Combining Synchronous and Asynchronous Learning to Engage Learners in an Online Class

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Abstract— A shift in the mode of learning and teaching delivery has occurred in the changing pedagogical landscape of the world. Online and blended learning have gained momentum due to evolving technologies and their capability to provide the flexibility of place or distance. Although online and traditional face-to-face mode of delivery share many fundamental aspects for both student and educator, there are significant differences between these modalities. Therefore, carefully considered pedagogical design and well-planned approaches are required instead of retrofitting online technologies in a traditional face-to-face classroom. The study presented the online application of a blended learning model and compared student learning experience between traditional face-to-face format and blending learning platform. The study results indicate no significant different between these those modes of delivery and concludes that online delivery with carefully considered pedagogical design approaches can maintain student engagement. However, further research is warranted.

Index Terms— Asynchronous learning, Blended learning, Online delivery, Civil engineering, Comparative study

I. INTRODUCTION

The world has experienced a shift in the mode of learning and teaching delivery. In the changing pedagogical landscape, online and blended learning have gained significant attention as they can capitalise on evolving technology and provide the flexibility of place or distance. Both online and traditional face-to-face mode of delivery share many fundamental aspects for both student and educator. Students are still required to participate classes, understand the learning materials and submit their assessment tasks whereas educators still have to design and plan the delivery to maximise student learning, answer student queries and provide the grading. However, there are significant differences between these modalities. Therefore, carefully considered pedagogical design and well-planned approaches are required to create new opportunities for learners to develop independence in their online learning and to overcome the relevant challenges of designing and delivering learning activities.

Online learning can be a means of providing new opportunities for learners including increased interactions, communication, motivation and participation [1], In addition, it can be a tool for developing particular self-management skills for learners such as time management, reflective thinking and independence in their learning [2]. Online learning environment needs to be developed to engage learners and to overcome the challenges of designing and delivering learning activities on the online platform with the planned use of pedagogically appropriate intervention instead of simply adding digital technologies to the traditional face-to-face learning structure [3].

A blended learning model was developed at Melbourne Polytechnic (MP) to deliver pedagogically sound online learning and to provide a quality learning experience. Very few studies are conducted to identify the effectiveness of this learning model. The objective of the current study is to understand whether learning engagement can be maintained in online delivery using the Melbourne Polytechnic Blended Learning Model (MPBLM). The study presents the application of the MPBLM to engage learners in a fully online setting and compares student learning experiences and outcomes with those achieved in a face-to- face learning environment.

The paper is structured as follows: the next section presents some comparison of face-to-face vs. online learning. That is followed by a description of the blending learning model. The application of model in a course offered to civil engineering students is then presented. The paper concludes with a summary and an outline of areas for future research.

II. TRADITIONAL CLASSROOM VS. ONLINE LEARNING

The traditional face-to-face classroom is a well-established learning and teaching method used over many centuries. Face-to-face classroom instruction is dynamic in nature as traditional face-to-face teaching provides real time interactions, stimulates encouraging discussion and sparks creative innovation questions. A number of benefits are particularly associated to this face-to-face instructional method and these cannot be found in online learning [4]. On the other hand, online learning provides a number of benefits such as the freedom to communicate with instructors, connect with classmates and complete assigned tasks from anywhere without sacrificing work time, family time and travel expense [5]. In addition, online learning platform provides program choice and time efficiency [6] and flexible study hours [7]. Some studies have summarised success of flipped and blended learning at a number of institutions [8], [9].

Researchers are still questioning the ability of online education to provide desired learning outcomes although there are recent reports supporting and advocating for online learning. Research is still being undertaken on the proper utilization of online learning platform. Provision of pedagogically appropriate online learning, desired student learning experience, distinctive student academic outcomes and the transformation of students from learners to self-motivated professionals at the completion of the learning journey are now being considerably paid attention to measure the suitability of online education as a sustainable substitute for face-to-face learning. In this context, the aim of the current study is to understand whether learning engagement can be maintained in online delivery.

III. MELBOURNE POLYTECHNIC BLENDED LEARNING MODEL (MPBLM)

The Melbourne Polytechnic Blended Learning Model (MPBLM) was developed to reflect the breadth of ways for applying blended learning across vocational and higher education programs and to provide a quality learning experience for students. This blended learning model is intended to retain a learner-centred approach of learning and to support the Melbourne Polytechnic vision of developing the capabilities of students for industry readiness and to thrive in a rapidly changing world.

The MP definition of blended learning is: *"Blended Learning at Melbourne Polytechnic means that you will be connected to your learning and assessment through a combination of in-person and technologically enabled experiences. Your study will be supported by teachers and resources available to you through scheduled classes and workshops held on campus and online. Blended Learning offers the best mix of the flexibility of online learning with the benefits of the personal experience of face to face learning.''*

A set of standards for have been collaboratively developed as part of the blended learning model to support a quality learning experience for MP students. These standards outline a student-centred approach that articulates how students are to be provided with: The standards for Blended Learning include: (i) A safe online learning environment; (ii) Flexible access to learning materials that are current, aligned and engaging (fully developed, comprehensive, consistently presented to a high standard); (iii) Assessment tasks that are aligned and relevant; (iv) Regular and relevant communication from their teachers; (v) Opportunities to interact and collaborate with peers; (vi) Meaningful opportunities to have input into their learning (student voice); (vii) Learning experiences that (a) utilise a range of contemporary teaching and learning strategies, (b) include purposeful use of technology, (c) engage students to develop contemporary skills for life and work, (d) enable students to demonstrate higher order thinking skills; (viii) Opportunities to give and receive feedback (to & from teachers; to & from

peers); (ix) Opportunities to use technologies to find, use and disseminate information; (x) Appropriate support in their learning journey, including support in the use of technology.

IV. METHODOLOGICAL APPROACH

Learning and teaching strategies along with the resulting student learning outcomes were considered for two consecutive offerings of a third-year civil engineering subject. The first of which was offered in essentially a face-to-face (pre-pandemic) with the second offered fully online (having synchronous and asynchronous components). The MPBLM standards are used as a framework to compare the delivery of these two modes of delivery.

The comparison of student learning achievement for each delivery was performed using a number of readily available standard indicators such as grade distribution, student experience questionnaire and assessment submission rates. Grade distribution comparison can be used to indicate the achievement of academic outcomes. Student experience questionnaire results can be an indicator to measure students' perception about their learning and their expectation about the relevance and appropriate delivery of the subject. In addition, weekly assessment submission rates of students are compared to provide an overall indication of student learning achievement and participation.

V. RESULTS AND DISCUSSIONS

The course studied in this research is a study unit on offered to third-year engineering students. The course was offered online for the first time using MPBLM in the second semester of 2020. This study compares the outcomes of this online mode of delivery with the one immediately preceding it i.e. the face-to-face delivery in the second semester of 2019. Both offerings of the course covered the same topics and the same instructor facilitated both modes of delivery. The duration of the course is 13 weeks. In the traditional face-to-face delivery, weekly lectures and tutorials were conducted with substantial time spend for instruction and learning support activities.

In the online delivery, the weekly learning and teaching duration remained unchanged, however, pre-reading resources were provided to spend substantial class time on discussion and active learning. The most significant change in online course was to place recorded class videos on the course learning management system (Moodle) for post-review. A number of strategies were used to maintain and enhance the learning engagement of engineering technology program students during the online delivery of class using MPBLM. These strategies include an asynchronous pre-introduction of selected contents, an explicit learning intentions with success criteria, a well-planned lesson structure with appropriate sequencing of learning activities, a learning process to building on existing knowledge and connecting to existing knowledge, an

encouraging learner participation environment to develop interest and curiosity, an alignment of the learning goal with the relevant assessment task and an instant probing for learner understanding with the provision of effective feedback.

Figure 1 shows the student mark distributes for these two modes of delivery. The students are graded into four categories – HD (80 -100%), D (70 – 79%), C (60 – 69%) and PA (50 – 59%). There are some variations in the grades obtained among different categories in these two modes of delivery. Some variations can be attributed to mode of delivery and some variations can be attributed to nature of the student cohort.
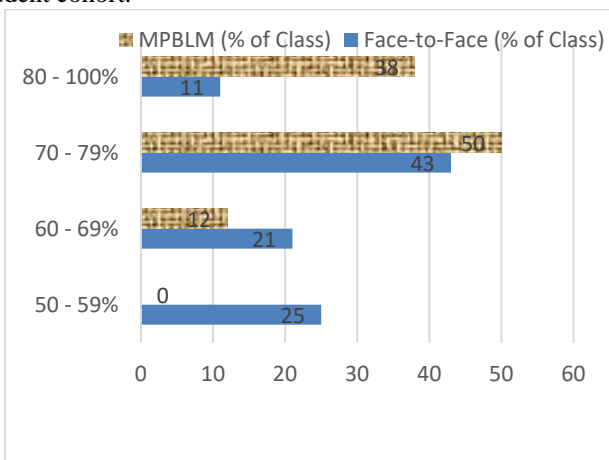

Figure 1 – Distribution of student grades for two modes of delivery

Figure 2 presents the submission rates of the weekly assessment tasks for both the modes of delivery. There were 10 assessment tasks indicating number 1 to number 10, The solid line indicates the percentages submission rates of these tasks and the dotted line indicates the same for online MPBLM delivery. The graph indicates that the submission rates of MPBLM mode closely match with those of face-to-face.
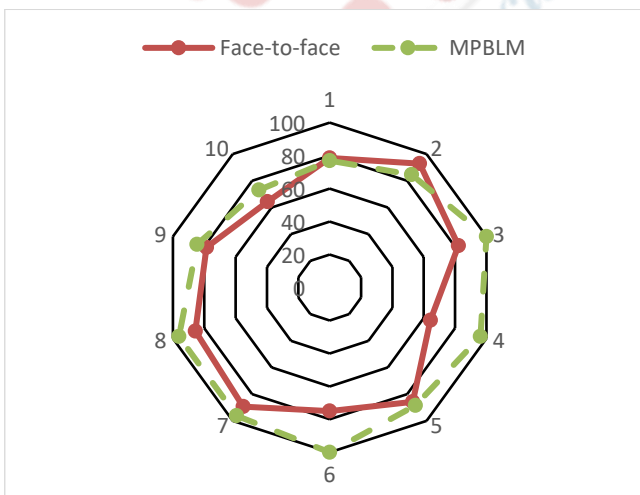

Figure 2 - Submission rates of weekly assessment tasks

Table 1 shows the student opinion surveys for these two modes of delivery. Subject evaluation questionnaire surveys are conducted at the end of delivery of the subject. In the survey, students respond to each question in a scale of 1 to 5, 1 being the worst and 5 being the best. The responses indicate that the average ranking value changed from 4.12 to 4.23 in MPBLM mode delivery, however, the percentage ranking variation is only 2.7 between these two modes of delivery.

Table 1 - Subject evaluation questionnaires (each out of 5)

Mark range	Face-to-Face Class	MPBLM Class
Achieve learning outcomes	4.00	4.20
Appropriate assessment	4.06	4.30
Helpful and timely feedback	4.06	4.30
Manageable workload	4.31	4.25
Appropriate learning resources	4.06	4.20
Relevance to future career	4.25	4.25
Professionally relevant skills development	4.19	4.15
Learning stimulation	4.25	4.15
Overall well taught	4.00	4.20
Overall quality of subject	4.00	4.30
Average	4.12	4.23

VI. DISCUSSIONS

A number of strategies were used to engage learners in their online class. These strategies are briefly mentioned here. However, the extent of effectiveness of each of these strategies were not measured as part of this study.

An asynchronous pre-introduction of selected contents

The introduction of selected contents via the learning management platform to learners before the start of the synchronous learning session makes the learners familiar with the forthcoming lessons and they can perform their own required pre-reading in preparation for the class.

An explicit learning intentions with success criteria

Each lesson has explicit learning intentions and this clear presentation of goals help the learners to know what they are need to understand and what capability they will achieve after the completion of learning activities.

A well-planned lesson structure with appropriate sequencing of learning activities

. Planned sequencing of learning and teaching activities optimizes synchronous class timing, stimulates higher order thinking and maintains engagement by linking lesson components.

A learning process to building on existing knowledge

Learners work together to apply previously acquired knowledge. The introduction of new topic based on previous learning reduces their cognitive load, facilitates smooth transitions and becomes a means of scaffolding learning to the new level.

An encouraging learner participation environment to develop interest and curiosity

In an encouraging learning environment, the learners feel comfortable and this environment provides opportunities for learners to engage on meaning discussions and to participate and collaborate on assigned tasks.

An alignment of the learning goal with the relevant assessment task

The alignment of learning to assessment provides motivation towards learning of new knowledge and creates opportunities for learners participate in various activities to demonstrate their understanding and apply their new skills.

An instant probing for learner understanding with the provision of effective feedback

The instant probes gather information about learners' understanding. In addition, instant feedback supports informal and formative assessment process, captures the effectiveness of teaching strategies and provides opportunities for immediate correction and improvement.

VII. CONCLUSIONS

Learning and teaching strategies and the resulting student learning achievement were considered for two consecutive offerings of a third-year civil engineering subject. The first of which was offered in essentially a face-to-face mode with some online components (prepandemic) with the second offered fully online, as necessitated by the pandemic related lockdown the following year. The MPBLM standards are used as a framework to compare the delivery of the two offerings. The learning strategies used to address each standard are presented. The student learning achievement was compared for each offering using a number of readily available standard indicators. Grade distribution comparison indicates educational outcomes achievement. Student experience questionnaire results indicate the extent to which students believe they achieved learning that was relevant and appropriately delivered in this study, however, assessment submission rates are also compared to round out an overall indication of student learning achievement. This provides an indication of learning achievement in relation to student participation. Differences in student learning achievement and delivery approaches are reviewed and compared to other studies in order to assess the validity of the approach. A selection of the comparative data is then discussed in relation to possible impact on student learning achievement. The results show that student engagement can be maintained in online learning using planned use of pedagogically appropriate processes.

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