Engaging experiences, and Diversified platform); thus, the framework is called a FLIPPED pedagogy model. They also revealed that those students who were engaged in this pedagogical model experienced higher satisfaction levels and better grade average as compared to those who were not engaged in it. Another study on the FLIPPED pedagogy model further revealed that students who watched more prerecorded video lectures tended to obtain a higher grade, those who completed more learning activities had better understanding of the learning concepts, and those who kept their synchronous learning activities (face-to-face discussions) had more active engagement (Lin et al., 2019).

In the OFC, students do not need to attend the physical class because they can fully perform all learning activities online. Thus, this pedagogical model can be implemented using asynchronous and synchronous online systems (Chen et al., 2014). On the one hand, in asynchronous learning activities learners are required to complete instructional content such as concept knowledge. On the other hand, in synchronous online learning activities, learners are required to attend the class time (face-to-face discussions) to discuss the content knowledge and to apply their understanding of it to solve problems. Since the class time does not require physical settings, the teachers should design and implement learning activities in the online learning environment (Lin et al., 2019). This study recommends problem-based learning as an instructional strategy for the synchronous online and asynchronous learning activities (see Figure 1).

Problem-based Learning

Problem-based learning (PBL) is an instructional model that primarily focuses on problem-solving activities. Savery (2015) argued that PBL is an instructional learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop viable solutions to a defined problem. According to Barrows (1996) and Dolmans (2019), there are four essential principles of learning activities in the PBL: learning should be a constructive process, a self-directed process, a collaborative process, and a contextual process. They suggested that problems are a stimulus for learning and for developing PBL skills. Unlike the traditional formats in which problems are solved in the physical classroom, the problems are solved through digitalized experiences such as video clips and websites through the learning management system (Barrett et al., 2011; Korin & Wilkerson, 2011). Thus, learners engage in independent research in finding, reviewing, evaluating, and applying new information to the problem entirely online.

PBL is comprised of a series of processes in which learner-centered tasks are monitored by teachers. In doing so, Best (2018) proposed four

Figure 1. Framework for Learning Activities in Online Flipped Classroom

Phase	Learning activities		Learning technologies
Asynchronous learning activity	Initial discussion		Learning management system (e.g. Moodle)
	• Learners learn basic knowledge via watching videos or reading lecturer notes		
	• Learners identify the main issues/problems		
	• Learners start to solve the issues/problems individually		
Synchronous learning activity	Post discussion		Video Conferencing (e.g. Vicon, Zoom)
	• Learners elaborate on the finding of the last step in initial discussion		
	• Learners reach agreement on answer through discussion		
	• Learners check if all learning goals and questions are answered		
	• Learners summary main points of discussion that guided by teacher		

strategies for facilitating students' problem-solving activities with technology.

- **Posing the problem**, where learning activity begins with problems that relate to one or more observable phenomenon, event, or situation.
- **Self-directed learning**, where learners engage in the learning tasks by collecting and studying resources and selecting the relevant literature to inform their report to the groups in the next meeting.
- **Collaborative learning**, where learners work in groups of five to eight to share their collective knowledge, revisit the problem, and reconsider and redesign hypotheses based on their developed understanding.
- **Consolidating and reporting**, where learners consolidate and summarize their learning, report their knowledge, and present responses to the problems presented.

Furthermore, there are two essential parts of learning activity in online PBL: initial discussion of the tasks through independent work and post-discussion of the tasks through group discussions (Blumberg, 2019; Rienties et al., 2012).

In this current study, the problem-solving process consists of two parts that make it a worthy discussion. One is initial discussion and the other is postdiscussion. These two parts of the learning activity were adopted from the Seven-Jump approach by Rienties et al., (2012). They classified the two learning activities of PBL in elearning environment as an is initial discussion of the task and a postdiscussion of the task. In the initial discussion, learners work independently by identifying the difficult terms and the main problem and then they start to solve learning issues. For the postdiscussion, learners work collaboratively in small groups, elaborate on the findings, and reach agreement on answers through the group discussion in which they check if all the learning issues are answered and summarize the main points of discussion with guidance by teachers. In short, learning activities in the asynchronous phase focus on the initial discussion and learning activities in synchronous online phase focus on the postdiscussion of the tasks (see figure 1).

Self-directed Learning

Research on self-directed learning approaches has become imperative for education and training in the international classroom (Du Toit-Brits, 2019). This approach becomes an essential variable in a rapidly changing world, such as during the recent COVID-19 Pandemic. This is a good example of the unknown futures learners are likely to experience where traditional teaching and learning methods in which the teacher and the learner engage in physical contact must be supplemented with modern technology. According to Jaleel & O. M. (2017), "today, educators are preparing learners for a world we cannot even predict, and therefore self-directed learning becomes an essential foundation for the 21st century learners" (p. 1849). It is important to note that we live in a world where the interactions learners experience have been broadened by the presence of technology. The interaction in the present teaching-learning process, which is characterized by the application of technological devices and media, goes beyond the student-teacher and student-student relationships by providing possibilities for learners to interact with a surrounding environment that is full of opportunities. Therefore, the teacher is not supposed to determine the directions that the learning process should take but should grant maximum freedom for learners to make use of the surrounding opportunities to explore and for effective learning to take place. This is supported by Malan et al. (2014), whose study revealed that the sustainability of self-directed learning skills was questionable if student beliefs in the approach did not support the activities employed during the teaching and learning process.

Bosch & Pool (2019) brought up the idea of learners' presence through the utilization of modern technology, considering the fact that learning does not take place in isolation but in association with others, such as educators, tutors, and peers. Therefore, when learning is placed on a continuum, it can range from educator-oriented at one end to self-directed at the other end. The more there is a teacher-directed atmosphere, the fewer opportunities the students have to think and make appropriate decisions that may facilitate their presence and consequently guarantee maximized learning outcomes. According to Malan et al. (2014), exposing learners to challenging circumstances leads them to the problem-based learning environments that "promote more meaningful learning patterns, typified by processing the subject matter critically and self-regulating

learning processes (p. 1). Exposing learners to challenging environments is further advocated by Du Toit-Brits (2019), who investigated self-directed learning in the context of the role that educators' expectations play in enhanced self-directedness. They recommended that educators need to transform the learning environment into one that is supportive by practicing good teaching, motivating students to learn in a manner that is relevant and meaningful, encouraging independence in learning, implementing teaching approaches that necessitate students to learn actively by taking responsibility, and through demonstrating positive expectations for students' learning.

Self-directed learning is a result of the changing education landscape that has resulted from the demands of the 21st century and the changes in knowledge and information production. It is important to note that while the concept of self-directed learning has received more attention in the present than previous times, studies on the concept are limited. This is indicated by Bosch & Pool (2019), who argued, "Despite the overwhelming interest in the community of inquiry framework, there is a lack of research regarding the role of students' self-directed learning" (p. 52). They further argued that learning presence is an important feature of the self-directed learning approach where the teacher needs to ensure that all the factors that limit the presence of the learner in the teaching-learning process need to be prevented. They also considered self-directed learning to be closely related with self-regulation. They further report study findings by Shea & Bidjerano (2010), who suggested that online students should monitor their time and cognitive strategies, regulate their own study environment, and exercise control over their interactions with peers to maximize learning in order to facilitate the learning presence, which is a prerequisite of effective self-directed learning. Therefore, self-directed learning belongs to the learner centered approaches through which learners are prepared for active participation in the present and for life-long learning (Du Toit-Brits, 2019). According to Malan et al. (2014), self-directed learning is associated with problem- based learning that provides a more realistic picture of the academic challenges that learners have to face in the process of teaching and learning. The essence of the use of self-directed learning is linked with the individual differences of learners due to the fact that while "most students are not homogeneous in their background, knowledge, experience, learning abilities or learning styles, the self-directed activities which are embedded in every PBL phase suit students' diverse learning needs" (Malan et al., 2014, p. 3).

One of the benefits of self-directed learning is in preparing students for life-long learning. This has been indicated in Tekkol & Demirel (2018), who investigated the relationship between university students' self-directed learning skills and their life-long learning tendencies. The results revealed a moderate positive relationship between self-directed learning skills and life-long learning tendencies. This finding suggested that those learners who are exposed to self-directed learning gain the possibility to continue learning for the rest of their lives. Furthermore, this study defined the SDL based on the work of Fisher and King (2010), who proposed three factors of the learner's SDL: self-management, desire for learning, and self-control.

The purpose of this study was to investigate learners' self-directed learning in the online flipped classroom model. The contribution and novelty of this paper is that the results are so significant because in the current world things have completely changed due to the advent of the COVID-19 pandemic, where teachers need to improvise ways to curb the challenges involved in the teaching and learning transaction. More so, the knowledge on the flipped learning approaches will help educators in higher education institutions improvise strategies that will enhance the self-directed learning among university students.

Specifically, this study was guided by the following six research questions:

1. What are learners' perspectives of their asynchronous learning activity in the OFC?
2. What are learners' perspectives of their synchronous learning activity in the OFC?
3. What is the perception of learners of their self-management in the OFC?
4. What is the perception of learners of their desire for learning in the OFC?
5. What is the perception of learners of their self-control in the OFC?
6. Is there a significant relationship between asynchronous activities, synchronous activities, and various aspects of self-directed learning?

Table 1. Demographic Information

Variable	Code	Frequency	% of sample
Age (years old)	17–20	102	56.4
	21–24	79	43.6
	Total	181	100
Sex	Male	96	53
	Female	85	47
	Total	181	100
Level of Education	Diploma	23	12.7
	Bachelor	159	87.3
Department	Library and Information Science	23	12.7
	Computer Science	101	55.8
	English Language Teaching	57	31.5
	Total	181	100

METHODOLOGY

This section presents the methodology that was used to guide the study. It addresses such aspects as the research design, participants, data collection procedures, and the validity and reliability of the questionnaire.

Research Design

The study employed the quantitative approach using a descriptive correlation design, which enabled us to examine the relationship between the online flipped classroom and learners' self-directed learning (Creswell, 2011). The data were therefore treated through both descriptive statistics as well as correlations to establish the possible effects that exist among the variables under investigation.

Participants

A total of 181 university students were recruited from three different departments in different public universities located in the Malang city. As shown in Table 1, of the 181 participants, 96 (53%) were male while 85 (47%) were female. Thus, the majority of respondents were males. The respondents were also categorized according to their age group: 102 (56.4%) were 20 years old and younger 102 and 79 (43.6%) were 21 years old and older. Thus, the majority of respondents were 20 years old and younger. By education level, 23 (12.7%) were diploma students while 159 (87.3%) were bachelor's degree students. Thus, the majority of respondents were bachelor's degree students. As far as the type of department is concerned, 23 (12.7%) came from Library and Information Science while 101 (55.8%) came from Computer Science and 57 (31.5%) came from English Language Teaching. Therefore, the majority of respondents came from Computer Science department.

Data Collections Procedures

The data were collected from August to November 2020 from three selected universities applying the online flipped classroom. In the final week of classes in November, learners were sent a questionnaire survey through an instant message group (WhatsApp) that asked about their views on the online flipped classroom class. The questionnaires were adopted from Fisher and King (2010) and consisted of three categories of self-directed learning: self-management, desire for learning, and self-control.

Validity and Reliability

The validity of the questionnaire was ensured through the expert judgment approach whereby three experienced researchers from the University of Arusha were given the questionnaire to go through and give comments for improvement before the questionnaire was tested for reliability.

Thereafter, the questionnaire was given to selected students from a university in Indonesia for the pilot study whereby the acceptable reliability level was obtained as seen in Table 2, where the Cronbach's Alpha for the variables ranged between .751 and .862, meaning the questionnaire was reliable for data collection.

Statistical Treatment of Data

The data were analyzed through the Statistical

Table 2. Reliability Test

SN	Variable	Items	Cronbach's Alpha	Interpretation
1	Asynchronous	5	.789	Reliable
2	Synchronous	7	.751	Reliable
3	Self-Management	10	.862	Reliable
4	Desire for Leaning	9	.822	Reliable
5	Self-control	9	.844	Reliable

Package for Social Science (SPSS) 23. Demographic data analysis involved frequencies and percentages. The data for learners' perception involved the mean scores and standard deviations. Finally, correlation analysis was employed to examine the relationships between the asynchronous learning, synchronous learning, and various aspects of self-directed.

FINDINGS

This section presents the findings of the study guided by the research questions that guided the study:

Research Question 1: *What are learners' perspectives of their asynchronous learning activity in the OFC?*

Asynchronous learning employs learning management systems developed by universities to allow teachers and learners to interact with each other in their own time (see Figure 2).

We used descriptive analysis (means and standard deviations) to search for an answer to the first research question. This question sought to establish the perception of students on the asynchronous learning activity whereby learners were to indicate their level of agreement or disagreement with particular statements.

As can be seen in Table 3, the mean score of the first three items in the questionnaire ranged between 3.50 and 4.49, which means agreement with the statements. Particularly, learners agreed that they are able to accesses the lecturer notes in their own time, the video lecturers increased their understanding of the main problem, and the quizzes prepared them to solve the problems in the synchronous class sessions. However, the mean score for the last two items was between 2.50 and 3.49, which denotes undecidedness. Particularly, learners were undecided whether they were satisfied by doing the discussion in the classroom and whether they were satisfied by the degree of problem difficulty in the assignments.

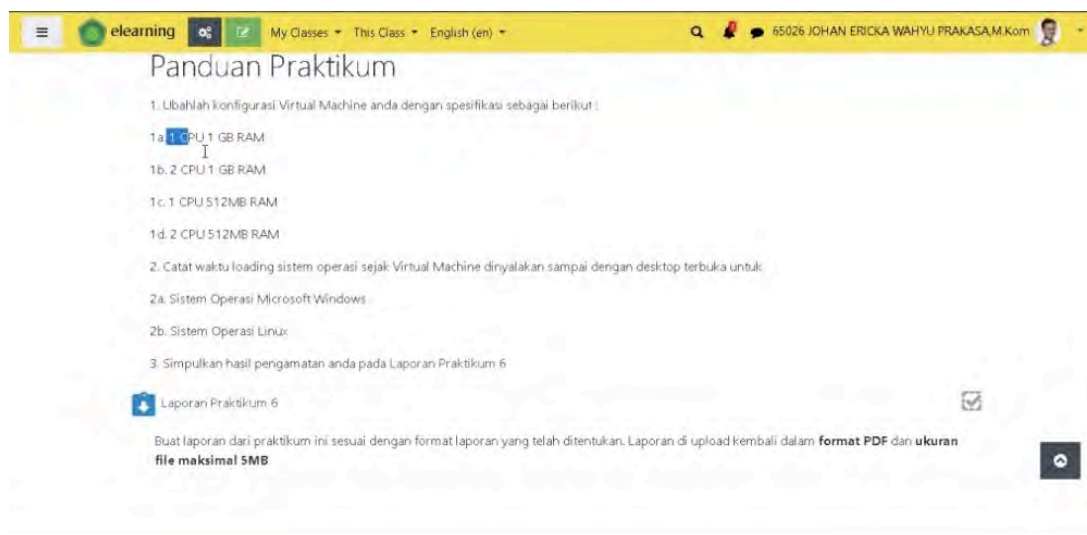Figure 2. Example of Issues/problems Posed in Learning Management System

Table 3. Learners' Perspectives of their Asynchronous Activities

SN	Item	Mean	Std. Dev	Interpretation
1	I'm able to accesses the lecturer notes at my own time.	4.0994	.81721	Agree
2	The lecturer notes increased my understanding of the main problems.	3.7238	.76807	Agree
3	The quizzes prepare me to solve the problem in the synchronous class sessions.	3.5580	.79106	Agree
4	I'm satisfied by doing the discussion in this class session.	3.4088	.87479	Undecided
5	I'm satisfied by the degree of problem difficulty in the assignment.	2.9890	.79575	Undecided

Research Question 2: *What are learners' perspectives of their synchronous learning activity in the OFC?*

Synchronous learning activity employs both video conferencing developed by the university or video conferencing platforms such as Zoom to allow teachers and learners to interact with each other at the same time (see Figure 3).

We used descriptive analysis (mean and standard deviation) to search for an answer to this question. This research question sought to establish the perception of learners on the synchronous learning activity whereby learners were to indicate their level of agreement or disagreement with particular statements. As can be seen in Table 4, respondents agreed that solving problems as a team improved their ability to think through a problem. The learners also agreed that working in a team motivated them to work hard during the class sessions, that they were satisfied working in a team during the classroom session, and that they were satisfied with the discussions in the classroom.

However, respondents were undecided whether working in teams increased their understanding of the main problem and whether they had sufficient time to interact with their instructors and with peers. The undecidedness could mean that students enjoyed a heated discussion but they did not reach a definitive conclusion.

Research Question 3: *What is the perception of learners of their self-management in the OFC?*

Self-management is the sense that learners are working through a required task with minimal supervision by the teacher. It is interesting to note that under this category, learners agreed with all the items except one, which means that learners did very well in the self-management aspect in the OFC.

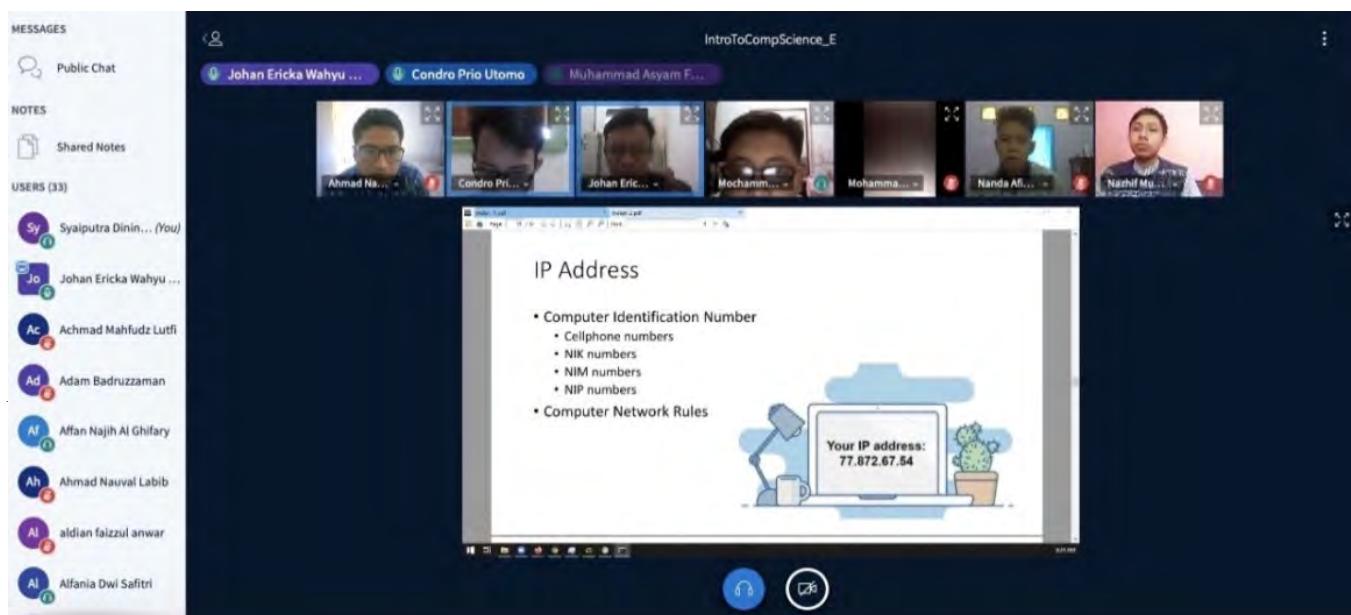Figure 3. Example of Synchronous Learning Activity

Table 4. Learners' Perspectives of Their Synchronous Activities

SN	Item	Mean	Std. Dev	Interpretation
1	Solving problems in a team has improved my ability to think through a problem.	3.9890	.70702	Agree
2	Work in a team motivated me during this class session to work harder.	3.5912	.84244	Agree
3	I'm satisfied to work in a team during this class session in this course.	3.5801	.82357	Agree
4	I'm satisfied by doing the discussion in this class session.	3.5635	.79763	Agree
5	Working in a team increased my understanding of the main problem.	3.4530	.99121	Undecided
6	I have sufficient time during this class session to individually interact with my instructor (e.g., asking questions, clarifying confusing concepts).	3.3867	.82640	Undecided
7	I have sufficient time during this class to interact with peers.	3.3094	.87773	Undecided

Table 5. Learners' Perspectives on their Self-management

SN	Item	Mean	Std. Dev	Interpretation
1	I am confident in my ability to search out new information.	3.9448	.68899	Agree
2	I am methodical.	3.8287	.63110	Agree
3	I prioritize my work.	3.7901	.88199	Agree
4	I'm organized.	3.7790	.71941	Agree
5	I'm self-disciplined.	3.7680	.69224	Agree
6	I have good managements skills.	3.5967	.77301	Agree
7	I can be trusted to pursue my own learning.	3.5801	.81680	Agree
8	I set strict time frames.	3.5414	.75623	Agree
9	I am systematic in my learning.	3.5359	.84003	Agree
10	I set specific times for my study.	3.2928	.88657	Undecided

However, mean score for the last item in Table 5 was between 2.50 and 3.49, which denotes undecidedness. Particularly, learners were undecided whether they set specific times for their study.

Research Question 4: *What is the perception of learners of their desire for learning in the OFC?*

The desire for learning is a key aspect for learning effectiveness. Unless the desire for learning is developed, the learners will lose the motivation to learn and therefore whatever activity takes place in the process of teaching and learning will be a waste of time and resources. This question therefore sought to establish the extent to which students had developed the desire to learn in the OFC.

According to Table 6, learners agreed that they learn from mistakes, which means that mistakes in the process of learning are not an obstacle to learning continuance. They also agreed that they need to know why, they enjoy learning new information, they have a need to learn, they enjoy challenges in the process of learning, and they critically evaluate new ideas in the process of learning.

Research Question 5: *What is the perception of learners of their self-control in the OFC?*

This research question sought to establish the perception of learners on their self-control in the OFC. The learners agreed with all the items in this section. According to Table 7, they agreed that they are responsible, they control their life, they can find the information on their own, they are responsible for the decisions they made, they evaluate their own performance, and they actually have moderate personal standards in the process of learning.

Research Question 6: Is there a significant relationship between asynchronous activities,

Table 6. Learners' Perspectives on their Desire for Learning

SN	Item	Mean	Std. Dev	Interpretation
1	I learn from my mistakes.	4.2818	.54073	Agree
2	I need to know why.	4.2818	.58037	Agree
3	I enjoy learning new information.	4.2431	.57399	Agree
4	I have a need to learn.	4.1215	.62060	Agree
5	I enjoy a challenge.	3.8398	.75408	Agree
6	I critically evaluate new ideas.	3.7348	.68016	Agree
7	I enjoy studying.	3.6961	.71604	Undecided
8	I want to learn new information.	3.2983	1.86173	Undecided
9	When presented with a problem I can resolve it without asking for assistance.	3.2762	.93745	Undecided

Table 7. Learners' Perspectives on their Self-control

SN	Item	Mean	Std. Dev	Interpretation
1	I am responsible.	4.1602	.57905	Agree
2	I am in control of my life.	4.1436	.61583	Agree
3	I can find out information for myself.	4.0884	.66075	Agree
4	I am responsible for my own decisions/actions.	4.0829	.63139	Agree
5	I am able to know my own limitations.	4.0552	.66436	Agree
6	I prefer to set my own learning goals.	4.0221	.64080	Agree
7	I evaluate my own performance.	3.9171	.75188	Agree
8	I have high beliefs in my abilities.	3.8785	.75765	Agree
9	I have moderate personal standards.	3.8564	.69228	Agree

synchronous activities, and various aspects of self-directed learning?

This research question sought to establish the relationship between asynchronous experiences, synchronous experiences, and various aspects of self-directed learning using the Person Correlation Coefficients to establish the relationships between asynchronous, synchronous, and various aspects of self-directed learning (see Table 8).

We found seven significant Pearson correlations, as found in Table 8. Asynchronous learning activity is positively correlated with the synchronous learning activity ($r = .532$, $p < .001$), self-management ($r = .478$, $p < .001$), desire for learning ($r = .238$, $p \leq .001$), and self-control ($r = .319$, $p < .001$). Furthermore, synchronous learning activity is positively correlated with self-management ($r = .478$, $p < .001$), and self-control ($r = .322$, $p < .001$).

Table 8. The Results of the Correlations Analyses

Variable		(A)	(B)	(C)	(D)	(E)
Asynchronous session	r	1	.531**	.478**	.238**	.319**
Synchronous session	r		1	.401**	.171*	.322**
Self-management	r			1	.485**	.448**
Desire for learning	r				1	.560**
Self-control	r					1

*$p<.005$, **$p<.001$

Additionally, we inferred that the self-directed learning aspects were closely interrelated. Thus it was supported by the results in which there is a low-level relationship between self-management and desire for learning ($r = .485$, $p < .001$) and self-management and self-control ($r = .448$, $p < .001$). On the other hand, there is a medium-level relationship between desire for learning and self-control ($r = .560$, $p < .001$).

DISCUSSION

Increased attention to online teaching and learning in higher education due to the Covid-19 pandemic has been accompanied by the emergence of self- directed learning. However, developing self-directed learning in the online setting is challenging (Bozkurt et al., 2020). Our study investigated the effect of implementing the online flipped classroom on learners' self-directed learning. The online flipped classroom was systematically structured by adopting the Seven-Jump model (Rienties et al., 2012) as the instructional strategy.

The results show that learners were able to accesses the lecturer notes at their own time, the video lecturers increased their understanding of the main problem, and the quizzes prepared them to solve the problems in the synchronous class sessions. These findings are in harmony with previous study findings (Heijstra & Sigurðardóttir, 2018; Zainuddin & Perera, 2018). By providing lecture materials online, such as lecturer notes, the students are given the opportunity to learn and understand the content in their own time. Being able to view the lecturer notes at the learners' own pace and place of choice resulted in greater focus, a less distracted condition, and greater comfort in the learning process. In addition, asynchronous learning activity in the OFC increased learners' understanding of the problem so they were prepared to attend to it in the synchronous learning activity.

Our study also showed that learners perceived that solving problems in a team improved not only their ability to think through problems but it also motivated them during the class sessions to work hard. In addition, they were satisfied working in teams during the classroom session and they were satisfied with the discussions in the classroom. This finding correlates with Ye et al., (2019) that the level of confidence for individual learners to complete learning task with team members improves their ability to think critically. In line with Hao (2016), working in groups was identified as an advantage of the conventional flipped classroom. Thus, in the online flipped classrooms, learners were able to work in groups, hear a variety of opinions, and get motivated through a video conferencing platform.

Interestingly, our study showed that learners agreed with all the items of self-management in SDL except one, which means that learners did well in their self-management. This finding correlates with the work by Liu et al. (2018) and Stratton et al. (2020), who revealed that the conventional flipped classroom could enhance self-directed learning aspects including self-management skills. Therefore, the learners' self-management skills were nurtured in the online flipped classroom. For example, learners were confident in their ability to search out new information, they were methodical, they prioritized their work, they were organized, they were self-disciplined, they had good management skills, they could be trusted to pursue their own learning, they set strict timeframes, and they were systematic in their learning activity.

Another interesting result in regard to the learners' self-control is that learners agreed with all the items of self-control, which means that they did well in their self-control. This finding is consistent with other findings on the conventional flipped classroom implementation (Tawfik & Lilly, 2015) whereby the conventional flipped classroom supports the learners in different ways where they are able to access learning resources on their own time as part of preparation for the classroom and as a way to close gaps in their conceptual knowledge. Therefore, the online flipped classroom is promising to nurture the learners' self-control skill. In regard to the learners' desire for learning, the finding correlates with the work by Knapp (2018). Learners perceived that mistakes in the process of learning are not an obstacle to learning continuance, they enjoyed challenges in the process of learning, and they critically evaluated new ideas in the process of learning.

The results of the correlation analyses imply that learners who are more prepared in asynchronous learning tended to participate, engage, and solve complex problems in the synchronous learning activities. This finding is in harmony with previous studies that consistently showed that asynchronous learning activity prepared learners for synchronous learning activities to interact and to solve problems using their previous knowledge (Karabulut-Ilgu et al., 2018; Kinsella et al., 2017; Lin et al., 2019). Therefore, this study suggests that in the asynchronous learning activity, learners are more encouraged to use their self-management, desire for learning, and self-control (Diningrat et al., 2020; Hao, 2016).

Our findings therefore show that the effect of the online flipped classroom on learners'

self-directed learning was encouraging, even though this study involved only a small sample of learners who participated.

CONCLUSIONS

We conclude that students did very well in their self-management through the online flipped classroom. They were confident in their ability to search out new information and they were methodical and self-disciplined. Furthermore, they were systematic in their learning activity. Through asynchronous learning, they were able to accesses the lecture notes on their own time and increase their understanding of the main problem. They were able to work in groups, hear varieties of opinions, and get inspired. Team learning motivated them during the class session to work hard. The online flipped classroom nurtured learners' self-management, desire for learning, and self-control. The asynchronous learning management system had a positive correlation with the students' desire for learning and self-control. The more the students were exposed to asynchronous activities, the more their desire for learning and self-control increased in the process of learning.

In addition, in order to facilitate learning and interaction between students and teacher in the fully online learning environment, it is important to support the flexibility of asynchronous learning activities as provided by the learning management systems. It is also important to support real-time interactive sessions in the synchronous online learning sessions by providing video conferencing that can allow students to see each other, talk freely, and share resources.

RECOMMENDATIONS

The study recommends that implementing the online flipped classroom is very important to nurture learners' self-directed learning in higher education contexts. Therefore, learners need to be exposed to online flipped classroom opportunities for better learning results to take place.

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