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Web Enhanced Flipped Learning: A Case Study

Apprentissage inversé amélioré par le Web : une étude de cas

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Abstract

This research study is a technology-enhanced flipped learning pilot to observe the students' engagement and learning in a self-regulated class through their individual feedback. Flipped learning was applied to a segment of the Study Skills course for more than two weeks to 129 students in the foundation year of a Teachers' College in Bahrain. Divided across four sections, the students worked in small groups, prepared an assigned portion of the course content provided through a Learning Management System (LMS), and presented it to the rest of the class. Students used posters, flash cards, and digital technology in different forms such as PowerPoint slides, mobile phones, and Kahoot!. The reflective individual student responses on this experience were analysed quantitatively and qualitatively. The findings show a favourable response to group work, sharing ideas, saving time through collaboration, and use of technology. It is recommended that the study be extended to a larger sample group, to a larger number of the course topics, and include the use of different technology forms.

Keywords: Web enhanced; Flipped learning blended approach; Study skills course; Self-regulated; Large classes; Student engagement; Individual feedback

Résumé

Cette étude de recherche est un projet pilote d'apprentissage inversé assisté par la technologie visant à observer l'engagement et l'apprentissage des étudiants dans une classe autorégulée par le biais de leur rétroaction individuelle. L'apprentissage inversé a été appliqué à un segment du cours de compétences d'étude pendant plus de deux semaines aux 129 étudiants en première année d'un collège d'enseignants à Bahreïn. Répartis en quatre sections, les étudiants ont travaillé en petits groupes, ont préparé une partie du contenu du cours fourni par une plateforme d'apprentissage en ligne et l'ont présentée au reste de la classe. Les étudiants ont utilisé des affiches, des cartes de support visuel et des technologies numériques sous différentes formes telles que des diapositives PowerPoint, des téléphones portables et Kahoot! Les réflexions individuelles des étudiants sur cette expérience ont été analysées quantitativement et qualitativement. Les résultats montrent une réaction

favorable au travail de groupe, au partage des idées, au gain de temps grâce à la collaboration et à l'utilisation de la technologie. Il est recommandé d'étendre l'étude à un échantillon plus large, à un plus grand nombre de sujets de cours, et d'inclure l'utilisation de différentes formes de technologie.

Mots clés : Amélioré par la web ; apprentissage inversé approche hybride ; cours de compétences d'étude ; autorégulation ; classes nombreuses ; engagement des étudiants ; rétroaction individuelle

Introduction

The Flipped Learning Network explains the concept of flipped learning using the acronym FLIP which stands for flexible environment, learning culture, intentional content and professional educator (Flipped Learning Network, 2014). These four elements, termed “the four pillars,” are the bases of a teaching approach that is adaptable, student-oriented, creative, and interactive.

The term ‘inverted learning” has been used synonymously by a number of researchers while defining or explaining flipped learning (Davies, 2013; Gannod et al., 2008; Midun et al., 2019; O’Flaherty & Phillips, 2015; Strayer, 2007). In the literature, the term *flipped learning* has also been loosely applied as *blended learning* in various forms when any two types of learnings have been combined with digital technology such as the mobile-blended collaborative learning model in and out of the classroom (Avci & Adiguzel, 2017), blended English learning using online and mobile technologies (Milthorpe et al., 2018) and blended learning environment and online learning environment (Hung & Chou, 2015).

In the context of the present study, flipped learning is combined with web-enhanced learning in higher education (specifically the first year, known as the foundation or preparatory year) which implies learning through using technology pre-class and inside the classroom, learning through the materials posted on the Learning Management System (LMS) or MOODLE before and after the class, face-to-face learning with the teacher, and also student engagement with peers and active learning for developing higher level skills. Considering these basic elements of the study, the literature was reviewed in the following five threads: a theoretical framework for flipped classroom, flipped learning in higher education, blended learning through LMS, student engagement in small groups, and active learning with large enrollment.

A Theoretical Framework for the Flipped Classroom

Bishop and Verleger (2013) trace the theoretical frameworks for the flipped classroom roots to Piaget 1967 and Vygotsky 1978 due to its student-centred learning approach with constructivism and cooperative learning respectively. Bergmann and Sams (2012) adapted Benjamin Bloom’s concept of mastery learning (1971, 1976, 1984). They termed it *flipped mastery classroom*, and incorporated modern technology in teaching, learning, and assessment. They state that this approach enhances student engagement, individualized interaction, and overall academic performance. On the other hand, the technology, pedagogy and content knowledge (TPACK) framework of technology integration emphasizes complex interactions. It also requires a deeper and more flexible understanding to maintain a dynamic equilibrium in successful teaching (Koehler & Mishra, 2009). In this study, we adopt the TPACK framework since it incorporates the concept of modern instructional technologies and because the course is web-enhanced.

TPACK – A Conceptual Framework for Technology Integration

TPACK, earlier known as TPCK, is a conceptual framework that addresses the important issue of what teachers need to know about technology, other than their subject matter, for effective teaching. Originally suggested as PCK (**p**edagogical **c**ontent **k**nowledge) by Lee Shulman, it adds in and builds on another component named 'technology knowledge' (Koehler & Mishra, 2009). Koehler et al. (2007) also pointed out that "effective technology integration for teaching subject matter requires knowledge not just of content, technology and pedagogy, but also of their relationship to each other" (p.740).

The authors offer this theoretical model focusing on complex interactions among content, pedagogy, and technology to bridge the gap between research and pedagogy or, in other words, between theory and practice.

Flipped Classroom Model in Higher Education

Inverted learning or flipped learning, which is a blended learning approach combining face-to-face communication with technology is widely prevalent in the mainstream of higher education, but scarcely documented or recognized even by faculty (Ozdamli & Asiksoy, 2016; Picciano et al., 2013). The links of higher education to pedagogy and learning outcomes have been examined through several research studies in a scoping review using comparisons, pre-test-post-test designs, and student perception and satisfaction. The results are inconclusive, yet there is indirect evidence of improved academic performance and student and staff satisfaction (O'Flaherty & Phillips, 2015).

A Jordanian study conducted by Sulaiman (2018) presents a descriptive and quantitative analysis of university students' perception of the use of blended learning incorporating technology and flipped classroom model. About 60 students in two sections of the 'Essentials of Public Speaking' course in the Department of Linguistics participated in the study. The students' performance, evaluated through a rating system and feedback collected through a questionnaire, confirmed that both blended learning and flipped classroom were effective tools, with the successful use of technology. Additionally, a mixed method case study by Avci and Adiguzel (2017) of foundation level students of English as a foreign language in Istanbul University also emphasized the positive effects of mobile-blended collaborative language learning, and the findings report improved communication with enhanced vocabulary skills.

Futch et al. (2016) also focused their study at the classroom level and conducted interviews with purposively selected community college instructors who were effectively engaged in blended learning teaching. The subjects were interviewed extensively to seek their perception on obstacles to student success and solutions to overcome them. The findings suggest organization, communication, and student support are important factors named as pedagogical strategies that lead to *comfort*, so-termed to describe students' confidence with the course content.

A Malaysian case study by Wai and Seng (2015) used path analysis method to examine the perception, effectiveness and efficiency of blended learning, and attitude towards technology. The study was conducted on university-level business students who were engaged in online learning, teleconferencing, Internet use, computer assisted learning, web-based distance learning, and other technologies related to education. The results confirm a positive correlation between students' learning experience and academic success.

The above studies, conducted in a variety of settings in higher education and using a variety of tools, pointed to positive gains and improved skills.

Blended Learning Through Learning Management Systems

Learning management systems (like Moodle and Blackboard) are important links between students, course content, and the teachers. Many flipped learning classrooms depend heavily on the LMS for formative and summative assessments. However, when literature was reviewed to explore the effectiveness of these systems, the findings indicated some gaps and challenges. A Canadian university study by Snow (2016) describes a blended learning pilot course in multi-cultural education that was a part of a teacher education program for pre-service teachers. Student interview data and observation of activities on the LMS were analysed and compared qualitatively. The findings of the study highlighted the significance of further research in this area. This has been supported by a more recent study conducted in the West Indies by Thurab-Nkhosi (2018) which presents the perspective of deans, directors, and funding agencies through a review of the Moodle LMS. The findings emphasize the need for better coordination from administrators in implementing blended learning through regular communication, better monitoring, and more incentives.

Student Engagement in Small Groups

Lundberg and Sheriden (2015) analysed the data of 812 online students from the National Survey of Student Engagement (NSSE) which was conducted in 2007 using Kuh's (2001) engagement model as the conceptual framework. This framework includes elements that require face-to-face interaction and use of on-campus facilities along with technology. The study examined students' engagement that contributed to their learning in various aspects of the college experience such as engagement with faculty, diverse peers, and participation in course discussions. The findings concluded that a supportive learning environment is the strongest predictor of learning, followed by faculty feedback.

Bergmann and Sams (2014), who pioneered the concept of flipped learning since 2006, emphasize that it is not one concrete teaching strategy, but a combination of effective teaching strategies including interactive and interesting learning activities which enhance student engagement in a meaningful way. They suggest pair work, cooperative learning, mixed grouping organization, or individual instruction as different options to provide students with an opportunity to learn from each other.

Active Learning in Large Enrollment

Another longitudinal Canadian case study conducted by Ravenscroft and Luhanga (2018) presented the results of using blended learning models under a course redesign project. This project was initiated to deal with large classrooms at the introductory level of higher education and to examine student engagement. Active learning during the class and student-faculty interactions were reported to be significant with regards to student engagement after adopting this model. Due to the focus on large courses in 16 diverse subjects, the impact of the course redesign project has been very high especially in the faculty of arts and science where the total annual enrolment of students in blended courses is over 10,000. Approximately 1,000 first-year students from the science stream are in at least three blended courses (p.112).

An American study successfully conducted by Eichler and Peeples (2016) focused on flipped classroom modules enhancing an active learning approach by using clickers in classrooms and problem-based case studies for general chemistry courses at the foundation level. A higher grade-point average achievement and other successful outcomes are reported by the authors.

A similar study in Malaysia conducted by Danker (2015) used the flipped classroom approach to explore deep learning in large classrooms of performing arts students. The study, which incorporated peer learning and active learning in a technology-supported classroom, concluded that a flipped classroom model successfully engaged students on a deeper level, increased their attention in class, and developed their higher order thinking skills.

The literature reviewed above points to one consistent common theme. There is a wide variety of digital technology along with a high satisfaction rate among the staff and students using it. Besides this commonality, all the studies are unique in terms of the blended model adapted, the type of digital technology implemented, and the size of the target group selected and their participation. Referring to the definition of flipped learning (Flipped Learning Network, 2014), the research studies discussed here focus on the four elements of the acronym FLIP and the teaching approach through their flexibility, creativity, learning outcomes, active student engagement, and professional involvement.

The current study, particularly with a comprehensive TPACK conceptual framework, integrated with technology, pedagogy, and course content, aimed to strike a balance in these three components and maintain it for effective learning.

Methodology

Background

Foundation year students at the Teachers' College in Bahrain are offered a three-credit course in study skills in the first semester of their first academic year. The content of the course focuses on academic skills, people management, task management, and self-management skills, referred as the APT-S framework of study skills, as suggested by Stella Cottrell (2013). In the past years, it was a challenge to teach this hands-on course to large classes with meaningful interactions and sustained interest among students. In addition, the medium of instruction to impart information was English, which was the second language of the students. In the foundation year, many students transitioning from the public school system struggled with understanding instructions and communicating in the English language.

In 2018, this course was one of the shortlisted courses of the college to be part of the online/ blended learning pilot project. To conduct the pilot project, the technology engaged consisted of the LMS of the college--the modular object-oriented dynamic learning environment (MOODLE), a smart board in each classroom, computer labs, and students' personal laptops and mobile devices among other technical resources, and several interactive in-class fun activities. Periodic assessments of small portions of the content, peer group learning through a series of classroom activities, and reflective learning tasks that promoted critical thinking were the other highlights of the course.

The purpose of this study was to implement various technological devices to support student interactions in a large classroom and to encourage independent learning. It also aimed to observe the firsthand response of the students who were a significant part of this research and analyse their engagement in various activities through self-reflections.

In the present case study, the reflections and feedback of diverse sections of students were analysed after a component of their study skills course was used for a web-enhanced flipped learning experience. The descriptive study aimed to explore the level of student engagement in the activity and reduce the time involved in teaching, learning, and assessing the use of technology and face-to-face communication in large classes.

The insights gained by the instructor through the whole process of implementation of the flipped learning model also reinforced the students' responses.

Research Questions

1. How do students perceive flipped learning experience and what are their firsthand impressions of it?
2. How does technology promote student engagement and interactions in a large classroom learning environment?
3. How does flipped learning experience help the students deal with their time management?
4. How does collaboration among students working in small groups in a large classroom contribute towards independent learning and classroom participation?
5. How does blended learning that includes using digital technology in the classroom result in deeper understanding of the content and critical thinking among students?

Flipped learning was applied over a span of two weeks in four 75-minute sessions for each of the four sections. In one segment of the study skills course, college/university exam protocol and test-taking strategies was covered in the four sessions. Students in the four sections of the course were asked to read the notes on this topic that were uploaded to Moodle before they came to class. In class, students were divided into small groups for discussion purposes and asked to prepare questions related to their assigned content. Students were asked to work in their groups and come to the next class prepared to teach the material they had learned to their classmates. Students prepared exercises on PowerPoint slides, quizzes on Kahoot!, posters, and flash cards to support their group's topic presentation.

At the end, students in Sections A, B, C, and D (pseudonyms) were surveyed and asked to answer five questions to assess the value they derived from the activity, identify challenges, and understand lessons to be learned for future iterations of a web-enhanced flipped classroom activity. A total sample of 129 students was taken, of which 102 (79.1%) were female and 27 (20.9%) were male. The students wrote their answers and reflections on these five questions in the response form given to them in the face-to-face class.

The sections were similarly sized, with Section A having 33 students, Section B with 36 students, Section C with 33 students, and Section D with 27 students. These study classes were created based

on the APTIS language test taken by all students at the beginning of the semester. Section D had a larger representation of high-scoring students and Section A was comprised of relatively low-scoring students. Sections B and C encompassed students with average scores, with Section B having a few more high performing students.

Five open-ended questions were posed to the students. Their responses were then sorted into nine categories, in order to simplify statistical interpretation. The open-ended question model was chosen so that students did not feel prompted to limit their answers.

Results and Discussion

Responses to the five questions were collated and analyzed statistically to identify trends. Overall, students most enjoyed the group work (52%) and sharing ideas through interactions (37%) that the blended classroom allowed them to experience (see Table 1). Their challenges were mostly related to formulating questions (50%) as well as managing time (26%) and other academic commitments (20%) (see Table 2). Most of the students claimed to be involved in the question creation (60%) and the creative (writing, editing, designing) side (49%) of the group work, while a significant percentage did not have clearly defined roles to contribute towards the final output and instead reported that their work was mostly in the ideation phase (see Table 3). About 30% of the students noted that the activity deepened their knowledge of the material and 25% found that it improved their communication skills, while over 50% noted that the group work aspect made them more efficient, due to the divided workload (see Table 4).

Table 1

*Summarized Results for **Question 1** -- Things enjoyed the most, according to students' personal reflections after the flipped learning group work*

Answer Categories↓	Sec. A	Sec. B	Sec. C	Sec. D	Avg
Group work	51.52%	61.11%	27.27%	70.37%	51.94%
Sharing ideas/interactions	42.42%	38.89%	27.27%	40.74%	37.21%
Kahoot!	21.21%	22.22%	36.36%	18.52%	24.81%
Creative learning style	15.15%	16.67%	45.45%	11.11%	22.48%
Cooperation/collaboration/sharing	21.21%	19.44%	9.09%	37.04%	20.93%
Public speaking	24.24%	13.89%	12.12%	3.70%	13.95%
Doing quizzes and preparing questions	0.00%	22.22%	9.09%	22.22%	13.18%
Real-life teaching experience	9.09%	13.89%	12.12%	14.81%	12.40%
Diversity/different points of views	15.15%	2.78%	3.03%	3.70%	6.20%

Table 2

*Summarized Results for **Question 2** -- Challenges in preparing for the quizzes, according to students' personal reflections after the flipped learning group work*

Answer Categories↓	Sec. A	Sec. B	Sec. C	Sec. D	Avg
Formulating questions	12.12%	63.89%	57.58%	70.37%	50.39%
Time management	66.67%	13.89%	18.18%	3.70%	26.36%
Other academic commitments	48.48%	11.11%	12.12%	7.41%	20.16%
Language skills	18.18%	5.56%	9.09%	3.70%	9.30%
No challenges	3.03%	16.67%	6.06%	7.41%	8.53%
Class presentation	6.06%	2.78%	3.03%	14.81%	6.20%
Understanding the task	3.03%	2.78%	18.18%	0.00%	6.20%
Using Kahoot!	0.00%	0.00%	15.15%	0.00%	3.88%
Group coordination	3.03%	0.00%	6.06%	3.70%	3.10%

Table 3

*Summarized Results for **Question 3** - Role and contribution to the team, according to students' personal reflections after the flipped learning group work*

Answer Categories↓	Sec. A	Sec. B	Sec. C	Sec. D	Avg
Question-creator	45.45%	52.78%	63.64%	85.19%	60.47%
Writing, editing & drawing	27.27%	47.22%	69.70%	51.85%	48.84%
Presenter	9.09%	27.78%	24.24%	62.96%	29.46%
Brainstorming	45.45%	5.56%	33.33%	11.11%	24.03%
Kahoot!/PowerPoint designer	6.06%	16.67%	27.27%	40.74%	21.71%
Helping team, as needed	39.39%	13.89%	21.21%	11.11%	21.71%
Leader	12.12%	8.33%	18.18%	7.41%	11.63%
All worked together	0.00%	8.33%	6.06%	3.70%	4.65%
Listening to others	9.09%	5.56%	0.00%	0.00%	3.88%

Table 4

*Summarized Results for **Question 4** -- Lessons learned from experience, according to students' personal reflections after the flipped learning group work*

Answer Categories↓	Sec. A	Sec. B	Sec. C	Sec. D	Avg
Improved efficiency	39.39%	47.22%	51.52%	66.67%	50.39%
Deeper knowledge	27.27%	30.56%	42.42%	18.52%	30.23%
Interpersonal communication	33.33%	13.89%	24.24%	33.33%	25.58%
Active communication	27.27%	8.33%	30.30%	37.04%	24.81%
Confidence	9.09%	38.89%	12.12%	18.52%	20.16%
Cooperation	21.21%	13.89%	15.15%	22.22%	17.83%
Presentation skills	18.18%	5.56%	21.21%	0.00%	11.63%
To respect others' viewpoints	6.06%	5.56%	12.12%	22.22%	10.85%
Kahoot!	9.09%	2.78%	21.21%	3.70%	9.30%

These findings are supported by learning outcomes of a similar pilot study of interior design and food nutrition courses conducted by Gomez-Lanier (2018) in which collaboration in flipped learning approach resulted in better critical thinking, time management, and performance. Overall, the activity was well received and students were actively engaged, with 36% of the students wanting to do the activity again and 29% wanting to try different teaching strategies (see Table 5).

Table 5

*Summarized Results for **Question 5** -- Things students would change if repeating the activity, according to their personal reflections after the flipped learning group work*

Answer Categories↓	Sec. A	Sec. B	Sec. C	Sec. D	Avg
Would like to do it again	12.12%	25.00%	48.48%	62.96%	35.66%
Will try other creative teaching strategies	21.21%	16.67%	57.58%	18.52%	28.68%
Will try to do better, greater effort	30.30%	27.78%	24.24%	22.22%	26.36%
More enthusiasm	12.12%	13.89%	12.12%	11.11%	12.40%
Working with different classmates	6.06%	22.22%	3.03%	7.41%	10.08%
Improve presentation skills	9.09%	8.33%	6.06%	14.81%	9.30%
Group task division	12.12%	8.33%	3.03%	11.11%	8.53%

Answer Categories↓	Sec. A	Sec. B	Sec. C	Sec. D	Avg
Deeper subject knowledge	9.09%	0.00%	6.06%	7.41%	5.43%
Flexible with time	12.12%	2.78%	0.00%	7.41%	5.43%

Drilling deeper into the data, it is evident in Table 1 that more students from Section A enjoyed the public speaking component than the average across the four sections. This section also found managing time and other commitments to be a much larger challenge than the other sections, according to Table 2. Section A's resounding response related to oral communication through flipped learning is reinforced by Milthorpe et al. (2018) who explore how blended approach can be effectively applied to a collaborative teaching and learning project in an English program at an Australian university.

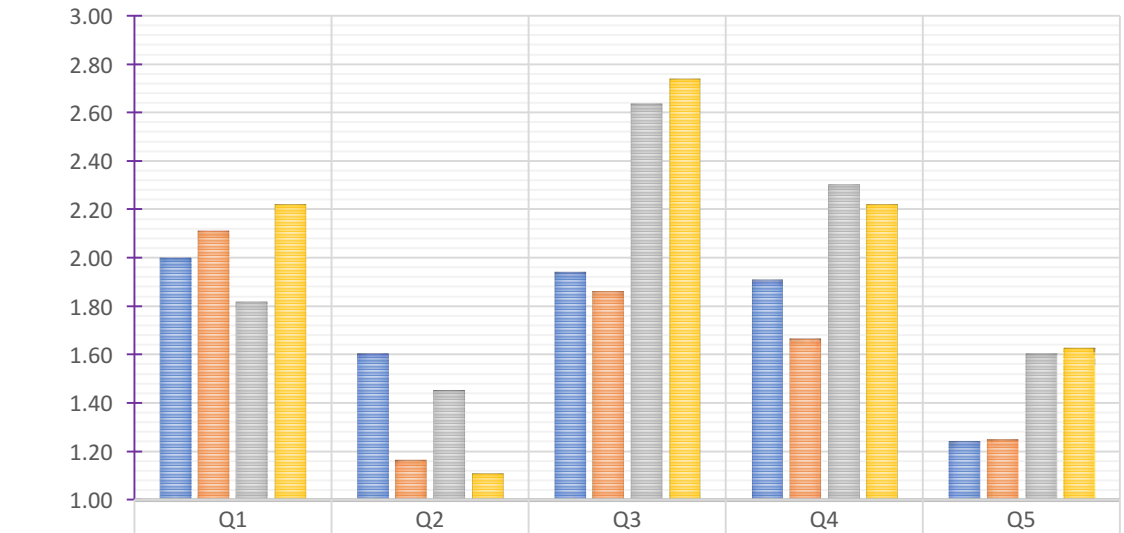
Two-thirds of the class had challenge with time management and nearly half the class struggled with balancing other time commitments. As a whole, only 26% of the total sample struggled with time management and only 20% found other academic commitments to be a challenge. Section D, which reportedly had the highest APTIS scores, found time management to be one of their lowest concerns (3.7%), but found formulating questions to be a significant concern (see Table 2). Over 70% of the class noting this as a challenge could be inferred as an indicator that they were further along Bloom's revised taxonomy of cognitive development than Section A. While Section A operated at the remember and understand levels, Section D operated and was challenged at the evaluate and create levels (see Tables 1 and 2). While this is not a good predictor of individual academic performance, it is a useful indicator of the unified cognition within the groups formed in each of these sections.

Formulating questions was more of a challenge in Sections B, C, and D by a significant differential, further proving the variation in cognitive levels of the whole group in the different sections (see Table 2). This is also evident in the distribution of team roles assumed on average among the four sections. While Section A students were more likely to take on vague and passive roles like brainstorming, helping the team as needed and listening to others, students in Sections B, C, and D were much more likely to note much more defined roles like question creation, writing, drawing, PowerPoint/Kahoot! design as their contribution to their team. This does not mean that there was not an overlap of roles. Table 3 shows that students in Sections B, C, and D were more likely to have an equal distribution of higher-cognitive level functions within each team versus a spearheaded approach found in teams in Section A, where a small number of people tended to lead the team and do the higher-level cognitive work, while the others contributed to more passive roles, like ideation.

This difference is also noted in Question 5, analyzed in Table 5, where participants were asked about what changes they would make if they had a chance to redo the activity. While Section A mainly noted a generic point about putting in greater effort, Section D also noted they found it challenging and would like to do it again. Section B reported that they would like to work with different team combinations, and Section C mentioned using more creative teaching strategies. There was no difference or pattern observed in any answer categories between responses received from male students and those received from female students.

Figure 1

Comparison of the Level of Detail Seen in Student Responses in each Section for each Question, as Measured by the Number of Answer Categories Noted by Students on Average



	Q1	Q2	Q3	Q4	Q5
Section A	2.00	1.61	1.94	1.91	1.24
Section B	2.11	1.17	1.86	1.67	1.25
Section C	1.82	1.45	2.64	2.30	1.61
Section D	2.22	1.11	2.74	2.22	1.63

It is worth noting, as evident in Figure 1, that by far, Section D participants were more detailed in communicating things they enjoyed about the activity, roles they took on in their teams, lessons they learned and things they would change the next time, while also mentioning the smallest number of challenges on average per student. Having been placed in the group with the highest achievers, combined with their attitude towards deep learning, Section D's responses are supported by Overmyer's (2014) study who, in his doctoral dissertation, compares the flipped classroom model with a traditional teaching method for teaching college algebra. While the flipped model incorporated collaborative group work, inquiry-based learning, and active whole-class discussions, the traditional method used lectures and homework. The findings of the research report statistically significant higher academic achievement particularly for those flipped classrooms that used inquiry-based and cooperative learning methods.

Table 1 shows that students from Section C enjoyed the innovative learning style of a flipped classroom significantly more than the average across the sections. This also came across in this section's notes for future iterations of this learning activity as shown in Table 5, since compared to 29% in other sections, 58% of the students in this section wanted to use even more creative teaching strategies next time. This may be related to this section being more committed to the purpose of the activity and their own active learning skills when compared to other sections, even though they did not have the highest average APTIS scores. The positive role of active learning and better student involvement is supported in a study conducted in Turkey by Sengal (2016) who examined the effectiveness of the flipped classroom approach, coupled with problem-based learning and cooperative learning, and evaluated students' perception of this approach. The findings reiterate that active learning with the help of group work leads to better student engagement and academic

achievement. In this case study, the responses from Section C resonate with the findings of Sengal's (2016) study. As evident in Table 2, students from this section were the only ones who found Kahoot! challenging (15% of the class noted it as a challenge, compared to 0% in each of the other sections). However, Table 4 shows that at least some students overcame the challenge of using Kahoot!, with 21% noting it as a lesson learned.

Section B had the most successful group dynamics, based on the instructor's observation. This social comfort level could be a factor in almost twice as many students in this section mentioning confidence as one of the lessons learned, when compared to the sample average (see Table 4). In fact, in this section, students also indicated wanting to try different group permutations and combinations in future iterations of this exercise, noting this as their top choice, if they had another chance to do the exercise, much more so than any of their peers, as evident in Table 5. As seen in Table 1, students across the varying levels of achievement on the APTIS language test had a resounding preference for group work that facilitated their engagement in the activity, helped them share ideas through interactions, and gain deeper understanding of the topic. They also noted that through cooperation and collaboration in their respective groups, they found the tasks more fun, and they were more efficient in their performance. The significance of cooperation and collaboration in flipped learning has been recognized in several studies (Butt, 2014; Enfield, 2013; Lundberg & Sheridan, 2015; Milthorpe et al., 2018; Overmyer, 2014; Sengal, 2016).

With regards to better time management, in an Australian study conducted by Butt (2014), study materials of the course were delivered outside the formal class and class time was used in undertaking collaborative and interactive activities relevant to the materials assigned. The findings of the study endorse the current study and confirm that students' views became much more positive towards the flipped classroom approach by the end of the semester. Similarly, Dean and Wright (2016) shared their experiences related to time management in a high-enrolment lecture-based classroom. The two authors implemented engaged-learning practices into large university classes over a period of four years and the lessons learned from the experience emphasize the need for a significant amount of time in pre-class planning and planning the logistics of an activity that involves active learning. On average, time management rated as the second biggest challenge for the sections in the present case study.

The challenges of using digital technology in classrooms have been discussed in several studies (Bergmann & Sams, 2014; Enfield, 2013; Montgomery et al., 2015; Wang, 2015). An impact study of the flipped classroom approach conducted on undergraduate multimedia students at a California university by Enfield (2013) posed similar challenges. While flipped learning spared in-class time, a lot of time was spent preparing and using the digital devices meant to save this time. Enfield's study also brings up an important issue of making the technology-enhanced instructional material accessible to learners with special needs. On the other hand, an action research study conducted by Montgomery et al. (2015) examines the digital challenges of student engagement in higher education through analysing qualitative data collected from instructors' insights as well as students' performance records and reflections. This indicates that blended learning can be effective for modelling how to use technology in classrooms. Another study conducted by Wang (2015) reports on the wear-out effect of using the game-based student response system Kahoot! in the classroom of a software architecture course on a regular basis over a five months' period. The results

of this quasi-experiment show minimal change in students' positive perception with respect to their engagement, motivation, classroom dynamics, concentration, and learning. The user friendliness and competitive nature of the game are stated to be the factors affecting students' sustained attention. Students in the current case study used Kahoot!, smartboard, and PowerPoint slides to render their presentations and about 25% of them seemed to have enjoyed it (see Table 1). A greater share of high scoring students in Section D (41%) reported being engaged in Kahoot! and PowerPoint design, implying their interest and involvement in it (see Table 3).

Overall, using the flipped learning approach and seeking students' own responses reinforced the firsthand experience of the target group as well as the positive impact of self-regulation in curriculum component implementation. Likewise, many students found flipped learning experience "a creative learning style" with 22% considering it enjoyable (see Table 1) and 36% wanting to repeat the experience (see Table 5).

Sharing tasks and ideas and collaboration in group work undoubtedly topped the list of the most enjoyed part of the activity, irrespective of high scoring or low scoring sections (see Table 1). This approach to group work enhanced their confidence, while half of them also asserted that it improved their efficiency, and about 30% claimed gaining deeper knowledge, implying better learning (see Table 4).

The current study is limited to the findings of only four sections of the foundation year students. These were the sections assigned to the principal investigator to teach that semester, so there was no random selection. Also the sample consisted of 79.1% female and 20.9% male students as per the demographics of a Teachers' College. The sample demographic make up does not affect the results of the analysis. The study focuses on the content of only one component of the course, i.e., university/college exam protocol and test-taking strategies. That is why the duration of the study was only for the two week period required to cover this topic.

Conclusion

This case study of a web-enhanced flipped learning classroom is a detailed descriptive study, and the approach used has been perceived by students as showing positive results such as deeper understanding with better retention of the content by the students, self-regulating student engagement, and highly motivating group dynamics. The flipped learning approach was aimed at enhancing students' confidence in critical thinking through brainstorming in small groups and using technology efficiently and creatively in a larger classroom. The statistical analysis of the findings emphasizes the significance of group work, improved efficiency through better time management, and overcoming digital challenges in a flipped learning experience as seen through students' eyes in this case study. However, this experience also highlighted the need for more sophisticated digital resources, a properly planned and smooth course assessment system in place, and more time available for creating course instructional materials. Further recommendations are as below:

1. The web-enhanced flipped learning approach should be extended to all the sections of the foundation year and to a larger portion of the course curriculum for further research, and response patterns should be analyzed to establish its replicability.

2. The flipped learning experience should be applied to an intermediate or advanced course where a certain foundational level of knowledge, skills and/or experience has already been proven, without the presence of students who do not meet this minimum expected level. When the prerequisite ability of students is at roughly the same level when they start the course, the impact of the FLIP pedagogy on the retention of the course content can be examined, without having to factor in previous variance in capability.
3. Other than PowerPoint slides, mobiles, and Kahoot!, a variety of instructional technology should be explored and their relative impact should be studied.

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