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The Effectiveness of Flipped Learning: A Quasi-Experimental Study of the Perceptions of Kuwaiti Pre-Service Teachers

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Abstract

This paper investigated the effectiveness of flipped learning (FL) in pre-service teacher education, especially educational technology. Research on the effect of FL is still rare in student-teacher education, and little is known about it. This study was designed to explore students' perspectives on the effectiveness of FL in the College of Basic Education situated within Kuwait's Public Authority for Applied Education and Training (PAAET).

This study used a quasi-experimental method; it used purposeful sampling to select 128 students from two classes taught using the FL approach (Experimental Group) and 67 students from one class taught using traditional in-class lectures (Control Group). Questionnaires, which comprised of closed-ended and open-ended questions, were administered to investigate students' perceptions of flipped learning.

Results showed that students in the experimental group had performed better. They had positive attitudes toward flipped learning; they perceived that the approach had a unique set of affordances and constraints. Findings suggest that FL may be a promising approach to enhance student-teachers' learning in educational technology courses. The study provides insight into opportunities for further studies.

Keywords: flipped learning, inverted learning, active learning, student-centred, student perceptions, pre-service teacher education

1. Introduction

Learning is no longer a product transferred from lecturer to student (Steen-Utheim & Foldnes, 2017; Swapp, 2017), but rather, a process that involves concrete practices and methods to stimulate higher-level thinking, problem-solving skills, and self-regulation (Hattie & Donoghue, 2016; Lee & Lai, 2017). These skills are considered essential for lasting success as learners enter the workforce (Rateau, Kaufman, & Cletzer, 2015). Modern learning theories, namely constructionism and social constructivism, posit that learning takes place when students are actively involved in their own process of learning through social interaction. However, research shows that teaching/learning continues to take place in the traditional way in this information age, even though there is a need to develop learners' critical thinking skills (Rateau et al., 2015). This adherence to traditional practices is assumed to be due to instructors being unable to keep up with the pace of advances in pedagogy and emerging technologies.

The present study focuses on flipped learning (FL), rather than other active learning strategies that are used to overcome traditional teacher-centred approaches because it is constructivist-inspired and emphasises that learners construct or build their own understanding when engaging in in-class collaborative activities. This study uses a quasi-experimental design to explore the effectiveness of the flipped classroom approach in an Introduction to Educational Technology (IET-112) course in the Department of Educational Technology (DET) at the College of Basic Education within Kuwait's Public Authority for Applied Education and Training (PAAET).

2. Literature Review

2.1 Flipped Learning

Flipped learning is defined as "an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom" (Bishop

& Verleger, 2013, p. 5). The four pillars of FL are Flexible environments, Learning culture, Intentional content, and Professional educators (FLIP) (Chen, Wang, Kinshuk, & Chen, 2014). This model is relatively new, allegedly the brain child of Salman Khan (2006) – an influential figure in educational technology and founder of the Khan Academy, a non-profit organisation (Schmidt & Ralph, 2016). However, most researchers credit the model to Bergmann and Sams (2012), two school teachers from Colorado, USA, who used digital media to deliver lecture materials online to students, so that they could learn at home, but complete their traditional homework assignments in the classroom (Bergmann & Sams, 2012; Tucker, 2012). This approach supplements and enhances students' learning opportunities (Tucker, 2012). Therefore, it is referred to as an inverted or reversed approach, where the learning is inverted, and the teaching is reversed: students engage in pre-class preparation by learning the fundamentals at home (view videos or review presentations and lecture materials); and participating in meaningful learning activities with the lecturer and their peers in class.

Studies on the effectiveness of flipped learning are mixed. FL allows students to devote more time to applying the concepts that they have learned to solve problems (Mason et al., 2013). Hence, lecturers facilitate learning by prioritising active learning in class; re-purposing face-to-face classes and using technology to deliver content online, thus allowing them to have more time to spend with their students (Tucker, 2012). In addition, the rapid rise of online learning and related technologies – e.g., online digital videos and social media – has made FL easier to implement (Martin, 2012). Teacher-centred activities have given way to student-centred learning, as online video lectures allow students to read and review content before attending face-to-face classroom sessions (Conner, Stripling, Blythe, Roberts & Stedman, 2014). These face-to-face sessions form a "dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter" (Flipped Learning Network, 2014, p.1). Supporters of this model suggest that flipped learning, when used appropriately, leaves more time for hands-on activities and inquiry-based learning; it enhances student engagement in learning, improves academic performance, and increases student motivation and satisfaction (Tucker, 2012; Gilboy et al., 2015; Schmidt & Ralph, 2016). In sum, FL has the capacity to initiate 'optimum disruption', thereby facilitating student-centred learning, and transforming the role of the teacher to bring about institutional changes (Hutchings & Quinney, 2015, p. 106).

Multiple studies were conducted to determine the effectiveness of FL; e.g., Strayer (2012), Chen et al. (2014), Dong and Sharma (2015), McCallum, Schultz, Sellke, and Spartz (2015), Nwosisi, Ferreira, Rosenberg and Walsh (2016) and Casasola, Tutrang, Warschauer, and Schenke (2017). These studies suggest that flipping the learning can improve students' conceptual grasp of content beyond memorisation and basic knowledge (Berrett, 2012; Casasola et al., 2017). Al-Nakib (2015) findings suggested that FL could be suitable for the Kuwaiti context, where rote learning is still prevalent in schools and higher education.

Chen, Liu, and Martinelli (2017) found that FL could lead to improved student motivation and engagement. Nwosisi et al. (2016) investigated the effectiveness of FL when 30% of the course content was flipped in a higher education institution in New York; they found that the approach facilitated interaction and resulted in better learning outcomes.

Prior research also claims that FL is effective, because it allows teachers to use multiple modalities, e.g., videos, lectures, discussions, interactions (Strayer, 2012; McCallum et al., 2015); allows more time for one-on-one instruction (Houston & Lin, 2012; Parslow, 2012); and makes better use of class time to engage students in meaningful learning activities (e.g., algebra class, Talbert, 2014).

Amresh, Carberry, and Femiani (2013) investigated the effectiveness of FL in teaching undergraduates an introductory engineering programme. The results showed the flipped approach improved students' scores. However, as in the case of Mason, Shuman and Cook's (2013) study, students found the approach at times overwhelming and intimidating.

Some critics questioned the costs/benefits of implementing FL (Goldberg, 2014; Spangler, 2014; Dong & Sharma, 2015). Chen et al. (2014) raised the issue of insufficient access to an expert while viewing videos outside the classroom but conceded that students make more effort in a collaborative environment. Engin (2014) found that some students favoured a traditional model over a FL approach, because they preferred to have information from a lecturer and to learn passively.

2.2 Students' Perceptions of Flipped Learning

The literature indicates that students have positive perceptions of flipped learning. They respond favorably to this method, because they can access videos of lectures as part of their homework prior to class and are likely to understand the concepts better (McGivney-Burelle & Xue, 2013; Carney, Ormes, & Swanson, 2015). Students can study anywhere, any time, and at their own pace (Gilboy et al., 2015*;* McCallum et al., 2015), and they can

download videos/lecture materials at any time, pause and replay/re-read them, thus learning at their own pace (Davies, Dean, & Ball, 2013; Lape et al., 2014). This learning model can foster improvement in students' communication skills (Wilson, 2013).

Steen-Utheim and Foldnes (2017) found that FL was gaining acceptance in Norwegian higher education as an alternative to conventional teaching approaches. Students who were taught using both FL and traditional lectures for two semesters declared that they preferred the active learning experience of FL over lectures. Also said they were committed to their peers and cultivated beneficial relationship with their peers and instructors.

Murray et al. (2015) examined students' perceptions in an Information Technology (IT) class and reported that the students liked the convenience and flexibility that the videos afforded. Although they felt they had minimal face-to-face interaction, they benefited from the high-quality videos and interactive tutorials. Hutchings and Quinney (2015), who investigated students' reactions to FL in the UK, confirmed these findings. They found that students welcomed the flexibility of the approach. Initially, they had difficulty adjusting, but their learning gradually improved.

Since most FL tasks are collaborative in nature, not all students could adjust to it (Burke & Fedorek, 2018). Hillyard, Gillespie and Littig (2010) found that those with negative attitudes toward group work and no previous exposure to collaborative learning had difficulty accepting this model. Some students experienced problems when FL was adopted (Strayer, 2012; Chen et al., 2014). Strayer (2012), compared traditional and FL environments in an inverted statistics classroom in a US higher education institution. The mixed-methods study found that students in the flipped classroom became more open to collaborative learning.

Nevertheless, contrary to claims that FL can enhance student engagement (Bergmann et al., 2013; Estes et al., 2014; Kurtz et al., 2014), there was a potential problem with FL: students did not necessarily take the opportunity to learn at their own pace or arrive prepared for class (Bristol, 2014; Carney et al., 2015; Chen et al., 2014). They did not always play an active role in their learning (Burke & Fedorek, 2013). In a study comparing student engagement in a traditional- vs. FL class, Burke and Fedorek (2013) found students were equally passive in their learning in traditional and FL classes. However, despite the drawbacks, FL is gaining in popularity (Stevenson & Harris, 2014; Abeysekera & Dawson, 2015).

2.3 Theoretical Frameworks for Flipped Learning

Flipped learning is used in higher education due to its potential to "combine learning theories once thought to be incompatible – active, problem-based learning activities founded upon a constructivist ideology and instructional lectures derived from direct instruction methods founded upon behaviourist principles" (Bishop & Verleger, 2013, p.1). This suggests that flipped learning affords educators a distinctive combination of learning theories: active learning, constructivism/ social constructivism and its components, namely peer-assisted, collaborative, cooperative, and problem-based learning. The Venn diagram in Figure 1 depicts FL as a compendium of multiple student-centred learning theories/methods.

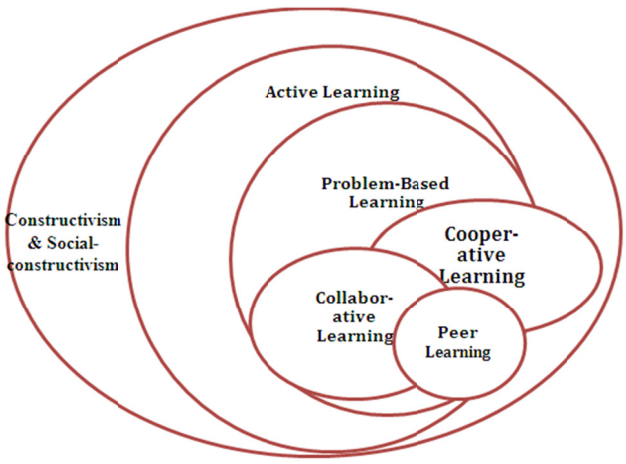

Figure 1. Student-centred learning theories/methods (Bishop & Verleger, 2013)

In FL, as the students engage in learning at home prior to learning in class, the constructivist definition of student-centred learning is implied. Learners also use their past experiences and knowledge to build an understanding of the new material, implying an equally socio-constructivist approach. From both the constructivist and socio-constructivist perspectives, learners actively construct knowledge aided by teachers' scaffolding and collaborative/cooperative dialogue with peers (Chen & Chen, 2015). Constructivism and collaborative learning stem from Piaget's theory of cognitive development; cooperative learning originates from Vygotsky's zone of proximal development (ZPD) (Pritchard & Woollard, 2010), which Vygotsky (1978, p.86) defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development … under adult guidance, or in collaboration with more capable peers". ZPD emerges, as students learn to perform new tasks through interaction with peers or teachers; they then internalise these tasks, so that they can learn on their own without help (Figure 2).

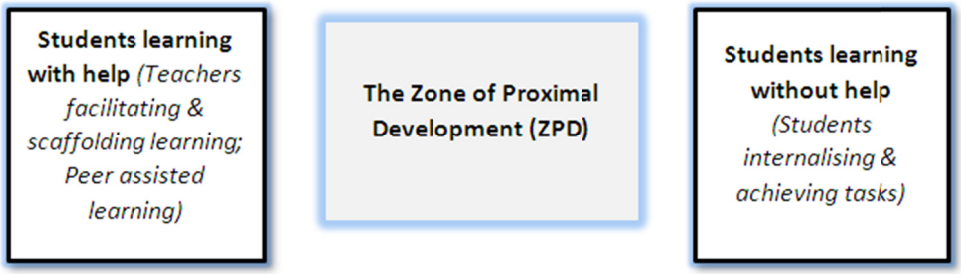

Figure 2. Components of social constructivist theory that are evident in the flipped classroom

When students actively participate in a learning task, they learn better (Chen et al., 2014). Cavanagh (2011) argued that although FL may be appropriate for active learning tasks, traditional lecture-based teaching can also include some elements of active learning; e.g., student-centred learning, discovery/exploration, a sense of structure, and use of technology. The difference is that in FL, students can carry out their homework activities as a form of active learning. They can also collaborate, cooperate, and enter into discussion with their teachers and peers (peer-assisted learning). Problems associated with a lesson or concepts are introduced prior to class and are used to provide the context and motivation for the learning that follows in class. This is why FL is considered to be problem-based. At the same time, Bishop and Verleger (2013) argue that despite theories supporting FL, technology-driven activities outside the classroom can be favoured over strategies like scaffolding, peer-assisted learning, and in-class collaborative problem-solving.

3. Literature Gap

There appears to be a dearth of FL research in the following areas:

1) Effects of FL on learning outcomes of pre-service teachers' training in integrating educational technology into teaching;
2) FL applications on educational technology;
3) Empirical research on the FL model in higher education, specifically of students' perceptions of its use (Bishop & Verleger, 2013; Gilboy et al., 2015); and
4) Efficacy of the FL model to promote student teachers' learning.

To fill these gaps, the present study examines the effectiveness of the FL model for integrating educational technology in pre-service teacher-training programmes.

4. Study Context

This research focuses on an experiment carried out during the second term of the academic year 2017-2018 at PAAET's in Department of Educational Technology at the College of Basic Education, one of only two Kuwaiti colleges that offer a four-year programme toward a bachelor's degree in Education, and the only college of education for female students in Kuwait. All programmes include a cultural, academic, and professional component (Almodaires, 2009).

Introduction to Educational Technology (IET-112) is a mandatory course in the department; it is an integral professional component embedded throughout the curriculum for all programmes offered at the College. Every

semester, 15-20 sections of this course are available and between 60 and 80 students are enrolled in each section. Although students registered in the course come from different departments within the College, they all share similar demographics.

5. Design and Procedure

5.1 Research Design

Considering the nature of this study and the complexity of the setting for the experiment, due to the random selection of course sections, and the administering of a treatment or stimulus to only one of two groups (the Experimental Group [EG], but not the Control Group [CG]), a quasi-experimental research design was determined as an appropriate research method for this study. This unique method is used to estimate the causal impact of an intervention on its target population (to test causal hypotheses), *without* random assignment (White & Sabarwal, 2014).

5.1.1 Research Questions and Methods

The research questions and methods used are tabulated below:

Table 1. The research questions and methodology applied in this study

	Research Question	Methods
1	Is there a significant difference in students' learning outcomes when a FL (experimental) approach is used, as compared to a traditional instructional approach (control)?	*t*-test
2	How do students perceive the use of the FL model in terms of its usefulness for learning?	Questionnaire-Descriptive statistics Qualitative open-ended responses-Thematic analysis

The two methods used in this study included conducting an experiment to determine the effectiveness of flipped learning, and administering questionnaires to investigate students' perceptions of FL.

5.1.2 Sampling

A purposive/random sampling technique was employed to select eligible participants who would receive the FL treatment (EG), while others were assigned to the CG, which did not.

5.1.3 Ethical Considerations

Before taking part in the study, the participants were informed about the research: purpose of the study, instruments, and data analysis. The participants were assured of confidentiality, and the right to withdraw from participation at any time, or to withdraw any information they had provided, without being disadvantaged in any way. To maintain their anonymity, pseudonyms were used.

5.2 Procedures

The IET-112 course consisted of three sections taught by the same instructor in three different classrooms. The students attended two 90-minute classes weekly. The three sections were assigned randomly to the experimental- and control groups. EG is consisted of students from two classrooms, and CG comprised students from one classroom. During the experiment period, students studied four chapters (see Table 2).

Table 2. Course sections and chapters assigned to the experimental and control groups

Group	Students	Sections of IET-112	Assignment
Experimental Group (EG)	From two classrooms	Sections One and Two (of three Sections)	Four Chapters
Control Group (CG)	From one classroom	Section Three (of three Sections)	Four Chapters

Table 3. The Groups' activities, before, during, and after class

Time	Control Group (CG)	Experimental Group (EG)
Before class		Online activities and assignments
During class	Traditional lecture setup	Group discussion and in-class activities
After class	Group work and assignments	

Before Class:

The EG students were required to participate in before-class activities, which included watching videos, taking quizzes, and studying PowerPoint presentations, in order to prepare for in-class discussions and activities. The videos were recorded from the CG lectures to avoid any bias, since both the CG and EG were taught by the same instructor. Students accessed these videos and materials before each lecture.

Step One:

Fill out an electronic form (to monitor activity in the course). Three to five days prior to each lecture, students received a link via WhatsApp and email and completed the electronic form. To ensure a proper review of the course materials prior to each lecture, the EG students had to take the following steps:

a) Read the brief introduction and instructions for completing and returning the form. The form provided a link to a video, which they had to watch in a new browser window.

b) Watch the video lasting 10-15 minutes (Part 1 of the lecture).

c) Go back to the form browser window to answer 3-5 random questions related to the video.

Step Two:

a) Go to another link to a video.

b) Watch the second video lasting 10-15 minutes (Part 2 of the lecture).

c) Answer another set of 3-5 random questions about the video.

Step Three:

a) Go to another link to a video.

b) Watch the video lasting 10-15 minutes (Part 3 of the lecture).

c) Answer 3-5 random questions about the video.

Step Four:

a) Access a PowerPoint presentation related to the lecture.

b) Answer a random question related to this presentation

c) Complete and return the form.

Step Five:

a) Participate in a class discussion related to the three videos.

b) Undertake in-class activities related to the course materials.

Completing the online form served two goals: first, to control the activities of the EG participants; and second, to guide the participants and help them go through the materials in a systematic and organised manner. Figure 4 below explains the procedures that students were required to follow before attending each class.

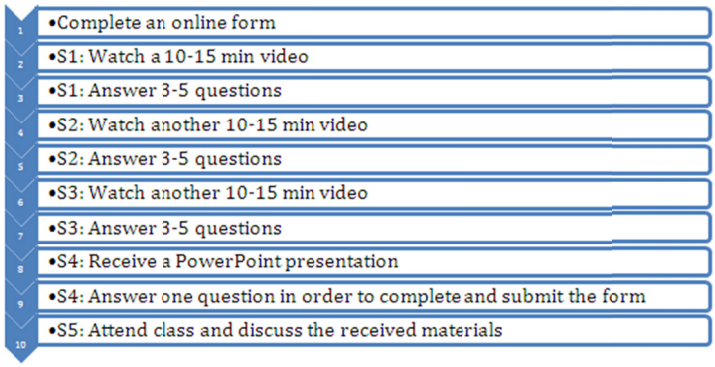

Figure 3. Experimental Group activities before each lecture

During Class:

The CG ($N = 67$) was taught using traditional in-class lectures, followed by assignments that required students to work with information that was important for the course. Copies of course materials and PowerPoint presentations were handed out to the CG students (as hard or electronic copies) during each lecture. The CG students were subsequently asked to review these materials prepare for the exams.

For the EG ($N = 128$), the FL model was implemented through group discussion and in-class activities. To engage students in these activities, different types of group work techniques were used, including structured/unstructured discussion, circle of voices and fishbowl formations.

After Class:

The control group was given assignments and asked to engage in group work.

6. Instruments and Results

6.1 Administering Exams

Students from both EG and CG were administered two exams during the experiment period. The first was administered to both groups after they had completed Chapters One and Two; the second was administered to both groups after they had completed Chapters Three and Four. Both groups took a final exam covering all Chapters at the end of the semester.

6.1.1 Exam Results: Comparison between the Experimental and Control Group

To investigate any differences in students' learning outcomes, the EG and CG's exam scores for the course were compared. Data from an independent sample *t*-test (Software Package for the Social Sciences, SPSS) was analysed to identify differences in learning outcomes between the CG and EG. The rationale for using the independent sample *t*-test was to compare the means of the two mutually exclusive groups of students. Comparison of the mean scores for the exams addressed the first research question:

Is there a significant difference in students' learning outcomes when a flipped learning approach (experimental) is used, as compared to a traditional instructional approach (control)?

Results of the two-tailed *t*-test revealed the EG had scores higher than the CG in the first, second, and final exams. There was a significant difference among the three exam results of the EG. Nonetheless, the final grade variable did not manifest as a significant difference between the EG (M=85.66, SD=7.71) and the CG (M=83.79; SD=7.81).

Table 4. Group statistics – mean scores after the exam

	Group	N	Mean	Std. Deviation	Std. Error Mean
Exam 1	EG	128	8.2500	1.26740	.11202
	CG	67	7.7463	1.76964	.21620
Exam 2	EG	128	7.9766	1.65279	.14609
	CG	67	7.4776	1.44975	.17711
Final exam	EG	128	39.0781	4.62041	.40839
	CG	67	36.4179	6.62216	.80903
Final grade	EG	128	85.6602	7.70952	.68143
	CG	67	83.7910	7.80741	.95383

Table 5. Independent sample test

		Levene's Test for Equality of Variances		*t*-Test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Exam 1	Equal variances assumed	3.471	.064	2.290	193	.023	.50373	.21996	.06989	.93757
	Equal variances not assumed			2.069	102.363	.041	.50373	.24349	.02078	.98668
Exam 2	Equal variances assumed	.007	.933	2.086	193	.038	.49895	.23920	.02717	.97073
	Equal variances not assumed			2.173	150.219	.031	.49895	.22959	.04531	.95259
Final exam	Equal variances assumed	2.788	.097	3.274	193	.001	2.66021	.81265	1.05740	4.26303
	Equal variances not assumed			2.935	100.529	.004	2.66021	.90626	.86234	4.45809
Final grade	Equal variances assumed	.031	.859	1.601	193	.111	1.86911	1.16759	-.43377-	4.17199
	Equal variances not assumed			1.594	132.612	.113	1.86911	1.17224	-.44959-	4.18781

6.2 Development and Administration of the Questionnaire

A questionnaire distributed to the students also requested feedback on the effectiveness of FL activity. The feedback questionnaire (see Appendix A) was adapted and modified from a validated questionnaire developed by Pierce and Fox (2012) and revalidated by Barua, Gubbiyappa, Baloch and Das (2014). The instrument consisted of items arranged according to a five-point Likert scale, ranging from 'Strongly disagree' to 'Strongly agree'. The questionnaire also included two open-ended questions. This qualitative component of the questionnaire explored students' learning experiences by assessing their perceptions of FL. The questionnaire was used to address the second research question:

How do students perceive the use of the flipped learning approach in terms of its usefulness for learning?

6.2.1 Results of the Questionnaire

Descriptive statistics (means, standard deviation) were used to analyse the questionnaire data (see Table 6). The total questionnaire response rate was 100% (n = 128). After accounting for respondents who returned incomplete questionnaires for some items (e.g., Questions 3, 5, 6, 7, 8, & 9), the adjusted response rate was 30.56% (n = 99.22).

The results revealed that most of the respondents were satisfied with the FL setting, with over 90% of the students 'agreeing' with six items in the feedback questionnaire: the videos and lessons were available on the e-learning portal before the FL activity (Item 1); the videos and lessons were relevant to the FL activity (Item 3); the activities during the FL session improved students' understanding of key concepts in the lecture (Item 5); the lecturer was able to engage the students in the FL activity (Item 8); the lecturer was able to provide clarification for difficult concepts during the FL activity (Item 9), and the lecturer was able to expand on the online videos and Power Point presentations during the FL activity (Item 10). Item 4 pertained to classroom arrangements, such as the positioning of the chairs before the group activity, data show projection, etc. and whether these arrangements were appropriate for the FL activity; 87.5% of the students 'agreed' on Item 4. Meanwhile, Item 2 related to the time that the students had available to view the videos and lessons before the FL activity, with 78.9% of the respondents 'agreeing' that they had adequate time to do so. However, although 74.2% of the students 'agreed' that the FL session inspired them to pursue further learning for the module (Item 6), some students (67.9%) expressed the desire for more lectures in the FL mode.

Table 6. Descriptive statistics

Questionnaire Items	N	Min	Max	Mean (SD)	%Agreement (A-SA)
Q1 The videos and lessons were available on an e-learning portal before the FL activity.	128	1	5	4.63 (.708)	95.5%
Q2 I had adequate time to view the videos and lessons before the FL activity.	128	1	5	4.19 (.978)	78.9%
Q3 The videos and lessons were relevant to the FL activity.	127	2	5	4.67 (.592)	96.1%
Q4 The classroom arrangements (positioning of the chairs before the lessons for the group activity, data show projection, etc.) were appropriate for the FL activity.	128	2	5	4.42 (.770)	87.5%
Q5 The activities during the FL session improved my understanding of the key concepts.	127	2	5	4.48 (.677)	93.8%
Q6 The FL session inspired me to pursue further learning for the module	127	1	5	4.03 (.942)	74.2%
Q7 More lectures should be delivered in the FL mode	127	1	5	3.87 (1.120)	67.9%
Q8 The lecturer was able to engage me in the FL activity.	127	2	5	4.48 (.665)	92.9%
Q9 The lecturer was able to provide clarification for difficult concepts during the FL activity.	127	2	5	4.67 (.578)	96.9%
Q10 The lecturer was able to expand on the online videos and lessons during the FL activity.	128	3	5	4.52 (.588)	95.3%
Valid N (listwise)	124				

The qualitative and quantitative data were analyzed together using quantitative analysis. Qualitative data obtained from the open-ended questions addressed students' perceptions of the flipped learning experience. Using Braun and Clarke's (2006) procedures for thematic analysis, emerging themes were identified by looking for any important or interesting patterns in the data, which would address the second research question. The aim was to code and define the responses within the bounds of the affordances and constraints of various technologies, which refer to "the strengths and weaknesses of technologies with respect to the possibilities they offer" (Gaver, 1991, p. 79). For the purpose of this study, affordances signify the advantages of using FL, which include all actions that are physically possible in a FL environment; and constraints represent the restrictions or limitations of an FL environment.

Affordances: Students reported that the flipped approach had several advantages. For instance, students were well prepared for the class, as they had acquired knowledge of the concept beforehand and they could access sources of this knowledge online at any time and from any place. Moreover, the students perceived that they were able to rewind, pause, stop, and replay the video to enhance their understanding of the concepts. Their enjoyment of the learning experience was enhanced, as they were pleased with the class discussions. They attributed their positive experience to increased communication between with their peers and the instructor. The students' responses suggest that the learning environment increased their focus and classroom productivity.

Constraints: The students also perceived certain limitations to the FL approach. For example, they needed more time to watch the videos. Although they thought the teachers were helpful in the classroom, the students wanted guidance when they were watching the videos online before class. The students also reported that some of the videos lasted for more than 10 minutes, which they considered to be time-consuming. This time constraint slowed down their advancing through the steps and answering the quiz questions.

6.3 Overall Results

The results relating to the two research questions were as follows:

Research Question 1: The *t*-tests showed there is a statistical difference between the EG and CG; the students in the EG performed better, with higher scores than the CG for the first, second and final exams.

Research Question 2: The descriptive data revealed that the students had favourable attitudes towards the FL approach. The qualitative data complemented the descriptive data, confirming that FL has a unique set of affordances and constraints.

7. Discussion

It has been well documented in the literature that interaction (i.e., discussion and communication) facilitates learning (Strayer, 2012; Bishop & Verleger, 2013; Chen et al., 2014; Fautch, 2015; McCallum et al., 2015; Murray et al., 2015; Nwosisi et al., 2016; Nguyen et al., 2016; Kwon & Woo, 2018). The descriptive data indicated that flipped learning provided an opportunity to clarify difficult concepts through interaction in class. It therefore opened up avenues for exploration and discovery through discussion. Based on an analysis of the qualitative data, the FL approach appeared to have facilitated active learning by providing more opportunities for students to engage in interaction. These results suggest that the FL approach enhances learning.

The use of flipped learning also appeared to have increased the students' enjoyment of their learning, demonstrating greater engagement and participation. Moreover, since the EG scored higher in their exams, they were more satisfied with their learning experience than were the CG, who had received traditional lecture sessions. This finding is consistent with the results of previous studies that show how the flipped model can facilitate students' enjoyment of their learning experience (Gilboy et al., 2015; Murray et al., 2015).

One of the findings from this study was that the FL environment engaged the students. Students perceived that the model was relevant for their learning. Prior studies have indicated that FL can encourage greater student engagement (Talbert, 2014; Gilboy et al., 2015; Schmidt & Ralph, 2016).

In addition, the results indicate that FL has a unique set of affordances to support instruction. The students believed that the lecturers' teaching practices, for instance the classroom arrangements, learning activities and scaffolding, constituted the affordances of a flipped approach, thus enabling them to learn successfully. Research has also shown that scaffolding from instructors, collaborative dialogue with peers, and instructors' awareness of the affordances of FL are important factors in implementing the FL model (Martin, 2012; Bishop & Verleger, 2013; L. Chen & T. Chen, 2015; Persky & McLaughlin, 2017). Some respondents thought the length of most of the videos used in this course was inappropriate. However, the findings of this study indicate that the affordances of FL far outweigh the constraints; they can be leveraged to engage and motivate students, while also strengthening and broadening the learning environment.

Students' perceptions of FL were generally positive. In contrast to the results derived by Hillyard et al., (2010), the students in this study did not have any negative attitudes toward group work and were therefore able to accept the flipped model. This may be because the FL approach facilitated student-centred learning, while fostering their independence and encouraging collaboration and discussion with their peers. These findings suggest a move toward a more student-centred course design on the part of the instructor. This conclusion is consistent with previous research (e.g., Bishop & Verleger, 2013; Conner et al., 2014; Hutchings & Quinney, 2015).

8. Limitations and Future Research

The use of a purposive sample for administering the questionnaire is a limitation of this study. Since the sampling is biased, the results cannot be generalised to the entire population of College of Basic Education While the study was quasi-experimental and involved two groups of students, the fieldwork took place at one educational institution and in a specific course.

Although the FL identified in this setting may be present in other learning situations, its importance may vary according to the context and specific active learning practices employed. Therefore, a potential extension of this research would be to validate the conceptual framework across different FL contexts. In order to generalise the effects of FL, this study needs to be repeated and conducted in diverse academic subject areas.

9. Conclusion

The purpose of this study was to assess students' satisfaction with and appreciation of the FL method used at PAAET's College of Basic Education and to ascertain whether there were any differences in performance between an experimental group (FL approach) and control group (traditional approach). The results of this study revealed that the use of the FL model resulted in increased student performance, which answers Research Question One. The study also found that students had positive perceptions of the usefulness of the FL model, which answers Research Question Two. Overall, we can be reasonably confident that FL is an effective means of creating a more active learning environment. Moreover, FL corresponds to the constructivist definition of student-centered learning.

This study acknowledges that there have been numerous scholarly publications on the flipped learning approach as it is practiced in the West. However, no research studies have been conducted about the implementation of the FL among pre-service teachers in Kuwait, especially in the area of educational technology. The results of this

study are presented to help fill these gaps. The findings demonstrate the complex and intersecting factors at work in successfully managing courses in higher education by adopting a flipped learning approach.

In order to generalise the effects of flipped learning, this study will be repeated and conducted in different academic subject areas. Considering the efficacy and power of video technology to improve learning, and the necessity of videos in flipped classrooms, future research needs to focus on the effectiveness of FL in improving student-teachers' skills, for instance, using software/hardware in creating and editing digital videos.

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