

EXPLORING THE FLIPPED CLASSROOM APPROACH IN THE TEACHING AND LEARNING PROCESS: A CASE STUDY OF PRESERVICE TEACHERS' VIEWS

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ABSTRACT

This study explored the teaching and learning processes carried out in a Malaysian university when using a flipped classroom approach with preservice teachers that was based on Gagné's (1985) Nine Events of Instruction theory. A survey was used to collect data from twenty-nine respondents who were taking a course on instructional technology. Data were analysed to provide descriptive statistics which showed that students had positive responses towards the teaching and learning processes that involved the flipped classroom approach. They were in general agreement that the use of this approach fulfilled the Nine Events of Instruction in keeping with Gagné's theory, and that it had the potential to enhance the quality of the teaching and learning used in the course. More specifically, the findings showed that the aspect of the approach of being able to gain students' attention received the highest agreement with regards to its application in the flipped classroom. It was concluded that the participants' experience of the FC approach provided a preferred alternative to traditional lectures, and both students' and lecturers' were supportive of a shift from lecturer-centred to student-centred learning. The approach was advocated as a relatively new pedagogical model to improve teaching practices and learning outcomes.

Keywords: Education technology, Flipped classroom approach, Formative assessment, Gagné's Nine Events of Instruction, Learning design, Mobile learning, Preservice teachers' views, Teaching and learning process

INTRODUCTION

Integrating technology into the teaching and learning process (T&L) requires educators to always be ready and flexible in its use. Safar and Alkhezzi (2013) stated that technology integration in T&L creates motivation in students to follow the lesson; it is an approach that interests students. According to Darvina (2003), the use of media as a teaching aid can not only motivate students' interest in the T&L process, but it can also help increase students' understanding and facilitate knowledge transfer. Ciampa (2014) also argues that using media in the teaching and learning process helps students to acquire new knowledge. Baharuddin et al. (2000) emphasise that several points need to be considered in selecting teaching aids, such as: the topic being taught, students' background, the required technical skills, location of the tool/s to be used, characteristics of the media, the number of students and financial considerations. Most recently, it has been noted that ICT provides a powerful learning resource to promote for use by students to enhance their learning (Bagon, Gacnik, & Starcic, 2018). However, teachers need to master several skills in order to maximise their use of ICT in their

teaching approaches, which in practice may reduce their need to only rely on conventional teaching aids. According to Palamino (2017), most teachers still cannot integrate information and communications technology (ICT) into their teaching, and there is evidence that this is a long standing issue (Azwan et al., 2005; Zaaba & Zurida, 2002). The reason for this, as Salam, Zeng, Pathan, Latif, and Shaheen (2018) point out, is that the involvement of ICT in T&L is a complicated process, where teachers have been found lack knowledge and skills (Hidalgo & Lopez, 2018; Macià & García, 2016; Mendoza, 2009). Moreover, according to Ertmer, OttenbreitLeftwich, Sadik, Sendurur, and Sendurur (2012), the teachers' attitudes towards and views about the use of ICT have been described as a critical obstacle in their uptake of ICT in practice.

Thus, it is argued here that the use of technology in learning must be emphasized in the T&L process in line with technological advancement and the opportunity to use technology in improving education. In the era of globalization, the T&L process with technology integration is very much encouraged to be used by students to enable them to be visionary so that they are not left behind in the ever-advancing world accessible via the Internet. Learning in this era is not only focused on the teachers but students themselves need to take the initiative and enhance their knowledge and skills in the use of technology. Importantly, when applying the T&L process with regards to the Flipped Classroom Approach (FCA), students need a computer, laptop, iPad or smartphone to enable access to the Internet and reasonably fast Internet speed and reliable connection. Thus, it is noted that for the purposes of the present research access and use of these tools among students did not raise problems because on the whole the students had the latest technological devices that enabled adequate Internet access such as free *Wifi* and broadband for their ever widening usage. This enabled them to maintain their access to the required applications at anytime and anywhere.

LITERATURE REVIEW

Technology Use in the Flipped Classroom

The use of ICT through the Internet has expanded so rapidly that it has shifted educational practices and opportunities across the world by enabling online communication, collaboration and the creation of virtual learning environments (Flórez et al., 2017; Siddiq, Hatlevik, Olsen, Throndsen, & Scherer, 2016). According to Staker and Horn (2012) and more recently, Habibi and Dashwood (2020), the activities such as lectures, labs, homework, and exams in traditional learning environments can be shifted outside the classroom through the use of technology. Li, Zheng, and Yang (2017), for instance, also point out that the adoption of the flipped classroom approach in combination with the current trend of digital learning is highly appropriate for facilitating the learning interests of students as well as for and enhancing the teachers' pedagogical effectiveness. In this way students' learning experiences are seen as being able to be more interactive and enriching through the integration on technology in the T&L process. Transforming traditional learning to technology-based learning can allow students to study any time and in many places outside the traditional four walls of the classroom. Evans (2011) emphasised that the development of instructional technology in education had already shown a positive impact and had influenced the growth in its use in education, though uptake has varied across systems such as higher education first followed by an increase in use in schooling. He noted that the use of the traditional blackboard has been replaced with interactive technologies such as online video lectures. Typically, in today's digital age, students know how to use their smartphones and other devices so are already able to access many free Internet learning resources or 'Apps', including YouTube, Google Books and various search engines to view

from where ever they are at their convenience and in communication with peers e.g. WeChat and WhatsApp (Gaudin & Chaliès, 2015; Richter & McPherson, 2012).

The use of video is one of the significant tools in the flipped classroom approach. Calandra and Rich (2015) believe that video can be a useful tool to support the T&L process. Video is a multimedia tool that has been effectively used in many learning experiences through the integration of resources such as text, images, sound and speech, which in turn gains the attention of the audience (Mayer & Moreno, 2002). For instance, Sherin and Dyer (2017) and West (2013) point out that students are able to discuss about video through visual and verbal input and produce solutions to manage problems without the traditional heavy reliance on just reading textbooks. Other researchers (Kay & Kletskin, 2012), O'Bannon, Lubke, Beard, & Britt, 2011; Tekkumru-Kisa & Stein, 2017; Vajoczki, Watt, Marquis, & Holshausen, 2010) have also found that using video lectures in teaching-learning activities has successfully improved students' learning and problem solving skills. Stockero et al. (2017) and Dymond and Bentz (2006) have also emphasised the effectiveness of using video in the T&L process where they found educators were able to better understand the purpose of their teaching, and the concerns and strengths they experienced during the process of T&L.

In the context of Malaysia and the Malaysian education system, Rahman, Aris, Mohamed, and Mohd (2014) have noted that there remains a lack of research on the implementation of the FC approach. However, in their comparison of the FC approach and the traditional classroom, involving lecturer and student perceptions of these two learning cultures in a case study at a Malaysian polytechnic, they found strong evidence in favour of FC approach being able to enhance students' learning experiences. Jamaludin and Osman (2014) also found that it was very valuable for enhancing students' engagement and promoting their active learning, as agents in their own learning. They concluded that for students to be 'active learners' there needed to be an element of emotional engagement where they were (a) interested in the topic, (b) involved in their learning, and (c) felt good about their participation. These findings reinforce the findings of Rozhan's (2015) study of mobile learning in the FC approach, and also those of Johary (2015) that focused on the flipped classroom in a university setting. On the basis of these findings it would seem that existing conventional teaching methods need to be transformed to ensure that the Malaysian education system is able to move along in tandem with advancements in the application of ICTs for learning and contemporary developments in pedagogical change. This is in line with the requirements of the Ministry of Education (MOE), which encourages educators and students to fully utilize the use of ICTs in the T&L process. Hence, the main objective of this research was to add to this existing knowledge by investigating whether the use of the FC approach in the T&L process is able to meet all the steps in Gagné's Nine Events of Instruction. If the FC approach lacks effectiveness it would be expected that evidence for the presence of these nine events would be lacking in some way in practice, and learner needs would not be met.

METHODOLOGY

This section briefly explains the procedure on how the FC approach was implemented in teaching an instructional technology course at a University in Malaysia. The course was a compulsory course for all undergraduate students in the academic year of the research study. The study focused on the FC approach using SPECTRUM as a platform for supporting the T&L process. SPECTRUM is a platform that was introduced in 2010 such that students in the university had already been using it for their learning practice (Noor et al., 2015). The FC approach was implemented for a period of four weeks.

Research Design

Five steps were involved in the pedagogical focus designed to enhance the students' learning experience using the FC approach. These steps were adopted and modified from Sams and Bergman (2013). They were: (1) preparing video lectures; (2) sharing videos via SPECTRUM; (3) watching video lectures outside the class; (4) facilitating - lecturer as a facilitator and quiz in the class; and (5) doing homework and interactive group discussion in the class. The following section provides an overview of what each step comprised in the implementation of the FC approach.

Step 1: Preparing video lectures

In this step, the lecturer prepared an attractive and interesting video lesson to motivate students to watch the video before coming to the class. The videos were adopted from free websites, including YouTube. The duration of video was varied, the shorter video was 1:20 minutes and the longest was 3:41 minutes. The lists of YouTube videos used in this study were:

- 1) [The history of technology in education](#)
- 2) [Why is technology important in education](#)
- 3) [Technology: From past to future](#)
- 4) [21st century education](#)

Step 2: Sharing videos via SPECTRUM

The class was conducted once a week and a video lecture were shared by the lecturer every week before the class. The lecturer shared the video via SPECTRUM and students watched it outside the class through streaming or downloading. Table 1 shows sharing of videos via SPECTRUM. Figures 1, 2, 3 and 4 show the screenshots of sharing videos via SPECTRUM for the four weeks of the trial.

Table 1. Sharing videos via SPECTRUM

Instructional Videos	Activity
<p>Topic: The history of technology in education</p>	<p>This video is about the history of technology education. This video provides a quick look at how advancements in technology have impacted teaching and learning over time.</p> <p>This video is adopted from YouTube <https://www.youtube.com/watch?v=UFwWWsz_X9s></p>



The lecturer shares the video on SPECTRUM with the instruction: “You will have a quiz and activity in classroom.” The students are allowed to give comments and questions if they do not understand the video contents.

Figure 1. Screenshot of sharing video via SPECTRUM for first week

Topic: Why is technology important in education



This video provides the information about the importance of technology in education and different ways to implement it.

This video is adopted from YouTube
 <<https://www.youtube.com/watch?v=kMi13DoDBAM>>.

The lecturer shares the video on SPECTRUM with the instruction: “You will have a quiz and activity in classroom.” The students are allowed to ask questions here and comment on their opinions.

Figure 2. Screenshot of sharing video via SPECTRUM for second week

Topic: Technology: From Past to Future

The video shows on the use of technology: from past, present, to future. Technology plays a very vital role in education, from something as simple as learning and the advancements in technology make it easier every day.

This video will recall students’ memory about their experienced



Figure 3. Screenshot of sharing video via SPECTRUM for third week

using technology. After watching this video, the students will be asked to prepare their talk about their experience using technology.

This video is adopted from YouTube
<<https://www.youtube.com/watch?v=iMx4Ov-Mfj4>>.

The lecturer shares the video on SPECTRUM with the instruction: “You will have a quiz and activity in classroom.” The students are allowed to ask questions and make comments here.

Topic: 21st century education



Figure 4. Screenshot of sharing video via SPECTRUM for fourth week

This video explains the students about 21st century in education. After watching this video, the students will be asked to choose one friend as a partner for a conversation in the classroom’s activity. Each group will present the conversation in 15 minutes about the topic on the use of technology in 21st century.

This video is adopted from YouTube
<<https://www.youtube.com/watch?v=nA1Aqp0sPQo>>

The lecturer shares the video on SPECTRUM with the instruction: “You will have a quiz and activity in classroom.” The students are allowed to ask questions here and comment on others’ opinions. The students are allowed to ask the question here and comment each other’s opinion.

Step 3: Watching video lecture outside the class

In this step, students watched the video lesson autonomously at their own pace outside the class. In this case, students could play, post and stop the video according to their needs. By

learning through video outside the class, it was expected that the students would confidently be able to participate in the subsequent classroom discussion about that topic. In addition, they could use various learning devices to watch the video in contexts convenient to their personal choice, such as via laptop, computer and smartphone, anywhere and anytime.

Step 4: Facilitating - Lecturer as a facilitator and Quiz in the class

In the fourth step, the instructor frequently started the class by checking students' understanding of the video lectures they had watched outside the class. The instructor gave students a quiz or presented Socratic questions/instructions to evaluate their understanding of the content they were supposed to have learned outside the class. In every class session, simple quiz questions/requirements were asked to five students, chosen randomly (e.g. Why does technology play a vital role in education? Give another example of technology tools. Explain what is meant by 21st century education. What was the video about?). Thus, much time could be used by students and the lecturer to interact personally and facilitate the solving of problems together in a group discussion.

Step 5: Doing homework and interactive group discussion in the class

In this step there was a focus on students being asked to tell about their experiences where they independently used the technology. This was the core part of the practice of the FC APPROACH where students were no longer listening to the lecturer's talk in the class but were expected to establish an interactive group activity to solve problems and exchange ideas.

During the classroom activities, instructors played the video again to support students' recall memory. Students were also given exercises in the classroom activity, where they were required to answer several questions. The lecturer gave rewards such as applause and praise to the students when they answered the questions accurately. This activity aimed at facilitating students' engagement in active learning, a confident focus on group discussion, the asking and answering of questions in dialoguing, and the enhancement of student-student interactions and students-instructor interactions. For example, students were able to review the video again in class and discuss with the lecturer in the class.

Theoretical Framework

The theoretical framework used in this research was based on the Nine Events of Instruction, the theory of which was developed by Robert M. Gagné (1985). It underpinned the investigation of the T&L process used in the flipped classroom approach by ascertaining whether this approach is able to fulfil all of these Nine Events of Instruction, seen as essential for learning to take place. Thus, Gagné's theory can help educators to understand the efficiency and effectiveness of the T&L process, and when applied to implementing the FC approach it can help check whether knowledge and skills can be acquired by learners in a more effective and interesting way. The theory posits the following Nine Events of Instruction, namely, providing learning guidance, gaining attention, providing feedback, presenting stimulus, stimulating recall of prior learning, sustaining retention and transfer, assessing performance, informing learners of the objectives and eliciting performance. These events can assist the teaching fraternity to understand the learning process such that educators can better influence the effectiveness of their teaching and learning or pedagogy. The theory can also extend the process and content of learning so that learning is facilitated and more easily understood, and made enjoyable, where students are more involved and more deeply engaged in their learning. In addition to these advantages, it is argued that students' cognitive abilities may also be enhanced in this learning process. Gagné's Nine Events of Instruction also stipulate that there are several levels of learning and each level requires different types of instruction. Thus, Gagné argued these nine events or phases in teaching activities are vital to the achievement of the

intended learning outcomes. Moreover, according to Gagné, Briggs, and Wager (1988), they should also inform the basis of design instructions and selection of appropriate media. Thus, in applying the FC approach in this research, these events should also contribute to the provision of appropriate conditions for learning. For the purposes of this research these are explored and described as follows.

Event 1: Gain attention

Learner's attention in the T&L transaction is seen as a very important ingredient for effective learning (Slavin, 2009). In the flipped classroom, the video lectures provided by the instructor are interesting and should attract students' attention. Kim et al. (2014) note that the teacher should ensure the chosen video is as attractive as possible to create students' interest and gain their attention when watching outside the class.

Event 2: Inform learners of objectives

Here, objectives inform students of the expected final performance, a state that should provide expectancy and curiosity among the learners (Gagné, 2005). The teacher should communicate expectations of the knowledge and skills needed, and provide expectancy and curiosity in the teaching process. Therefore, in the FC, students should appreciate the importance of mastering the content of the learning, and by being clear about the objective of the learning they should be in a much better position to learn and improve.

Event 3: Stimulating recall of prior learning

In this stage, the teacher allows students to build on their previous knowledge or skills. It means that the teacher provides opportunities for students to tell about what they have learnt in the previous lesson or outside the class (Ratliff, Masen, Sullivan, Fleming, & Carney, 2012). In the FC, the teacher may administer a quiz or ask students to recall what they have learned in previous meetings or outside the class. A quiz can help learners to recall prior learning as part of formative assessment. In the FC students are able to recall what they have learned outside the class or what they have learned from their previous learning to help construct new meaning.

Event 4: Presenting stimulus

In the FC, the content of a lesson should be displayed in the video, with students able to watch it anywhere according to their preferred time outside the class (Bergmann & Sams, 2014). As they watch the video, students can stop, pause, and replay according to their needs; they may also take notes and prepare questions for discussion in the subsequent class (Bergmann & Sams, 2012). Student/s-student/s and student/s-teacher interactions may also be established virtually, outside the class, to exchange idea or discuss the video content that may need clarification.

Event 5: Provide learning guidance

Guidance is an important practice that affects students' lives and particularly their academic performance and capacity to develop learning autonomy. In addition, guidance and counselling services contribute to better growth of students' academic competence and wellbeing as learners (Gettinger & Seibert, 2002; Gladding, 2014; Jennings & Greenberg, 2009). In this way it is important for the teacher to inform students on how to watch the video as a learning experience outside the class by demonstrating the usefulness of pausing, stopping, replaying and note taking. Such guidance can help identify learning difficulties and misunderstandings, besides enable the teacher to address individual students' needs.

Event 6: Elicit performance (practice)

This event refers to how the learning experience can give rise to students' application of the knowledge and skills they have learnt – putting their learning into practice. This may occur through participation in group- or individual- projects and activities. In a FC this may include discussing content that learners acquired on their own, prior to class. Students may establish interactive group discussions to present knowledge they have obtained outside the class. According to Bergmann and Sams (2014), the follow up classroom learning experiences should be used for interactive groupwork, involving asking and answering questions, to establish the discussion about the video lecture among other interactive activities, while the lecturer/educator acts as a facilitator and mentor in the classroom.

Event 7: Provide feedback

Feedback is seen as a necessity as part of the learning process. The teacher is seen as providing feedback in terms of formative assessment to evaluate students' learning in order to provide additional teaching to bridge any gaps or misunderstandings or reinforce any points as necessary. In the FC the teacher may provide feedback to individuals or groups according to need through various means, including written or verbal comments or provision of additional learning resources.

Event 8: Assess performance

This event refers to the importance of teachers' assessment of students' learning in relation to them meeting the objectives of the whole course of learning in terms of summative assessment. This may include the results of tests, quizzes and examinations to know how far the students understand the content they have learned and discussed for the term (Fulton, 2012).

Event 9: Enhance retention and transfer

At this stage of Gagné's nine instructional events, the target knowledge and skills are seen as having been learnt, such that what follows is to enhance their retention and students' ability to transfer to other learning contexts. Thus, students are expected to have the ability to recall knowledge or skills at appropriate times, and have the ability to prevent forgetting what has been taught in the past, and also be able to transfer the ability to the performance of similar tasks (Gagné, 2005).

Sampling

Registered students, from one Malaysian university, who were pre-service teachers, were purposively selected for the study. Following an instructional technology course, twenty-nine students, agreed to participate in the research. They comprised one tutorial group. The study required input from pre-service teachers to obtain their feedback, because preparing future teachers to be able to implement the flipped classroom approach plays an important role in their initial teacher education program. In addition, considering that the participants would be future teachers, they needed to cultivate expertise in ICT to prepare themselves for the future job market. In keeping with Shute and Rahimi (2017), teachers are urged to incorporate technology as a tool to support the T&L process.

Instrument and Data Analysis

The survey used in the study was based on Siti (2007), whose research verified its validity and reliability. The survey design used a four-point Likert scale to obtain the level of usage of each element, and also provided a neutral or unsure response (Trochim, 2006). It replicates the survey reported in Halili and Sulaiman's (2018) research that investigated

secondary school students' views of a learning module that focused on use of information communication technology. Data were analysed, calculating descriptive statistics: percentage, mean, and standard deviation (SD) using the SPSS version 17.0 software.

FINDINGS

The discussion focuses on the percentages and overall mean for the questionnaire items listed for each event of instruction in the Nine Events of Instructional theory (Gagné, 1985). Based on Table 1, it can be seen that the students' ratings on all the events of instruction recorded percentages exceeding 50% with as would be expected similarly mean values of more than 2.50. Four of the nine events received between approximately 80-90% of students' positive response ratings and the remaining events between approximately 60-70%. Thus, the students were shown to hold positive views regarding the use of FC approach in the T&L process.

Table 1. Percentage agreement, mean values and SD in descending order for overall items in the Nine Events of Instruction using T&L by FC approach

Nine events of learning according to Gagné's theory	Overall Mean value for Events		Overall Percentage for Instructional events (%)
	Mean	(SD)	
1. Gaining attention	2.89	(0.95)	88
2. Providing learning guidance	2.83	(0.93)	85
3. Providing feedback	2.80	(0.90)	83
4. Enhancing retention and transfer	2.79	(0.87)	79
5. Stimulating recall of prior learning	2.74	(0.85)	71
6. Presenting stimulus	2.70	(0.84)	69
7. Informing learners of the objectives	2.64	(0.81)	65
8. Eliciting performance	2.60	(0.79)	61
9. Assessing performance	2.58	(0.73)	60

These research results showed that the learning process using the FC approach based on the Nine Events of Instruction, as proposed by Gagné, was viewed as a positive experience by the students involved. These nine events involved teachers gaining students' attention, providing learning guidance, providing feedback, enhancing retention and transfer, stimulating recall of prior learning, presenting stimulus, informing learners of the objectives, eliciting performance, assessing performance, and sustaining retention and transfer.

In looking at the agreement of students with the events of learning, Table 1 shows the instructional event of *gaining attention* as the event that received the highest agreement from students in terms of their experience with the use of the FC approach in the T&L process. Based on Table 1, this event of instruction received 88 percent positive response agreement with a mean and SD of 2.89; 0.95, respectively. According to Vesely, Saklofske, and Nordstokke (2014) and Azizi et al. (2005), all individuals differ regarding influences on their ability to learn and level of learning. Thus, a different level of focus and attention is required for each student based on the individual student's performance and capability. This suggests that use of the FC approach is capable of deeply engaging students' interest during the T&L process. When the second event of instruction is considered, *providing learning guidance*, students' percentage positive response ratings showed 85% agreement (mean and SD, 2.83; 0.93). This finding shows that for effective learning the provision of learning guidance is perceived as important as it can activate and encourage students to take proceed with their study. When students are encouraged to learn something the T&L process is more effective because they are more likely to concentrate in listening and observing the instructions given in the T&L session.

The third learning event agreed by the students as important for their learning was *providing feedback*; this received 83% agreement (mean 2.80 and SD, 0.90, respectively). This related to the provision of immediate feedback to questions they put forward by their lecturers. This supports the importance of ensuring that feedback is given more clearly to the students and any questions to the lecturer during the learning sessions receive an immediate response. According to Walker and Fraser (2005), the learning process can be expanded by sharing ideas and thoughts and interactions between the student and lecturer. Ramlogan, Raman, and Sweet (2014) also agreed that using video in learning allows students to interact with the teaching contents at their own pace. In keeping with Vygotsky (1978) the FC approach to learning supports the need for two-way communication between lecturer and student in the construction of knowledge as opposed to the notion that learning is the transmission of information. For the learning event *enhanced retention and transfer*, students' percentage positive ratings at 79% (mean 2.79; SD 2-79) are supportive of the FC approach in addressing students' deeper learning and its application. Thus, the T&L process is not just a matter of attendance at lectures but requires students to be engaged with the resources and tasks for learning.

The students' responses showed that they agreed that these events of instruction facilitate the T&L process throughout their studies and enables them to understand difficult lessons quickly. With regard to *stimulating recall of prior learning* their percentage positive response ratings were 71% (mean 2.74; SD 0.85); almost three quarters of the students perceived their learning through the FC as able to achieve this. Learners also agreed that the T&L process using the FC approach helped them to remember the concepts learned, with the event *presenting stimulus* receiving 69% positive ratings (mean 2.70; SD 0.84). This confirmed that the majority of students agreed that using the FC approach enabled them to learn more effectively. This means that using the FC approach is able to help the lecturer to deliver the content of the lesson and stimulate students' interest to expedite T&L.

For the learning event, *informing learner of the objectives*, the majority (65%) of students gave positive ratings (mean 2.64 and SD 0.81) showing that they agreed that they were prepared with learning objectives and knowledge of the topics in advance. These were provided to the learners before the session was carried out, such that they were more prepared for the explanation on the topics accessed using the FC approach in the T&L process. The research supports the importance of lecturers explaining the objectives or purpose of the learning in detail to learners as part of the flipped classroom approach. This is also vital when the flipped learning experiences rely on the use of information communications technologies.

Students' positive response ratings for the instructional event *eliciting performance* showed 61% agreement that the FC approach supported this (mean 2.60, SD 0.79). This suggests that using the FC approach helps learners to attain the intended skills and new knowledge in the T&L process. The students agreed that they could differentiate the important and relevant facts from the unimportant facts and in fact reported they paid more attention to stimuli such as diagrams, tables, charts, maps and so forth because these could help them understand the lesson more effectively as part of the FC approach. Similarly, for the event *assessing performance*, which received 60% positive ratings (mean 2.58, SD 0.73) shows that students agreed that using the FC approach increased their understanding by enabling them to enhance their performance in the T&L process. Students agreed that they show a positive change in their performance and become more confident to take part in the T&L process using the FC approach. When compared with the results of Halili and Sulaiman's (2018) use of the survey with secondary school students' views of their use of ICT in a learning module, which was also supportive, there was no statistically significant difference based on the Mann-Whitney U Test for two independent samples (two-tailed hypothesis; $p > .05$; U-value 36; z-score -035321).

DISCUSSION AND CONCLUSIONS

The results of the questionnaire showed that the students' experience with the FC approach to learning, in terms of the nine events of Gagné's (1985) theory, proved to be positive in that the majority of them agreed that each of the nine learning events assisted with their learning. The level of agreement ranged from 60 to 88 percent and, as shown in Table 1, the most positive learning outcomes (1-4) highlighted the importance of ensuring students were focused, and provided guidance and feedback, with the enhancement of retention and transfer of learning. The remaining five events gained 60 to 71 percent agreement supporting that the FC approach improved learning by linking to students' prior learning, stimulating their interest, clarifying the purpose and objectives, as well as relating to assessment.

Thus, these findings show that on the whole the students agreed that the usage of the FC approach was able to fulfil the Nine Events of Instruction as stated in Gagné's theory that he argues enhance the quality of the T&L experience. They show that these pre-service teachers were of the view that the FC approach can not only attract the interest of students in engaging with the learning experiences, but can also help to enhance their understanding as well as facilitate delivery of the program. This may not be surprising because they reported the FC approach facilitated their learning of the contents via the video provided outside the class hours. In turn, they believed this enabled them to better understand the subject before coming to class. In this way the students were provided greater responsibly to study on their own, as they were able to independently explore the video content and watch, pause and replay according to their needs (Cohen & Brugar, 2013). Overmyer (2012) argues that in using the FC approach students should be more confident and active learners in their classroom activities because they have prepared outside the class so becoming aware in advance of the course contents and learning objectives. Hence, the results of this questionnaire, although a small group of one tutorial, provide support for the potential effectiveness of the FC approach in T&L with pre-service teachers. Although this finding contrasts with that of Johari's (2015) research, which found students were unsure of how the FC might assist them in their learning, the researchers take the view that when using/demonstrating the FC approach in the course pedagogy, lecturers need to be explicit in fostering a wider understanding of learning in students, so they can become more autonomous in their own learning, and be more competent in the use of ICTs to improve their knowledge, skills and performance.

Now more than ever, students spend much of their time using technological tools to interact with friends and are exposed to a wide range of resources/content outside of class via the Internet, besides that provided in class, thus facilitating the flipped classroom (Blair, Maharaj, & Primus, 2016; Fisher, 2009). Students today have the potential to be 'mobile learners' as well, by using their mobile smart phones, Tablets and iPads, and the like. As the learners who come to formal educational institutions to acquire new knowledge and skills and use them in their daily lives and careers like the students in this study (Bransford, Brown, & Cocking, 2000), applying Gagné's (1985) theory as pedagogical principles would seem essential to ensure students are guided in being able to evaluate and select the most appropriate learning resources. According to Miller, Lukoff, King, and Mazur (2018), Tappscott (2003) and Nichols (2012), students today are very interested in using technology and want the T&L process to be more challenging and interesting, and are more capable in managing their own learning. Related to that, students need to make full use of the capabilities of technology so that T&L becomes more effective and produces students who are autonomous learners and can ultimately excel in their chosen field. Recently, Rahman and Manaf (2017) pointed out that when there is a limitation of time to teach course content, the FC approach has been shown to be an advantage (Lage, Platt, & Treglia, 2000). Thus, the T&L process using the FC approach is able to provide many benefits to both students and lecturers. Firstly, students are able to

involve themselves in and take part more actively in the flipped classroom thus increasing interaction between lecturer and students and students' learning autonomy. According to Delozier and Rhodes (2016) and Hughes (2012), students are able to review and discuss course content with the lecturer in class, thus more dialogue is likely to be created thus fostering greater objectivity with their study. Besides that, delivery of information when the FC approach is employed should be more engaging for students and should better stimulate and maintain their interest throughout the T&L process.

In summary, this study has provided three major findings. Firstly, it provides evidence that encourages educators to implement the FC approach in their T&L practices in keeping with Findlay-Thompson and Mombourquette (2014) and Fulton (2012) who agree that the FC is a relatively new and innovative approach to create an active learning environment. In the FC approach, students can experience real world activities to solve problems through hands-on learning activities, and no time is dedicated to lectures (Bergmann & Sams, 2014). Secondly, the survey results supported that the experience of the FC approach was well accepted by the preservice teachers and suggested it contributed to transforming the culture of their learning from that of lecturer-centred to student-centred. This is because the most meaningful aspect of applying the FC was to enhance students' learning autonomy and at the same time the lecturer's role as facilitator of learning rather than transmitter of information. Bergmann and Sams (2014) also reported that that the FC approach has been implemented worldwide and has become a new culture of learning. Thirdly, this research highlights and supports the potential for academic institutions to adopt the FC approach as a relatively new pedagogical model. It helps foreshadow that higher education institutions need to be prepared to take advantage of emerging technologies to enhance the implementation of their T&L activities. It is hoped that the Ministry of Education and policymakers urge lecturers to implement the FC approach in their teaching practices given its potential to improve pedagogy and learning outcomes.

On the basis of this research and taking into account the limitations of this small case study, it is recommended that future research continue to investigate students' perceptions of this more autonomous learning experience with the FC approach, including aspects such as students' motivation, engagement, interaction and achievement. It would also be valuable to investigate the impact of this pedagogical change on lecturers' practices and perceptions of students' learning. Moreover, since the present study only focused on the use of the FC approach via SPECTRUM, other technological tools such as Web 2.0 could be applied since such tools encourage students to be more active learners and facilitate feedback toward students' improvement. Other studies on the flipped classroom may explore different platforms such as Blog, Wiggio, Facebook, Proboards, Edmodo, Spicynodes and TeamViewer, and so forth, so that the effectiveness of the T&L using these tools can also be investigated.

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