AN INVESTIGATION OF THE EFFECTIVENESS OF FLIPPED CLASSROOM TEACHING IN PROJECT MANAGEMENT COURSE: A CASE STUDY OF AUSTRALIAN HIGHER EDUCATION

Dr. Rakesh Khanal
Asia Pacific International College, Sydney, Australia
rakesh.khanal@apicollege.edu.au

Abstract

This paper is a pedagogical experimental study which describes a trial of a flipped-classroom approach of teaching within the context of project management education to a cohort of international students. Project management being an applied course cannot be learned entirely thorough a textbook under traditional teaching setting. Therefore, a flipped-classroom approach has been introduced to address the need to transform the traditional teaching pedagogy to foster active learning in project management education. The flipped classroom model adopted in the present paper has three important components: offloaded content made available through an online learning management system, student-centred in-class activities and three major assessments. The result of factor analysis revealed that pre-class activity has a greater role to play in the success of a flipped class. The result of the study further shows that the flipped-classroom approach is effective in enhancing student's performance in terms of the final grade and overall student learning experience. Also, the results show that flipped classroom approach led to a significant increase in student performance on average as compared to the traditional

lecture-based approach suggesting that the flipped classroom approach is a good substitute to traditional lecture-based teaching for an applied course such as project management. More importantly, flipped classroom teaching could serve as a good tool for Emergency Remote Learning (ERL) to substitute Face-to-Face teaching amidst the COVID-19 pandemic.

Keywords

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1. Introduction

Project management is known to mankind for centuries. However, it is not until the mid-20th century that project management gets its recognition as a profession (Project management institute, 2017). Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirement (Project management institute, 2017) and thus is a discipline rooted in practice. Being a young academic discipline, project management has attracted considerable attention from the researcher on various facets of project management study since the mid-1990s (Garel, 2013). However, research is scarce on the aspect of effective teaching pedagogy for project management courses (Ingason & Gudmundsson, 2019). Therefore, this work is primarily focused on investigating the effectiveness of flipped classroom pedagogy for teaching project management course.

1.1 Background

The flipped classroom method is one of the innovative teaching approaches adopted by many educators as an alternate to the traditional lecture-based approach of teaching to foster active learning (Butt, 2014; Kim, Kim, Khera, & Getman, 2014). Active learning enhances graduate attributes such as critical thinking, teamwork, communication skills and overall learning outcomes. Thus, it contributes towards fostering higher order-thinking, problem-solving and critical analysis skills. All these attributes are essentials to become a successful project manager.

In recent years, colleges and universities, in particular, private higher education providers in Australia have faced considerable scrutiny from the regulatory bodies such as the Tertiary Education Quality Standards Agency (TEQSA) to ensure the quality of education provided by higher education providers. One of the tools employed in this regard is the Australian Quality

Framework (AQF) with each level defined by a set of learning outcomes and graduate attributes to be attained by a graduate at a particular level of qualification. Among the graduate attributes listed in the AQF framework, critical thinking, teamwork and communication skills are thought to be at the core of higher education. A student with poor performance in terms of these graduate attributes are reported to have higher unemployment rates (Arum, Esther, Jeannie, & Roksha, 2012). On the contrary, some researchers (Arum & Roksa, 2011) argued that students are not learning these key graduate attributes and thus their future employability is being affected. Such ongoing issues related to the quality of education has drawn attention to the need to transform traditional curricula and teaching approaches to better equip students to prepare for success in today's global economy (McLaughlin et al., 2014). Flipped classroom teaching is a promising solution to equip graduates with employable skills such as critical thinking, teamwork, and communication.

The core of a flipped classroom method is active learning. By flipping the classroom, deeper learning can be achieved as part of active learning by assigning activities before and during class time. The main idea of a flipped classroom is to flip the instructional approach where the teacher creates videos and interactive lessons to be completed by the student before class time (most likely at home) while class time is best utilized to work through problems, advance concepts and to engage in collaborative learning. This way the information imparting session of a traditional lecture-centered class can be better utilized for deep learning. A flipped classroom approach has two facets: computer-based individual learning and interactive and collaborative learning inside a classroom. In a flipped classroom, content delivery takes place through LMS with offloaded content whereas the classroom time is more utilized in active learning through various interactive and collaborative activities.

1.2 Literature Review

The flipped classroom approach is a universal approach to teaching irrespective of the faculty or department. The flipped classroom approach is becoming a popular teaching method in Science, Engineering, Medicine, Social Science, Management, a few to name. In a recent study, Bergfjord and Heggernes (2016) reported an overall higher course satisfaction level in students with better grades in Strategic Management class with a flipped-classroom approach as opposed to the traditional method of teaching at Bergen University College, Norway. Similarly, Moravec et al. (2010) reported an increase of 21% in student's performance on Exam when a course

(introductory Biology) was taught using a flipped-classroom approach (Learn Before Lecture) as compared to the traditional lecture-based approach. McLaughlin et al. (2014) flipped a first-year Pharmaceutics course at the University of North Carolina and showed that flipping the traditional classroom is feasible and necessary to empower a student to develop higher-order cognitive skills and to engage in meaningful learning.

The importance of a flipped-classroom approach in cultivating critical and independent thinking in students and thus preparing them for future job market has also been highlighted by O'Flaherty and Phillips (2015). Albert and Beatty (2014) assessed the effectiveness of the flipped classroom model against the lecture-centred traditional approach on student grades for the Introductory Management course. Their result showed that the overall grades were higher for the cohort taught with a flipped model as compared to the cohort taught with the traditional approach. A similar result of higher test scores with a flipped classroom model was also reported by Papadopoulos and Roman (2010) for an Engineering course. The flipped classroom approach of teaching is also suitable for a class with a large number of students. Vazquez and Chiang (2015) used a flipped-classroom approach to teach the microeconomics class with more than 900 students. Their result showed that a flipped-classroom approach motivates students to come to class better prepared which in turn adds value to an overall student learning experience. Similarly, in another study, Chen and Chuang (2016) examined the effectiveness of a flipped-classroom approach with a cooperative learning approach for a project management course. They reported that the combination of the flipped classroom approach and cooperative learning strategy enhances the student learning experience and help the student learn the technical skills necessary to be a project manager.

1.2.1 Rationale

It is evident from the above discussion that the flipped classroom model is an excellent approach as compared to the traditional lecture-centred teaching to foster critical thinking, teamwork, communication skills, problem-solving, and critical analysis which are among the important graduate attributes required for students to prepare for future career and to the potential job market. Because of the value-added to student's learning, there is a growing number of research published on the practice of flipped learning (see, for example, Zainuddin & Halili, 2016). A recent review (O'Flaherty & Phillips, 2015) on the topic highlights that most of the work in this area has been carried out in the American context with very few related to an

Australian context. Also, to the best of the author's knowledge, no work on the flipped practice of teaching at postgraduate project management course in the context of Australian private higher education (non-university higher education provider) has been reported in the open literature. This is the impetus behind the present work which reports a trial of a flipped-classroom approach in teaching postgraduate level project management course at Asia Pacific International College (APIC), a private higher education provider in Sydney, Australia. Also, this study presents a discussion on the use of flipped classroom teaching as a tool for Emergency Remote Learning (Rahiem, 2020) to substitute Face-to-Face teaching amidst the COVID-19 pandemic.

2. Pedagogical Approach

Although various approaches of the flipped classroom model have been implemented by educators (Amiel & Wilson, 2012; Bretzmann, 2013), the very essence of any flipped classroom model is to transform the student from passive to an active learner by engaging them in the problem-solving and higher-order of critical thinking through collaborative and challenging class activities. A traditional class can be flipped in many ways and thus there is no single model to be adopted. The model adopted largely depends on the operational definition of the flipped classroom established by the teacher as there is no single agreed definition of a flipped-classroom approach reported in the literature (Abeysekera & Dawson, 2015). For the present study operational definition developed for the flipped classroom consists of the pedagogical approaches of moving most of the information imparting sessions out of the class and using the class time for active learning with assessment task at a regular interval.

The success or failure of a flipped-classroom approach largely depends on the student as this is a student-centric approach. Therefore, it is the responsibility of an individual student to come prepared for the class with the materials practice before-hand as instructed and to take part actively in the classroom activities and to engage in-class discussion. While designing the flipped model for the present study it was expected that students would allocate at least 4 hours out-of-class time for pre-class activities as subject policy expects a student to do an equivalent amount of personal study for the subject. It is noteworthy that student engagement in out-of-class and in-class activities largely depends on the level of motivation. The relationship between student motivation and a flipped-classroom approach is not well understood and is out of the scope of the

present work. However, for the present study, it was expected that the learning environment created by a flipped-classroom approach leads to a higher level of student motivation (Abeysekera & Dawson, 2015).

It is to note that a flipped classroom model was adopted for the first time in APIC to teach project management subject at the postgraduate level. To conduct this pedagogical study, Project Risk, Quality and Procurement Management (hereafter referred to as QRP) subject was chosen. The rationale for choosing this subject was the availability of data for comparison against a lecture-based approach for the same subject. There were 70 intentional students, the majority of them were from South-East Asia, enrolled for the subject with no prior experience of learning in an environment other than traditional (Face-to-Face). Therefore, it was a challenge to introduce the flipped classroom model to a cohort that has never been taught in an approach other than the traditional.

2.1 Flipped Model

The flipped classroom model adopted to teach project management subject is depicted in Figure 1 consists of three basic components: pre-lecture offloaded content; student-centred in-class activities and appropriate assessment. A similar pedagogical approach of the flipped classroom has also been reported by Mclaughlin et al. (2014).
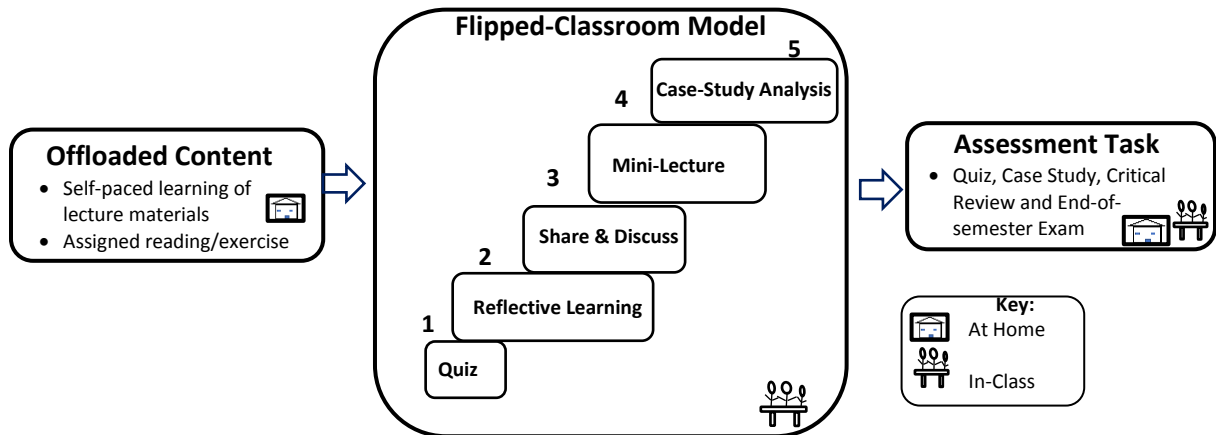
Figure 1: *Flipped Classroom Model Adopted for Teaching Project Management Subject.*

The flipped classroom model adopted was designed to utilize in-class time for meaningful learning and to encourage students to be more active participants which in turn will facilitate student needs for autonomy and competence as pointed out by self-determination theory (Cole, Feild, & Harris, 2017). As shown in Figure 1 all lecture modules consisting of

PowerPoint slides and companion readings and exercises were offloaded to Learning Management System (LMS). The offloaded content aimed to provide mobility to student learning by enabling them to have access to learning resources anywhere anytime and with various devices at their own pace before the actual class time. Learning Management System is key to administer web-based learning activities (El-Mowafy, Kuhn, & Snow, 2013). With this approach, the class time can be used in more meaningful and collaborative learning with various activities designed to encompass more critical thinking and problem-solving. Learning Management System at APIC is referred to as the Online Learning System (OLS), which was a Moodle-based platform. This platform has recently been changed to Canvas.

With offloaded content available in OLS, it was expected that student got themselves prepared for the class by going through the lecture materials, assigned reading and some exercises. These activities were done outside the class-time by the student at their own pace and comfort. This was every week preparatory work for the class. With this preparatory work beforehand, the class time was dedicated to student-centred learning designed to assess fundamental knowledge, promote critical thinking, engage in meaningful discussion and collaborative work. Fundamental knowledge of the subject was assessed through "Quiz" at the beginning of a class based on the offloaded content. The quiz consisted of 10 to 15 multiple choice questions and lasted for 15 minutes. Following the quiz was the feedback and discussion. This activity allowed the student to consolidate their understanding of the fundamentals and to highlight the area for further improvement. Following the quiz was "Reflective learning" where students were given 15 minutes to reflect upon what they had learned based on offloaded reading materials (journal articles, conference paper, report, etc.) and asked to participate in class discussion. This activity lasted for 25 to 30 minutes. During the reflective learning phase, students were encouraged to discuss what they learned concerning real-world practice. Following the reflective learning was "Share and Discuss" where students worked in a group to prepare answers for a given question and to share ideas among each other. Students afterwards presented their answers and ideas to the class which was followed by feedback from the lecturer. Another important part of the flipped classroom was mini-lecture where the lecturer used the time in class to reinforce the important concept and to answer and discuss any question raised during the active learning phase of the class. It is noteworthy that this was not a typical F2F lecture. The last component of the flipped classroom was "Case study analysis" which was a group work where

students in the group discussed, shared and analyzed the given case and presented their answer to the class. This activity was different from the previous activity- Share and Discuss in a way that this activity involved Case study rather than an individual question and gave the student a wholistic outlook to a scenario/problem.

2.2 Assessment Regime

Central to any pedagogical and curriculum design is an assessment regime. The assessment regime designed for QRP allowed students to develop deep learning and engage in higher-order thinking. Every week Quiz, Reflective Learning and Share & Discuss enabled the lecturer to make formative assessments of student learning. Also, such assessment allowed the lecturer to give immediate feedback on student's questions, misconceptions and to help student fill their knowledge gap. In QRP students' understanding of the subject content and their ability to achieve desired learning outcomes was assessed through ten graded quizzes (worth 10% of final grade), one case study (worth 20% of final grade), one critical review (worth 30% of a final grade) and one comprehensive end-of-semester examination (worth 40% of a final grade). Quiz and Exam were individual assessments whereas case study and critical review were group assignments. It is to note that the case study as an assignment was different than "case study analysis" done in class. It is also noteworthy that the assessment regime for QRP placed equal importance on individual and group work. Through various team-based activities, students develop teamwork skill which is one of the key graduate attributes required to be successful in professional work as a project manager. Case study and critical review provide an opportunity for the student to develop higher-order thinking and assessed student's ability to evaluate, analyse, synthesis and present materials in a coherent and structured manner that is consistent with Bloom's Taxonomy of Learning.

3. Research Method

Student performance in QRP and perception about the flipped classroom approach must be evaluated to assess the effectiveness of this new approach in teaching project management subject. To evaluate student performance, subject results from the preceding semester where the traditional approach (F2F) was employed were analyzed and compared against the result obtained with the flipped classroom approach. As the subject was taught in the preceding semester by the same lecturer with similar content and assessment components, it was, therefore,

considered comparable for analysis of the subject final grade. The paramount importance of introducing any pedagogical approach is to improve student learning. To access how student learning has been improved, Student Evaluation of Teaching and Student Evaluation, of Course, have been widely adopted. However, there have been some concerns about the result of such surveys and how irrelevant factors appear to influence student response (McPherson, 2006). Therefore, in this paper, grade distribution and student's in-class survey result had been used primarily to evaluate the effectiveness of the flipped classroom model in enhancing the student learning experience in the project management course.

The survey was administered during the final teaching week (week 12) which consisted of eight questions designed to solicit students' opinions about the flipped classroom teaching approach and their satisfaction with various in-class activities using the five-point Likert scale ranging from " Strongly Disagree" to "Strongly Agree". The survey response rate was 65% and the data were analyzed using IBM SPSS.

4. Results and Discussion

This section presents the result of statistical analysis that was carried out in SPSS along with the discussion on its implication.

4.1 Factor Analysis

The data below shows the measures of the reliability of questionnaire items and the conformity of data suitable for the exploratory factor analysis (EFA).

Table 1: *Measures of Reliability and Adequacy of Data for EFA*

Measure	Value
Cronbach Alpha	0.75
Bivariate Correlation	r >0.3
Bartlett's Test of Sphericity	97.62
Kaiser-Meyer-Olkin Measure of Sample Adequacy	0.7

The reliability of the survey questionnaire in terms of internal consistency was tested using Cronbach's alpha. Cronbach alpha statics is most useful for indicating scale reliability in terms of equivalence of items in a single construct scale (Taber, 2018). The value of alpha was calculated using the formula:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k}\sigma_{y_i}^2}{\sigma_x^2}\right) \qquad (1)$$

Where, σ_x^2 is the total variance observed in each questionnaire for all participants and $\sigma_{y_i}^2$ is the total variance observed for each participant for all questions. The calculated Cronbach's alpha value of 0.75 indicates a desirable level of internal consistency of the survey questionnaire as the value of Cronbach's alpha of around 0.7 or greater is widely considered desirable (Taber, 2018). The strength of inter-relationship among variables was tested through *Bivariate correlation analysis* that shows $r > 0.3$ confirming the patterned relationship among variables (Yong & Pearce, 2013). This result was further verified by *Bartlett's Test of Sphericity* $\chi^2(28) = 97.62, p < 0.001$. Further, *Determinant score* of 0.91 confirms the absence of Multicollinearity. Finally, the adequacy of data for EFA was confirmed by the Kaiser-Meyer-Olkin measure (KMO), which was well above 0.5. These initial tests confirmed that a distinct and reliable factor could be produced from the survey data to understand the underlying dimensions of the questionnaire items.

Using Kaiser's criterion of eigenvalue cut-off of 1.0 (Kaiser 1960 as citied in Yong & Pearce, 2013), two factors were extracted using the Principal axis factoring method. Cattell's scree plot (refer to Figure 2) confirmed the finding of retaining two factors solution. In the scree plot, the number of factors to be retained was determined based on point of inflexion such that those factors to be retained lie above the point of inflexion. It can be seen from Figure 2 that beyond the point of inflexion the remaining eigenvalues are relatively small and of comparable size and hence not considered based on Kaiser's criterion. It is to note that eigenvalue represents the total amount of variance that can be explained by a given factor. The first factor explains the most and the last factor the least.
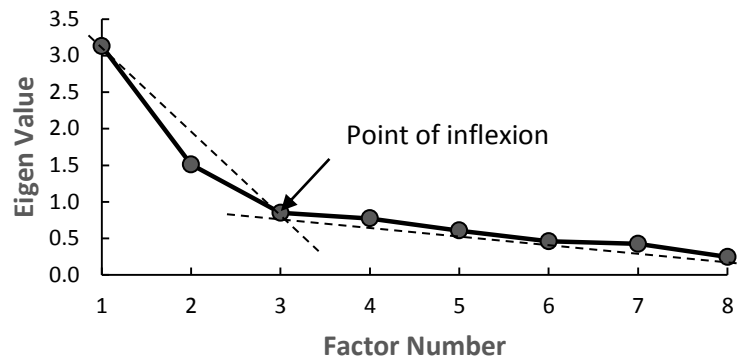
Figure 2: *Cattell Scree Plot for Data Showing Point of Inflexion.*

Table 2 shows the factor loadings after Varimax rotation with Kaiser normalization and using a significant factor criterion of 0.3.

Table 2*: Rotated Factor Matrix with Varimax Rotation for Two Factor Solution*

| Question Number	Question Item	Factor	
		1	2
Q1	Learning key concept before coming to class greatly enhanced my learning	0.713	
Q4	I participated and engaged in-class activities	0.678	
Q2	The mini lecture helped me in understanding important concepts	0.658	
Q8	In-class assessment test my basic understanding of the subjects	0.553	
Q3	Interactive in-class activities enhanced my learning	0.519	
Q6	I read assigned readings from Journal prior to coming to class		0.912
Q5	In classroom discussion, concept sharing with my peers enhanced my learning	0.514	0.534
Q7	Assigned reading from Journal is for enhancing my learning		0.327

It is evident from Table 2 that there exists a good correlation between the question items and the factors such that each factor is defining a distinct cluster of interrelated variables. However, a closer look of the data reveals that item 7, i.e., Q5 ("In classroom … my learning") loads at higher than 0.3 on two factors resulting in a condition of cross-loading or split loading (Costello & Osborne, 2005) and thus makes it a complex variable. For the present study, this complex variable is retained (the difference is greater than 0.2) under Factor 1 as it is the latent nature of the variable to give rise to a common underlying construct (active learning: in-class

learning). This way all six active learning items loaded together on the first factor and all assigned learning items loaded together on the second factor.

It is also evident from Table 2 that all Active learning items are strongly loaded (0.5 or better) and thus Factor 1 indicates a solid factor. Whereas, only one item (Q6) is strongly loaded on Factor 2 while another item (Q7) is marginally loaded. It is to note that number of items (variables) in Factor 2 is also small. Some authors (Costello & Osborne, 2005) argue that if items are less than 2, a factor can be considered weak and suggest reducing the item number. However, for this study, no item was reduced, and it was believed that these factors were still useful in exploring the data set as the nature of this study was exploratory.

4.2 Conceptual Model

Figure 3 presents a conceptual model of the 2-factor solution with varimax rotation for the present study. A close comparison of this model with the flipped classroom model adopted in this study (refer to Figure 1) revealed that the items in Factor 1 largely contributed to the underlying dimensions of active learning whereas those of Factor 2 contributed to the underlying dimensions of offloaded content. This comparison further showed why keeping the weak factor (Factor 2) was crucial to understanding the overall construct of this study. As evident from Figure 2, the underlying dimensions of 8 question items were clustered around two factors representing a construct of flipped learning.
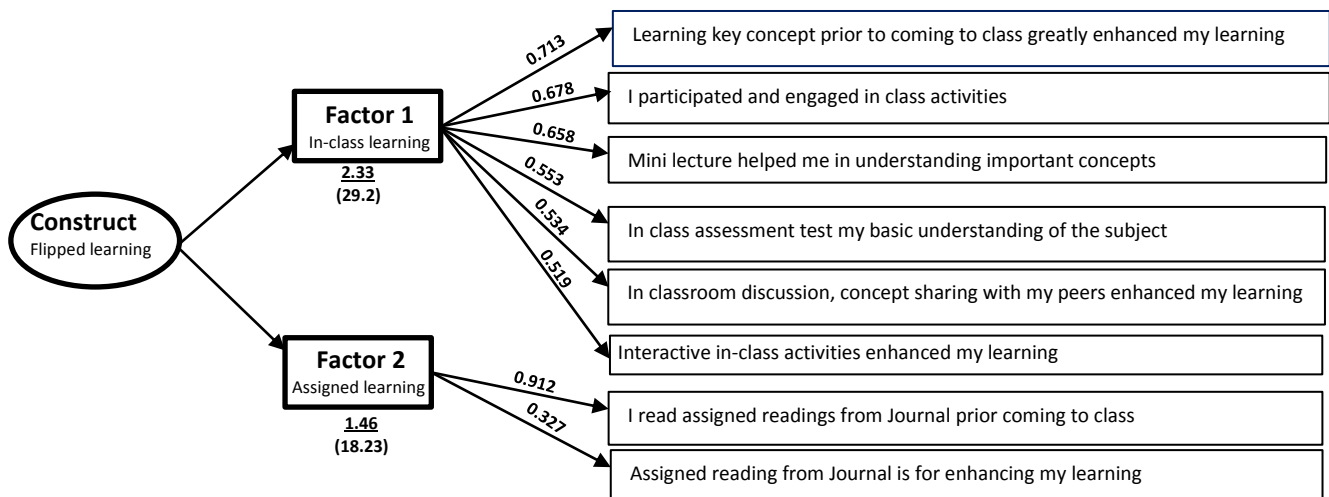
Figure 3: *Conceptual Model of 2-Factor Solution. Number in Bold Represent Factor Loadings, Number in Bold Underline Represent Eigenvalues and Number in Parenthesis Represent Percentage of Total Variance Explained*

Figure 3 also shows the total variance explained by the first two varimax rotated factors solution such that Factor 1 explains 29.2% of the variance in the items and Factor 2 explains 18.23% of the variance. Thus, 47.49% of the variance in the items is explained by the first two extracted factors. Descriptive statistics for mean factor scores of items on each factor were generated for the 2-factor model (refer to Table 3). Mean values as shown in Table 3, indicate that items in Factor 1 strongly contribute to measuring a common theme in the questionnaire as compared to Factor 2.

Table 3: *Descriptive Statistics for 2-Factor Model*

Factor	Mean ± SD	Range
Factor 1 In-class learning	4.07 ± 0.70	2 - 5
Factor 2 Assigned learning	3.63 ± 0.72	2 - 5

4.3 Students' Perception

To further understand students' perception of active learning (in-class learning), a one-sample *t*-test was conducted to compare the mean opinion rating of factor items (questions) with a neutral rating of 3. In a recent study (Pattanaphanchai, 2019) similar approach has been used to understand student's satisfaction of the flipped classroom teaching. The result of the t-test is shown in Table 4.

Table 4: *One-Sample T-Test of the Mean Opinion Ratings for Factor 1*

Item	Mean (SD)	t	df	P	Mean % difference
Learning key concept before coming to class greatly enhanced my learning	4.21 (0.623)	*13.339*	*46*	*<0.001*	40
Interactive in-class activities enhanced my learning	4.15 (0.788)	*9.918*	*45*	*<0.001*	38
Mini lecture helped me in understanding important concepts	4.09 (0.654)	*11.379*	*46*	*<0.001*	36
In classroom discussion, concept sharing with my peers enhanced my learning	4.09 (0.725)	*10.169*	*45*	*<0.001*	36
In class assessment test my basic understanding of the subjects	4.02 (0.577)	*12.011*	*45*	*<0.001*	34
I participated and engaged in class activities	3.85 (0.834)	*7.000*	*46*	*<0.001*	28

The result shows a significant difference (statistically) between the mean opinion rating and the neutral rating of 3 with *p <0.001* for all items. The difference ranges from 28% to 40%

with the mean in the range of 3.85 to 4.21 indicating strong agreement that active learning (flipped teaching) helped a student improve their understanding of the subject and increase their engagement in class. The result further reveals that students perceived and agreed that learning important concepts and ideas of the topic before coming to the class is very crucial in their learning. This is evident from the highest mean score of 4.21 obtained for the first item ("Learning key … learning") of Factor 1. This result further indicates that pre-class activity (learning key concepts) has a greater role to play in the success of flipped teaching. Overall, the finding revealed that students were satisfied with in-class learning and had a strong positive opinion about studying concepts before coming to class, interactive activities, mini-lecture, in-class discussion, concept sharing, in-class assessment, and various class activities. It is to note that all these activities were the major part of the flipped classroom model adopted in this study (refer to Figure 1).

Further analysis of descriptive statistics for items in Factor 2 revealed that though student positively agreed on the purpose of assigned reading their participation were not good. This was further confirmed by the mean value of 3.96 (SD = 0.63) for item 2, i.e., Q7 ("Assigned … my learning") with the strong positive contribution, whereas, item 1, i.e., Q6 ("I read … to class") had least contribution (Mean = 3.30 and SD = 0.805) in measuring the underlying theme of assigned learning.

To investigate whether there was a significant difference in student performance between flipped learning and traditional face-to-face learning, the Chi-square method was used to analyse the data. This analysis allows us to determine if the relationship between teaching practice and student performance can be extended to the larger population. The final letter grade obtained for the subject was used as an indicator of the student's overall performance in the subject. Table 5 shows the performance measure of the flipped classroom and face-to-face students by grade category.

Table 5: *Percent of Students in Two Different Teaching Modalities Earning a Final Letter Grade for the Subject*

Final Subject Grade	Flipped	Face-to-Face
Distinction (D)	1%	2 %
Credit (CR)	19%	18%
Pass (P)	63%	37%
Pass Supplementary (PS)	0%	18%
Fail (F)	16%	24%

The result of Table 5 shows that student pass percentage with flipped classroom teaching increased by more than 50% as compared to Face-to-Face teaching which a significant improvement was. This shows the effectiveness of flipped modality over F2F. This result was further corroborated by the result of the Chi-square test ($\chi^2(4) = 18.5, p < 0.05$) which showed statistically significant result improvement in student performance with the flipped classroom teaching as compared to face-to-face teaching. It is noteworthy that the result of Table 5 further suggests that the flipped classroom method of teaching is more beneficial to below-average students who often struggle to pass the subject. This result is consistent with the result of Bergfjord and Heggernes (2016) that the flipped classroom approach proved to be helpful to weaker students to obtain the Pass grade. It is conjectured that unlike the traditional learning approach where students act more like a passive listener and there was no prior demand for students to come prepared for the class and actively participate in-class activities, the pedagogical approach of the flipped classroom made students to get prepared before the class using the offloaded content and to actively engaged in classroom activities thus enabling them to master fundamental knowledge and to increase their independent subject work during the class time. The active involvement in class ultimately enabled students to perform well in all assessment components.

Further to the letter grade comparison, overall grade value was also compared between the flipped method of teaching and F2F teaching. As mentioned in Section 3 (Research Method), results should be comparable as the subject had been taught by the same lecturer with similar subject content and assessment components. For this purpose, the individual grade was converted into a corresponding numerical value and the total grade value for a cohort was calculated which was then normalized by the total grade point. The result of this comparison is shown in Table 6.

Table 6: *Grade Value Comparison between Different Modality of Teaching*

| Teaching Modality	Normalized Grade Value
Face-to-Face	6
Flipped	10.4

It is evident from Table 6 that the normalized grade value for the flipped classroom method is significantly higher as compared to F2F teaching. This result further corroborates the earlier results of the effectiveness of flipped classroom teaching over traditional face-to-face

teaching. This improvement is attributed to a new pedagogy: flipped classroom, which is effective in enhancing student performance, particularly in a project management course.

5. Emergency Remote Learning

The COVID-19 pandemic has created unprecedented health crises and affected every sphere of life across the globe, including education. In the education sector, this crisis resulted to what is now being called "quarenteaching" (Pace, Pettit, & Barker, 2020) that compelled academics to take the breathtakingly fast transition from brick-and-mortar classroom to the virtual classroom. This pedagogical transition as a result of the emergency has been referred to as Emergency Remote Learning (ERL) in education literature (Hodges, Moore, Lockee, Trust, & Bond, 2020). With new outbreaks, international border close and lockdowns looming, the immediate future for the educational sector is uncertain. Thus, the education sector (schools, colleges, and universities) around the world are reviewing, rethinking and redesigning their pedagogical approaches to come up with the strategies that would make their teaching stimulating, engaging and safe. A flipped classroom could be one of such pedagogical approaches for ERL whose effectiveness in F2F teaching for project management course has been shown in the present study (refer to Section 4-Results and Discussion).

To make the flipped model adopted in this study (refer to Figure 1) suitable for ERL, the present author modified the model and adopted a new teaching model which is referred to as the Emergency Flipped Teaching (EFT) model. The EFT model uses the component of the current flipped model and MicroFlip Teaching (MFT) model (García-Peñalvo, F. J. Fidalgo-Blanco, Sein-Echaluce Lacleta, & CondeGonzález, 2016) and is depicted in Figure 4.
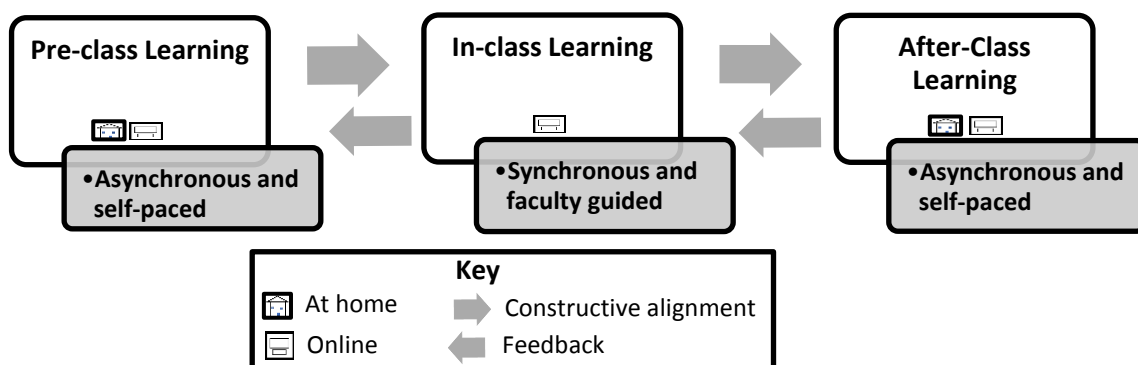
Figure 4: *Emergency Flipped Teaching (EFT) model adopted for ERL*

As seen in Figure 4, the EFT model has three components: Pre-class Learning, In-class learning and After-Class Learning. These components are connected through carefully designed learning activities that are constructively aligned (Biggs, 2014). Besides, this model allows feedback in two stages: synchronous feedback (real-time feedback) to pre-class learning and in-class learning and asynchronous feedback to after-class learning which can be used for course improvement. This way student does not have to wait till the end of the course to provide their feedback through the Course Evaluation Questionnaire. The proposed EFT model is currently being used to teach project management subjects by the present author at APIC, where Zoom is used for Synchronous learning utilizing its breakout rooms feature for collaborative sessions. As the EFT model is currently in practice, its effectiveness is yet to be reported. However, the initial outcome and feedback have shown great potential for this model for ERL.

6. Conclusion

This paper discussed the trial of introducing the flipped-classroom approach to teach the postgraduate project management subject at Asia Pacific International College, Sydney. This study highlights the importance of active learning pedagogy, the flipped classroom, which is necessary to enhance students' learning experience and to achieve graduate's attributes much needed to be successful in the project management profession. The flipped classroom approach is feasible to implement, however, there is no single model to be adopted. Nevertheless, the core features of the flipped classroom such as content in advance, collaborative and higher-order learning in-class should be the part of an adopted model. The flipped classroom model adopted for F2F teaching in the present paper consists of three main features: offloaded content using an online learning system, collaborative and high-order thinking in-class activities and appropriate assessment task during the semester and at the end of the semester.

It is evident from the result of this trial study that the flipped classroom model can enhance student performance and overall student learning experience and is an effective pedagogy for teaching project management courses. The result shows significant improvement in student performance in terms of average subject grade point for a flipped class as compared to the traditional lecture-based class. The outcome of the present study is encouraging but to further validate the result it is necessary that a similar study need to be conducted for a large sample with different courses. This is the limitation of the present work, where a small sample size had

been used for a single course. Nonetheless, the outcome of this study suggests that a similar approach to active learning could be adopted for crisis teaching amidst the COVID-19 pandemic. Therefore, this study proposes one such flipped model, named Emergency Flipped teaching (EFT), suitable for Emergency Remote Learning (ERL) which incorporates three components: Pre-class learning, In-class learning and Post-class learning. It is to note that to implement the proposed model, curriculum redesign is necessary to integrate Pre-class, In-class and Post-class activities in line with course learning outcomes as these activities are paramount for effective flipped pedagogy.

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