Chapter 2
Engaging Learners: A Flipped Classroom Approach

Abstract This chapter titled ‘Engaging learners through a flipped classroom approach’ will cover how a flipped classroom approach was developed, the authentic and contextualized framework adopted and tested, the learning aspects, elements and logistics involved in having this approach executed. This includes presentation of insights, analysis and discussions of evidence-based results on various aspects, say for example, effectiveness, efficacy of the approaches adopted, self-reports from students’ perspectives and experiences as learners, the different aspects of learning outcomes it focuses on and why using such a learning approach is more appropriate in preparing them for the industry or corporate world. In this chapter, the rationale and effectiveness as well as the pragmatic challenges in adopting such a learning design will be covered. Survey and interview findings will be shared to show evidence-based reflections on the claims made. Experiences and contextualized issues will be shared so that it could be seen how the findings could be extended beyond the sample group and applicable to varying learning cultures.

A flipped classroom is generally defined as a swap of what is done in the classroom context with what is carried out as learning outside the classroom (Lage et al., 2000). It involves interactive group learning activities during class and online learnings, outside the classroom context (Bishop & Verleger, 2013). There appear to be two common characteristics to a flipped classroom: (a) an easily adaptable learning environment that facilitates active learning (DeLozier & Rhodes, 2017; Hamdan et al., 2013; Little, 2015) that allows students to develop different skills and competencies (Hamdan et al., 2013; Little, 2015) and (b) a student-centred learning culture (Bishop & Verleger, 2013; DeLozier & Rhodes, 2017; Hamdan et al., 2013; McLaughlin et al., 2013). By leveraging on technology, what instructors used to teach in a lecture can now be performed outside the classroom arena (Abeysekera & Dawson, 2015; Little, 2015), for example, in the form of a video recording of a lecture. With the widely accessible Internet, students can watch the web-based lecture anytime and
anywhere. This enables the class time to be freed up and used for engaging students in more active and social learning activities (Abeysekera & Dawson, 2015). Mason et al. (2013)’s study compared the effectiveness of a flipped classroom to a traditional classroom in an engineering course. They found that the flipped classroom has shown three advantages in comparison with the traditional classroom: (1) it enables the instructor to cover much more relevant and useful course material; (2) students’ academic performance improved; and (3) students found the flipped classroom format satisfactory and effective. Though a flipped classroom holds a lot of promises, simply viewing the lecture video outside of class time is not enough to make the flipped classroom successful (Tucker, 2012). There is no single model of how a flipped classroom is implemented (DeLozier & Rhodes, 2017). It is highly dependent on how the instructor structures the class (Little, 2015). As Lage et al. (2000) have rightfully pointed out, an instructor would have to put in a lot of effort in preparing the activities for the class to achieve the teaching goals. Instructors need to make sure the learning activities are adequately monitored, students are not marginalized unintentionally, and the lessons are not confusing. This might be especially difficult and stressful for an inexperienced instructor.

Blended learning is defined by Maarop and Embi (2016) as a teaching and learning approach that blends online instructional methods and face-to-face interaction. Spanjers et al. (2015) conducted a meta-analysis and found blended learning on average more effective than traditional learning. Some of the benefits of blended learning include increased student-to-student and student-to-instructor interaction, student engagement (Alebaikan & Troudi, 2010; Korr et al., 2012) and flexibility in class design (Alebaikan & Troudi, 2010). Similar to the flipped classroom framework, it has been pointed out in literature reviews that there have been many difficulties implementing the blended learning environment, especially due to a high demand on the time and workload of instructors to design the right blend between the two types of learning (Maarop & Embi, 2016) as there has not been much literature revealing any detailed framework designed (Boelens et al., 2017).

In this chapter, the rationale and effectiveness as well as the pragmatic challenges in adopting such a learning design will be covered. Survey and interview findings will be shared to show evidence-based reflections on the claims made. Experiences and contextualized issues will be shared so that it could be seen how the findings could be extended beyond the sample group and applicable to varying learning cultures.

2.1 Introduction

The need to respond with an agile mindset and foresight to effectively engage our students to enhance their learning outcomes is vital. The rapidly changing educational landscape has caused many disruptions through digital transformation, for example, online learning, interventions through artificial intelligence, virtual reality and so on. Hence, the learning design of pedagogies must incorporate such disruptions to be able to effectively respond to the evolving needs of learners and the way they learn.
Flipped classroom (FC) or “Flipped Learning” (FL) is gaining more popularity in the design of a blended learning environment. There is an evolving body of research that is being carried out in the area of flipped classroom (FC) design. Although this concept has been around for years (Baepler et al., 2014; Gilboy et al., 2015; Lowell et al., 2013), it has received more research attention (Albert & Beatty, 2014; Kim et al., 2014; O’Flaherty & Phillips, 2015). This design concept advocates building on a specific aspect of the “blend” of online learning element and face-to-face segment of teaching. Research literature shows that there is a vast amount of literature about blending learning and such modalities (e.g. Bliuc et al., 2007; Garrison & Kanuka, 2004; Owston et al., 2013; Vaughan & Garrison, 2005; Zacharis, 2015); however, there are still much “gaps” or not much concrete evidence in the specific nature of these “blends” and how different “blends” could possibly have a varying impact, explicitly on students’ performance. Majority of the research focuses only on one specific aspect of the blend that comprises of online and/or traditional learning (Ashby et al., 2011). Inline to this argument, we could characterize flipped classroom as a unique type of blended learning (BL), where it builds on the design where learners are required to attend a pre-class online learning prior to the face-to-face classroom sessions that could be facilitated in both physical and virtual settings. Research scholars (Gilboy et al., 2015; Tune et al., 2013) advocate that flipped classroom enhances students’ engagement, hence resulting in much improved learning outcomes. Studies also report that flipped learning enables students to learn at their own pace and allocates more time in their preparatory work, and hence, this facilitates them to be more involved during the class discussions, sharing and classroom activities (Johnson, 2013; Kong, 2014; Roach, 2014).

The flipped classroom model, where students prepare for class by accessing lecture-type resources beforehand, creates greater opportunities for instructors to engage students in meaningful learning activities during class than merely delivering lectures in a traditional classroom. At the same time, these opportunities come at a cost for instructors designing the classroom activities. Like a blank page which intimidates an author struggling with writer’s block, being faced with hours of course time to fill with untested learning activities can be intimidating to an instructor, especially when he is accustomed to conducting lectures in the traditional format. Furthermore, instructors adopting the flipped approach would also have to take extra care in class to monitor the learning activities, and not to unintentionally marginalize students and increase their confusion.

The millennials, a term believed to be coined by Howe and Strauss (2000), refers to the generation that spans from about 1982 to 2004 (Horovitz, 2012). As the current batch of higher education undergraduate classrooms comprises of mostly millennial students, it poses different teaching challenges for instructors compared to the classrooms of Generation X and before. Karakas et al. (2015) proposed three key challenges in today’s management of education. Firstly, it is managing millennial students’ short attention spans during lectures and tutorials, and their inattentiveness due to being distracted by the prevalence of technology gadgets. Secondly, there is difficulty in keeping millennials engaged during traditional lectures and tutorials. Lastly, millennials themselves face challenges related to social isolation or alienation.
Although the theoretical antecedents of the flipped classroom are somewhat solid, substantial research questions remain unanswered, for example, regarding the efficacy of flipped classrooms in relation to qualitative work into student learning and students’ experiences of this approach (Abeysekera & Dawson, 2015). To address these teaching challenges and current research gaps, we developed a flipped classroom framework embedded with an e-scaffolding learning support system. Although the literature on flipped classrooms is comprehensive, there remains an explicit gap when it comes to an examination of learners’ engagement levels and their perceived effectiveness of the learning process. This context will be addressed further in the next section “Theoretical Background: Flipped Classroom”. There is also little research that investigates the sequential process of implementing flipped classrooms from both the in-class and out-of-class contexts. The findings of this study include the learners’ collective perspectives on levels of engagement, self-learning efficacy and their perceived effectiveness through (a) an improvised and contextualized flipped classroom framework and (b) learning intervention through an authentically designed in-class scaffolding support system.

In the improvised framework, we clustered the activities into two parts, namely pre-class online learning and in-class activities which emphasize reflective, deep learning. In the pre-class online learning, several authentic interventions were introduced, namely (1) self-designed and developed animated short videos in which dry and complex content has been converted into easy to comprehend and relatable ones; (2) a brief weekly reflection journal in which learners reflect on and apply the essential takeaways of the lesson. The unique feature is the connectivity of the mini cases in the reflection journal that shows the links between the topics. Hence, learners are able to appreciate how these weekly topics are interrelated, which allows them to see beyond the standalone content and focus on the intertwined links which reside within them; (3) the self-reflective and short interactive assessment quizzes are another vital highlights that engage learners through formative feedback during the learning process. During the in-class learning activities, the focus is on the critical thinking and deep learning process achieved through peer and collaborative learning. (1) Instructors do not conduct lectures, instead students participate in an interactive dialogue session engaging instructors using a mind map of the session; (2) this is followed by interaction between the instructor and the class where they revisit the online reflection journal and engage in formative feedback; (3) the focus is geared towards the application of course content to assigned problems, which are based on real-life issues, through a process of peer and collaborative learning, with the cultivating of critical thinking and deep learning as the intended goal. To achieve the intended learning outcomes, the in-class scaffolding support system builds in a collection of varying perspectives that give students the opportunity to hone their critical and deep learning skills, and ultimately focus on the learning process, instead of focusing on the expected possible answers. Through this improvised framework which leverages on the flipped classroom philosophy and an authentically self-designed, developed scaffolding support system, our ultimate goals are: (1) to keep millennials more engaged in learning through a structured collaborative approach (2) and to have them think more deeply and critically about the course content and learn from their
peers. Students can access the course materials outside the class, usually online, and thereafter apply the acquired knowledge with their peers during class, under the instructor’s guidance. This approach draws on the theoretical foundations of pedagogical approaches such as flipped classrooms, blended learning, active learning and technology-enhanced learning. Although the framework was developed with undergraduate courses in mind, it is flexible enough to be modified and adapted by instructors in any learning context.

2.2 Theoretical Background

2.2.1 Flipped Classroom

A flipped classroom is generally defined as a swap of what is commonly done in the classroom with learning activities usually conducted outside the classroom (Lage et al., 2000). It focuses on a learner-centred environment and involves interactive group learning activities during classroom time and online learning outside the classroom (Bishop & Verleger, 2013). The flipped classroom serves as a platform to achieve a collaborative and organic learning environment. To meet the challenges and complexities of the twenty-first century workplace environment, there has been a shift and adoption of an organic learning environment in the business community. Similarly, universities and accreditation bodies in business schools are moving towards developing competency-based curricula where learners foster lifelong learning skills through a process of self-directed learning. There appear to be two common characteristics which encapsulate a flipped classroom: (a) an easily adaptable learning environment that facilitates active learning (DeLozier & Rhodes, 2017; Hamdan et al., 2013; Little, 2015) and allows students to develop different skills and competencies (Hamdan et al., 2013; Little, 2015); (b) a student-centred learning culture (Bishop & Verleger, 2013; DeLozier & Rhodes, 2017; Hamdan et al., 2013; McLaughlin et al., 2013). The available research on flipped classroom points towards emphasizing that the design of flipped learning results in higher level of learning performance as compared to traditional learning and e-learning; however, it is still ambiguous how learning in a flipped classroom setting and climate would result in an enhanced performance compared to other blended learning approaches (Thai et al., 2017). If there is no close monitoring of the classroom learning activities, students might be inadvertently marginalized and may experience misperceptions in the classroom. For example, they may presume that there is a lack of a clear and organized approach in the facilitation of course content, or they may not be able to appreciate the autonomy and flexibility that characterize the flipped approach, even if it is driven by clear learning outcomes. This could be challenging and stressful for an instructor to achieve the intended learning outcomes effectively. In contrast, during a traditional lecture, the instructor has control over the amount of information to be taught and delivered.
The literature on flipped classroom design is somewhat long on stories and short on efficacious evidence. In its most basic implementation, course instructors of flipped classrooms assign videos of their lectures as homework and then have students do “homework” problems in class (Mazur, 2009). In Mazur’s case, he reframed his classroom time to have students answer multiple-choice questions (MCQs) and then have them discuss the questions in pairs to resolve discrepancies in their answers. In the years since the earliest implementations of the flipped approach, students have shown greater facility in answering critical reasoning questions about physics (Crouch & Mazur, 2001). However, nothing mandates that a flipped design needs to foster greater communication between students. Much to his students’ dismay, Enfield (2013) assigned video lectures and content-based quizzes prior to class to open more time for instructor-led demonstrations during class. When you think about the fundamentals that constitute the “content coverage before class and homework during class” version of the flipped approach, what remains is an instructional model in which students use resources to prepare for class activities prior to the session so that more time would be allocated to those activities (Herried & Schiller, 2013). With this understanding, flipped classrooms offer instructors more freedom to choose how students will discuss, use and build upon these resources as they actively think through a topic, instead of passively receiving the content. However, this freedom of choice should be tempered with limits, for having too much freedom has been shown to decrease satisfaction and stifle creativity (Iyengar & Lepper, 2000).

A flipped classroom design also serves as a gateway for greater student engagement (DesLauriers et al., 2011). Research studies report that flipped classroom experience correlates with affirmative impact on student learning outcomes as compared to traditional learning approach (Albert & Beatty, 2014; He et al., 2016; Roach, 2014). If course designers have the time to incorporate more in-depth activities, they can integrate “high-impact” activities into the course. High-impact activities include having meaningful contact with course instructors, deep discussions with instructors and/or peers, differentiated instruction and prolonged collaborations. These activities correlate with student self-reports of engagement (Kuh, 2003). Student engagement is then correlated with participation in public service, self-reported learning gains, increased student achievement (Carini et al., 2006) and job engagement (Busteed & Seymour, 2015). This could be validated by research scholars (Gaughan, 2014; Lowell et al., 2013) who report that students are much better prepared to be involved and participate in face-to-face interactive and higher-order activities, such as problem solving, discussions and debates. The presence of instructors for the face-to-face part, be it physical or virtual, allows students to receive immediate feedback on their engagement in learning activities by instructors, aiming at higher levels of Bloom’s taxonomy (Gilboy et al., 2015). Students can increase their level of understanding of contents before attending the face-to-face sessions that enable them to be engaged in a much deeper learning over a much-prolonged period with much focus (Roach, 2014).

While a course coordinator may design a curriculum using the flipped approach filled with high-impact and meaningful activities, it still falls on the shoulders of the course instructors to optimize these opportunities. Perhaps the greatest limiting
2.2 Theoretical Background

agent on student learning is that not all instructors are created equal (Hattie, 2003). Just because one instructor can administer high-impact activities successfully does not mean a replacement instructor can deliver the same results. Much of an instructor’s learning in tertiary settings comes from personal experience (Kember, 2009). However, communities of practice oriented towards enhancing teaching and learning can be used to guide new instructors towards the community’s specific and more effective teaching practices (Lave, 1991). In the context of courses conducted by a small group of instructors, each course group behaves like a community, with the course coordinators serving as the centre of such communities. With the right support, course coordinators can scaffold the learning of the other instructors as they adopt the community’s teaching practices. This scaffolding can take place via workshops, formal and informal professional conversations, and through deeper reflection, and dialogues with the help of appropriate tools and platforms.

2.2.2 Technology-Enhanced Learning

One distinct characteristic of the millennial generation is the ubiquity of technology in their lives (Blue & Henson, 2015). Millennials expect multimedia to feature prominently in their education (Blue & Henson, 2015; Patrick & Martin, 2015), and one way in which this occurs is via technology-enhanced learning (TEL). As defined by Patrick and Martin (2015), TEL refers to “all approaches in which technology is used to support the learning or teaching process”, which includes web-based learning, game-based learning, the simple usage of animation or computer-generated pictures and movies.

Higher education institutions constantly face technological and educational challenges and increasing demands to meet the needs of relevant stakeholders (Adams Becker et al., 2017; Chai et al., 2013; Wamboye et al., 2015). Rather than being merely subject matter experts, teachers must also be adept facilitators and keep pace with rapid developments and innovations in education and technology (Ifenthaler et al., 2014; Rajaram, 2015a, 2015b, 2015c; Rajaram et al., 2017). They must be adept at providing learning experiences that support discovery, knowledge generation and reflection. Increasingly, teaching is being delivered in a blended mode, incorporating experiential, participative, social and collaborative learning (Delcker et al., 2017). Greater digital literacy amongst students has necessitated a substantial curriculum redesign with greater use of digital learning platforms, mobile applications and other innovative approaches or devices (Brooks, 2015). Teachers face various challenges in adapting to these changes. On the one hand, the teacher’s role in this new environment can be unclear. For instance, they often struggle with selecting the types of learning techniques that would optimally enhance student engagement and learning performance. On the other hand, they are not always aware of the technological tools, innovative concepts, digital platforms or mobile applications that are available, particularly those appropriate for teaching. Furthermore, it is unclear what capabilities are required for teachers to successfully harness these technologies and
how they may be trained. Finally, there is an open question of how technology can best be used to prepare students for their future careers in the business world.

Some scholars have argued that the exact role of TEL in the learning experience needs further exploration (Kirkwood & Price, 2014). The Higher Education Funding Council for England (2009) proposed three potential benefits that TEL may bring (depending on the type of technology used): efficiency, enhancement and transformation. Efficiency refers to improving existing processes in a “cost-effective, time-effective, sustainable or scalable manner”; enhancement refers to a general improvement in the existing processes and its outcomes; transformation refers to a profound and positive change in the current processes or even the introduction of new processes. In developing our improvised flipped classroom framework, TEL has been leveraged in both pre-class and in-class learning to meet evolving student needs as well as enhancing the instructors’ ability to facilitate courses productively in today’s complex and evolving learning environment.

2.2.3 Blended Learning

Blended learning is defined by Maarop and Embi (2016) as a teaching and learning approach that blends online instructional methods and face-to-face learning in a brick-and-mortar location (often referred to as traditional learning). The inclusion of these two modalities enables integration into the cohesive learners’ experience.

Blended learning provides a richer range of learning experiences and produces higher levels of student engagement largely due to its adoption of a range of delivery approaches (Bliuc et al., 2007; Ginns & Ellis, 2007; Smyth et al., 2012). Blended learning should be understood and considered through a thorough understanding in terms of students’ motivation and how it supports learners’ demand needs to be duly considered beyond the mere aspects of delivery and technology (Sloman, 2007). In blended learning, the flexibility dimension of e-learning element, in terms of time and place, is added to the learning environment (Deperlioglu & Kose, 2013; Garrison & Kanuka, 2004; Smyth et al., 2012). Many research scholars reiterated the positive impact that blended learning has on learners’ perceived learning effectiveness and their academic achievement (Deperlioglu & Kose, 2013; Owston et al., 2013; Suda et al., 2014), in addition, also the affirmative effect that the online learning has on learners’ academic performance (Bawaneh, 2011). Comparative studies performed on blended learning contrasting them with traditional learning or e-learning show a significant higher academic performance in a blended learning setting (Suda et al., 2014; Vernadakis et al., 2012). This could be further validated by another research by Bernard et al. (2014) that reports that blended learning has exceeded traditional classroom instruction in terms of academic achievement (1/3 standard deviation). Thai et al. (2017) advocate that this would be the case especially if the blended design focuses on the interactivity aspects between the student and instructor as well as amongst students, plus addressing the cognitive support element that addresses the content processing and representational support.
The subtle distinctions between blended and flipped learning need to be appreciated to ensure that both approaches are utilized appropriately and effectively to achieve the intended learning outcomes. In blended learning, classroom time between instructors and students is not substituted by online delivery. Instead, the online component comprises of content and activities that complement in-class lessons. It usually involves online resources such as online journals, quizzes, voice-overs and/or audio podcasts, interactive games and videos. Learners can access these online resources from anywhere and they are usually delivered through a university-wide learning management system, blogs or contextualized learning systems. The important point to understand about the blended approach is that traditional learning has not been replaced by online learning; rather, the two elements complement each other to provide learners with an inclusive and holistic learning experience. In contrast, the flipped classroom’s primary focus is on the reversal of the traditional content delivery mode of learning. A traditional learning approach involves listening to lectures, watching demonstrations or visuals, understanding the content in the classroom and completing assignments at home. In a flipped classroom, course materials are prepared such that learners have access to the materials prior to their classes, at their own pace and time. Actual class time is then utilized to clarify concepts and run learning activities that emphasize content application, with facilitation and guidance from the instructor. The different types of online platforms adopted in-class serve to enhance and work towards higher levels of student collaboration, engagement and a holistic learning process.

Collins and Moonen (2001) report “flexible learning” as referring to learners’ choice, specifically learners being able to make decisions about when, how and where they will study. The ultimate intention of blended e-learning is to provide learners with choices as to what, how and at what pace they wish to learn. E-learning also facilitates the opening of different avenues for formative assessment which helps learners to review course materials and take the assessment activities again when they feel that they are ready or want further practice. In addition, the blended approach allows learners to quickly move through the courses they are comfortable with and spend more time on areas where they struggle. Siemens (2004) in his theory of connectivism explains that (a) the capacity to know is more critical than what is currently known, (b) learning may reside in non-human appliances, and (c) decision-making itself is a learning process. Choosing what to learn and the meaning of incoming information are seen through the lens of a shifting reality, in the sense that while there is a right answer now, it may be wrong tomorrow due to alternatives in the information climate affecting the decision. This clearly emphasizes the shift in the design and incorporating the pre- and post-blended learning platform. This implementation facilitates students to achieve deeper levels of learning with more emphasis placed on collaboration, cooperative and participative context beyond just mere information delivery.

Spanjers et al. (2015) conducted a meta-analysis which indicated that on average, instructors found blended learning to be more effective than traditional learning. Some of the benefits of blended learning include increased student-to-student and student-to-instructor interaction, enhanced student engagement (Alebaikan &
Troudi, 2010; Korr et al., 2012) and flexibility in class design (Alebaikan & Troudi, 2010). Similar to the flipped classroom framework, the evidence from the literature suggests that there have been many studies in which instructors have shared about the difficulties involved in implementing blended learning, especially due to the high demands placed on the instructors’ time and workload in order to design the right blend between the two types of learning (Maarop & Embi, 2016). There is also little evidence in the literature regarding the development and implementation of any detailed framework (Boelens et al., 2017).

2.3 Concept and Features of the Framework

Our improvised and contextualized conceptual framework is designed to fill the “gap” of not having a scaffolded, comprehensive and effective flipped classroom design that helps instructors to fully utilize the available technology, in both the pre- and in-class phases. The authenticity of this framework is reflected in the following components: (1) a holistic and thorough pre-class online learning comprising an engaging and comprehensive learning design embedded with students’ data analytics; (2) authentically created animations which make it easier for students to comprehend complex, dry theories and concepts; (3) a reflection journal that provides a link across all course topics, with an in-class dialogue session and a reflective learning process; and (4) incorporating an in-class team-based collaborative scaffolding support system that equips students with the “harder skills” of management competencies.

The variety of teaching techniques and activities involved in this learning design is especially targeted at capturing the millennial students’ attention, who are known to have shorter attention spans. There are two components to the conceptual framework: pre-class online learning and face-to-face seminars enhanced by real-time technological interventions through the scaffolding learning support system. Figures 2.1 and 2.2 are a summary of the conceptual frameworks, while Appendix D contains a weblink to a video trailer about the framework for flipped classrooms embedded with technology-enabled learning.

Two conceptual frameworks are shared taking into due consideration of the recent demands of having to acknowledge the importance of both physical and virtual real-time lessons, perhaps the recent worldwide pandemic of COVID-19 that puts universities to re-think and re-design their lessons’ delivery. Figure 2.1 presents.

Figure 2.1 Improvised conceptual framework—Flipped classroom with technology-enabled learning provides a guiding structure on how flipped learning could happen in a blended approach where there is a part to be done out of the class via e-learning and a part to be in class from a physical setting. This approach fits well when there are no constraints to have physical classes conducted. However, the question is how this framework could be improvised and re-designed if there are limitations such as: students are not able to be present in a physical setting due to a pandemic like COVID-19; there could only be a limited number of students present in a physical setting; or there is a need to accommodate a large number of students.
2.3 Concept and Features of the Framework

Fig. 2.1 Improvised conceptual framework – Flipped classroom with technology-enabled learning (Extracted from Rajaram, K. (2019). Flipped classrooms: Scaffolding support system with real-time learning interventions. Asian Journal of the Scholarship of Teaching and Learning, 9(1), 30–58)

Fig. 2.2 Improvised conceptual framework – Flipped classroom, a model adopted in a 100% virtual learning setting
at any one time, for example, more than 50 students where there is a requirement to have learners’ interactivity at much smaller group levels, incorporate active and experiential learning aspects and so on. As such Fig. 2.2 Improvised conceptual framework—Flipped classroom, a model adopted in a 100% virtual learning setting is formulated and shared.

### 2.3.1 Pre-class Online Learning

The pre-class online learning comprises two parts. The first part is the online learning where students have online access to the lecture materials. The lecture materials are presented using a mix of different modes of learning, such as a lecture with voice-over, animated text, animations and/or interactive quizzes. Each segment would be no more than 10 min, to ensure that the material would be engaging and exciting for the students. At the end of the lecture videos, students must complete either a timed and graded quiz, or an ungraded quiz at their own pace to reinforce what they have learnt. They must complete all the online lessons for a topic 24 h before the 3-hour face-to-face seminar for the same topic.

After completion of the online learning, students must do an online reflection journal entry, which will be followed by an interactive classroom discussion. Evidence shows that such reflective activities encourage students to reflect on and review their own thinking processes (metacognition), help to boost students’ critical thinking skills and assist in the preparation of course assignments and final examinations (Homik & Melis, 2006). The reflective portion also reinforces students’ understanding of the applicability of key concepts which they learnt through the online lectures, ensuring that they are not just passively watching the videos. There are 12 reflection journals which students need to complete over the 3- to 4-month semester. They first must read a case study; then, using knowledge acquired from lecture materials, they write down their responses to the questions related to the case study. They are expected to write between 50 and 200 words for each reflection. The case study material for each of the 12 reflection journals is designed to be interrelated to the other lessons so that the links become evident to students. The reflection journals serve as an application activity which is incorporated as the last activity for each pre-class online learning session. Instructors would be able to track the weekly journal submissions and correspondingly students’ participation. The completion and quality of the journal submissions would be tagged to the students’ pre-online learning course assessment and hence serve as an effective control to monitor their course performance.
2.3.2  **Face-to-Face Session: Applied and Active Learning, Scaffolding Learning Support System**

During the face-to-face classroom session, the instructor would begin with an overview of the lesson, displayed as a mind map. This would be followed by a discussion with the class about their reflection journal submissions. During the lesson overview, the instructor would engage in interactive dialogue with the students for 15–20 min, presenting a summary of the lesson on a PowerPoint slide. Following the class discussion, the instructor would summarize key points from the journal submissions and address any queries from students.

Following the discussion, the instructor may choose from a variety of activities to facilitate the active learning portion of the lesson, such as a case study, a problem-based learning activity, role-play and mini-game, or more. These team learning activities are facilitated differently from the traditional approach in two distinct ways, namely: (1) specific roles would be assigned within the teams, for example, leader, scribe or any assigned position based on the activity (team manager, supervisor, client); (2) at the end of the activity, each student would have to evaluate their team in terms of one primary competency. This serves as a peer review competency exercise that would enable every student to be trained on not only the course content but also the skills required to perform the assigned role.

A new, innovative, synchronous and collaborative feature called the “doKumaran” tool (dKT) has been developed and included within the learning activity management system (LAMS). The dKT captures and documents collaboration amongst students in real-time. It is an integration tool that allows for the subsequent creation of powerful and collaborative activity sequences. With the dKT, we introduced five activity sequences as the activity scaffolding support system. This support system (a) enables “real-time” collaboration and students have more opportunities to participate in active learning activities with peers and instructors; (b) focuses on the learning process; (c) archives student discussions and reflections; (d) increases the level of engagement by minimizing disruptions between learning activities; and (e) serves as a platform for students to apply what they learnt and hone their critical thinking skills. Details of the LAMS, dKT and activity support system can be found in Appendix C.

2.3.3  **Pre-class Online Learning: Components**

Online learning enables students to access the course materials anytime and anywhere at their convenience. The online learning framework adopted for this course comprises several components, as listed below.
2.3.3.1 Voice-Over Video Lectures

In this framework, the pre-class online lesson includes short video lectures, usually presented as slides with a pre-recorded voice-over. Wilson and Gerber (2008) proposed the need for a modularized course structure, which breaks traditional courses into “manageable units”. A distinctive feature of such video lectures is that the content would be succinct and easy to understand, and each recording would be no more than 10 min.

2.3.3.2 Animation

Apart from the video lectures, the instructional materials in pre-class online learning also make use of animations, which refer to “any display element that changes its attribute over time” (Schnitz & Lowe, 2008). Berney and Bétrancourt (2016) proposed several purposes for using animation. First, it directs students’ attention to essential portions of the course materials. Second, it is a useful way to demonstrate abstract concepts which students would need to memorize and apply, such as completing puzzle rings and tying nautical knots. Third, it can help students gain a better understanding of a dynamic system that changes over time, such as a flushing system or a light formation. It can also be used to demonstrate a succession of steps.

In Berney and Bétrancourt’s (2016) meta-analysis, where they examined 140 pairwise comparisons between animated and static graphic visualizations in multimedia instructional material from 61 studies, they found that the use of animation yielded positive effects in terms of learning enhancement as compared to static graphic visualizations. A key finding was that the positive effect of animation over static graphics was only found when students had no control over the pace of the instructional material being presented.

The study by Stebner et al. (2017) yielded a similar outcome when they compared German high school students in learning environments which had different combinations of visualization in their instructional materials (e.g. no visualization, use of static pictures and animations). Their study showed that students needed to have visualization to gain a better understanding of the learning material. The results also consistently show that learning environments which feature the use of animation yielded more positive learning benefits compared to learning environments which only used static pictures.

2.3.3.3 Quizzes

After the students have gone through the course materials, they have to complete one of the following two types of quizzes: graded and timed quizzes, or self-assessment quizzes. Studies have shown the effectiveness of utilizing quizzes in teaching. According to Cook and Babon (2017), when students are required to take online quizzes based on prescribed preparatory material, it leads to enhanced levels
of student engagement and motivation to complete the online learning in preparation for the following class. This would improve students’ participation in active learning classroom activities, for example, class discussions. It was found to be an effective tool that saved instructors’ time (Cook & Babon, 2017). In the blended learning context, Spanjers et al. (2015) found that incorporating quizzes into the course had positive effects on the effectiveness of this approach.

In a study by Khanna (2015), students performed better in the final exams when they were given continuous formative assessments (e.g. quizzes) that are ungraded rather than graded formative assessments or none before the final summative assessment (e.g. the final examination).

2.3.3.4 Online Reflection Journal

Another way of assessing the quality of online learning is with online reflection journals. This is the last activity in the pre-class online learning, where students write reflections of between 50 and 200 words for the assigned case study. The case studies have been carefully picked by the instructor, and these cases not only reflect the primary topic of the lesson itself but also connects with the other case studies in the course. At the end of the course, students can review all the journal submissions and see how they connect across the different topics in the course. This enables students to appreciate the larger context of the whole course and put things in perspective.

2.3.4 Face-to-Face Seminar with Real-Time Technological Interventions

With the instructional course material covered before the seminar, classroom time could be utilized more efficiently through active or experiential learning activities. These activities could be technology-enabled, for example supported by the scaffolding activity support system or executed through traditional facilitation methods. When students engage in meaningful learning activities, they are actively learning and in doing so, are more engaged (Prince, 2004). Experiential learning gives students opportunities to develop leadership competencies in business programmes (Crossan et al., 2013). Examples of such activities include (a) Fishbowl, where groups of students discuss and lead discussions on an assigned topic; (b) Test Questions, where students get to pose questions instead of just answering them; (c) the Pros and Cons Grid, where students discuss and develop a list of advantages and disadvantages about an issue related to the lesson, helping them to appreciate a topic from varying angles and develop analytical and evaluation skills; (d) Cross-Age Peer Tutoring, which leverages on peer learning where a student proficient in a course topic instructs another who is a novice.
The use of the activity sequences in dKT’s scaffolding support system enhances overall class participation which enables students to be more actively engaged in class. Studies indicate that students who appear quiet and shy tend to contribute more to synchronous online discussions than classroom discussions (Warschauer, 1995). This may be explained by the fact that many students, especially those of East Asian heritage (Paulhus et al., 2002) or with more introverted personalities (Caspi et al., 2006), tend to shy away from speaking up in class (Freeman et al., 2006). With the use of an online tool, these students may feel more comfortable sharing their ideas online (Cain & Klein, 2015). Students tend to learn more when they participate in group work (Arbaugh & Benbunan-Finch, 2006). In a meta-analysis performed by Johnson et al. (1998), studies since 1924 were reviewed and the findings indicated that when students learn together, academic achievement is enhanced. Moreover, the students were found to have higher self-esteem and better quality of relationships (Johnson et al., 1998).

Millennials are used to participating in collaborative activities since young—at day care, schools and volunteer projects; therefore, it is believed that they would be open to engaging in collaborative learning in the higher education classroom (Blue & Henson, 2015). Furthermore, they would expect an increase in such collaborations when they graduate and enter the workforce, especially between colleagues and with clients. According to Bedwell et al. (2014), interpersonal skills are critical to achieving success in today’s business environment. With the flipped approach, the interaction and collaboration between students may take place during the face-to-face seminar part of the framework. With the use of the activity sequences in dKT’s scaffolding support system, synchronous collaborative activities can take place. The five activity sequences facilitate different forms of group collaborations and discussions.

The activity support system in this framework supports activities which enable students to hone their critical thinking skills, such as the peer review activity sequence. The rigorous process involved in peer review, encompassing inter- and intra-group activity sequences and the reflection phase, gives learners the opportunity to think critically about ways to refine their solutions to the problems presented. Both the student reviewee and the peer reviewer can benefit from this exercise (Boase-Jelinek et al., 2013) of evaluating each other’s written submissions (Sims, 1989). Students would be able to practice critical thinking when they critique the work of their peers. When the reviewee reflects on the peer reviewer’s feedback, it is also an opportunity for them to critically consider the feedback received and ways to implement the suggestions. Apart from the peer review activity, the literature also suggests that both collaborative learning, through “discussion, clarification of ideas, and evaluation of others’ ideas” (Gokhale, 1995), and high student engagement (Carini et al., 2006) enhance the development of critical thinking. Through the support of the framework in enhancing student engagement and collaboration, students’ critical thinking skills may also be enhanced.
2.4 Methodology

We began the project by running a pilot of the learning activities within the context of a course titled “Management Principles, Skills and Competencies”. A capstone course in the Nanyang Business School, 400–450 students take the course each semester. Enrolment is divided across 8–10 sections/classes by a team of instructors and overseen by a single course coordinator. Each session meets once a week for three hours, with one hour catered for pre-course online learning. We worked with the course coordinator to run a pilot of the new set of technology-enhanced learning (TEL) supported activities through the scaffolding support system within two sections of the course.

2.4.1 Phase 1 of Study

An online post-course survey (n = 59) was conducted to find out whether students responded positively to the pre-class online learning system, reflected an increase in self-reported levels of student engagement, collaboration and critical thinking. The survey questions appear in Appendix A.

All students taking the two sections/classes were informed of the survey and could choose to participate or withdraw from it. Students who chose to withdraw would still be able to complete the course activities as part of normal education practice with no impact on their grades. Students who agreed to participate had to complete the survey at the end of the class, and members of the research team gathered and analysed the data, as well as coded the survey results.

Around twelve students from the two sections/classes were randomly selected and interviewed to find out their experiences of the flipped classroom learning design and the usage of the e-scaffolding learning support system adopted real-time in class. The sample size is adequately representative of the study as the profile of students for whole course as the exact same learning online design is replicated across the total number of sections. To re-iterate the adequate validation of this sample size representation, this study result shows high level of similarity in terms of its outcomes in comparison with another separate study performed on similar survey questions across all sections. The reason could be well explained due to the profile of students who are homogenous and well distributed across all the sections. The interview questions are presented in Appendix B.

2.4.2 Phase 2 of Study

As an independent measure, the research team analysed students’ performance on one of the core summative course assessment items, a project work report, comparing
their performance before and after the implementation of the improvised flipped classroom approach with technology-enhanced learning. For the pre-implementation \((n = 310)\) and after implementation \((n = 367)\), the reports were evaluated using an assessment rubric with the following criteria, namely (a) defining the problem; (b) devising strategies to solve the problem; (c) assessing implementation; and (d) evaluating outcomes.

### 2.5 Results and Discussion

#### 2.5.1 Phase 1 of Study

Overall, 94.92\% of the students (i.e. 56 out of 59 students) rated their pre-class online learning experience as ranging from “Somewhat Positive” to “Very Positive” (see Fig. 2.3). When we analysed the comments in the clusters of “very positive”, “positive” and “somewhat positive” categories, there were five key and common themes emerged that could be linked to the students’ positive experiences. First, there was a collective and clear consensus on the quality, rigour and easy to understand contents covered with a creative adoption of animation, which is one of the key contributing factors. We could credit this positive feedback to the use of design thinking in developing the animation contents, focusing on elements of cognitive resonance in the learning process, psychological factors and social presence variables in having the contents curated. Second, many highlighted that the interactive quizzes embedded were benefitable as they serve as a quick form of self-assessment in understanding the contents covered and a formative feedback avenue. Third, students collectively mentioned that the reflection journals enable them to apply their learned concepts

![Fig. 2.3 Students’ responses regarding the online learning experience](image)
through reflective and critical thinking. Moreover, they appreciate that the reflection journals are interlinked across the 13 weeks’ lessons that show the connectivity of the topics. Fourth, students largely felt the flexibility and self-directed learning space beneficial in better managing their learning with more autonomy and empowerment. Lastly, the accessibility of contents via mobile devices was cited by quite several students as a contributing element to their positive experience. This mobility enables flexibility in how, where and when they would like to access the course contents as well the bite size videos and course materials enabling them to view and read, for example, while they are travelling and in between their breaks of other commitments.

When we examined reasons for the flip side of 5.08% (i.e. 3 out of 59 students) who have rated “Somewhat negative”, we found 2 key common issues that emerged. First, the technical disruptions due to either the broadband/Internet/Wi-Fi related issues. For example, the poor Internet connectivity has caused disruption to the smooth flow of their learning process online that largely causes the unhappiness. Despite detailed instructions and support given to students who potentially face such information technology (IT) infrastructure-related issues, the support may not have extensively reached this minority group of students somehow. Hence, we realized to effectively work around this more individualized approach through much better communication channels via dedicated task force teams created to explicitly address these minority group of students’ explicit needs who may have poor or not up-to-date IT services or related infrastructure functionalities subscribed especially if they are to be operating from their own residences. Second, the capacity of their own personal computers or laptops or I-pads is probably dated, for example slow in speed, unable to support some of the advanced technological requirements to optimize learning and so on. To address this, we intend to explicitly target the minority group who may face challenges where the university could then examine how we could work around to extend the support respectively. We felt that these numbers are rather small; hence, much individualized attention could be proactively taken to sort this out which would effectively enhance their experiences as these are external factors and not tied to the quality or design of the course.

96.61% of the students (57 out of 59 students) indicated that they “Somewhat Agree”, “Agree” or “Strongly Agree” that they would like to see more of this type of course delivery, which has both online and face-to-face learning activities (see Fig. 2.4). We define appeal as “to be of interest”, “engaging” and “enticing” to students. When we examined the strong positive inclination of students’ appeal on the online learning, it was attributed to two primary reasons, namely (a) its learning design and (b) the interactivity elements that were embedded within the online learning process. The lesson topics are thoughtfully designed adopting the design thinking framework where the students’ learning needs, their learning styles and engagement drivers were well understood. Hence, this helps in designing the course materials in a manner that is fundamentally able to engage students through making the complex theories much easier to understand. Next, the interactive elements embedded within the online learning enable social presence and connectivity that enhances the students’ interest and engagement in their online learning experience.
2.5.2 Survey Findings

2.5.2.1 Flexibility

With the rapidly evolving technological interventions and applications in education, flexibility is increasingly associated with e-learning and evolving as a core driver that influences the learning deliverables through the online learning experiences. Flexibility could be defined primarily as the aspect of personalizing learning and the facilitation process, addressing the wide-ranging activities that the learners are exposed to from the pre-class learning and in-class experience to the end of the learning process across varying places and time (Bergamin et al., 2012). Hence, the element flexibility could be viewed as a multi-dimensional construct addressing the technological and pedagogical aspects of learning. In accordance with research scholars (Li & Wong, 2018; Soffer et al., 2019), elements such as pace of learning, time, place, learning resources and interaction are the most addressed dimensions of flexibility in e-learning.

96.61% of students (57 out of 59 students) responded that they “Somewhat Agree”, “Agree” or “Strongly Agree” to the statement “Online delivery for this course provided a flexible learning environment to help me understand the topics better” (see Fig. 2.5). Flexibility, through flexible support services for online courses, has a positive impact on academic success of students (Austerschmidt & Bebermeier, 2019). In addition, studies also validate that the improvement of students’ academic performances in e-learning environments could be linked to the support provided.
in terms of high-level flexibility of technology, pedagogy, learning resources and activities (Bergamin et al., 2010; McGarry et al., 2015).

When asked to provide their qualitative responses to the statement “What you like the most about the online content for this course”, many students commented that being able to learn at their own pace is what they liked the most. Some of the responses included: “It allows me to do it at a pace I am comfortable with”; “I can digest the necessary information first before proceeding” and “without rushing through theories after theories”. Some students also commented that it made learning very “convenient” and “flexible” as they were “able to watch [the] lecture at anytime and anywhere”. Al-Harbi (2011) reported that students’ perceived flexibility levels were a vital predictor of usefulness of e-learning. A significant relationship between perceived flexibility and self-regulated learning strategies has also been validated Bergamin et al. (2012). There is clear evidence to conclude that effectiveness of flexibility correlates with enhanced learning and teaching process.

Another advantage of such flexibility in learning is that students can also revisit and review the material any time they needed to. This aspect of the study’s insight could be validated by a study that disclosed that the attainment of intended outcomes was linked to the patterns of flexibility in terms of their learning time and effectiveness on the accessibility to learning resources in the online learning platform (Soffer et al., 2019).

Primarily, the level of flexibility is largely tied to the learning of students at their own pace and convenience, where contents can be reflected upon prior to the actual class. However, 2 out of 59 students indicated that they somewhat disagree. When we examined closely the disagreements, both mentioned that the time phase to complete the pre-class online learning should be extended to 2 h prior instead of 24 h prior to the respective scheduled class. However, this perspective may not be practical as the instructors need time to review students’ pre-class online learnings prior to their classes and bring forth the relevant insights to be part of the class discussions. Also,
students are given ample time to manage their learning as the access to these pre-class learnings is made available at least few weeks prior in reference to the respective lesson. Hence, the students are given full autonomy and empowered to manage their learning at their own pace and complete it 24 h prior to that week’s lesson.

2.5.2.2 Levels of Engagement

Due to the wide-ranging usage of the term engagement, it seems to have a range of interpretations (Dixson, 2015; Gibbs, 2014; Lawson & Lawson, 2013; Taylor & Parsons, 2011). Student engagement can be defined as a compendium of behaviours that involve students’ learning where they devote their time, energy and resource to learning activities (Krause, 2005). Similarly, Macquarie University Learning and Teaching Centre (2009) defined engagement as the quality level, depth of commitment and the activeness of involvement in their learning. Chen et al. (2010) pointed out that inline to the above definitions, engagement is inclined towards more to individuals’ engagement with learning instead of interactions with instructors or their student peers, although such exchanges are identified as a separate influencer of engagement. It is also vital to acknowledge that the complexities of effective and quality students’ engagement in learning could be contributed through varying dimensions as rightfully pointed by various studies (Kahn et al., 2017; Lawson & Lawson, 2013; Reeve & Tseng, 2011), namely related to the place and interconnectedness of cognitive, socio-cultural, affective, behavioural, ecological and organizational factors and even the actions of students as a collective.

Many students commented that it was an “interesting” way of learning. They particularly enjoyed the visual presentations such as the animations, graphics and videos, which “aid deeper understanding of concepts” and “enhanced the entire learning process rather than providing us with only text and words”. The learning design of the online resources took great efforts in embedding the social connectivity and social presence through the adequate and relevant usage of, for example, animations that picturized the caricature of the instructor, graphics that students could visualize and well relate to and so on. One student commented that “[in] addition, the animations and videos serve as a good learning aid by providing real-life examples, making the lessons much more interesting and engaging”. The study’s insights could be justified and validated by the research studies (Coates, 2006; Fleckhammer & Wise, 2010; Kift, 2004; Rhodes & Nevil, 2004) that revealed that in addition to the academic engagement, the part of social relationships and a greater sense of social engagement in the online space are vital as the overall engagement is affected by student experience and transitions that have implications on the learning design and instructional techniques adopted by instructors in online learning environments.

There was evidence of students being more engaged and sparked their interest to learn more, as indicated in the quote below:

I think online learning is a great way to learn. This is especially true when you are able to research and further find out theories and information that you are interested or unsure of. Through online platform learning, it allows me to gain a better insight of this module.
2.5.2.3 Critical Thinking

Critical thinking entails varying aspects, and the broad definition focuses on reflective discretion and the process of purposeful thinking. It involves higher cognitive level/order of thinking skills that are required to analyse and interpret information in a meaningful manner. Bloom (1956) identified a set of thinking skills under a thinking triangle. Moore (2013) refined critical thinking into five domains: understanding, judgement, caution/scepticism, originality and reflection/action. These complement Bloom’s revised cognitive taxonomy that comprises of six dimensions, namely remembering, understanding, applying, analysing, evaluating and creating. In terms of their qualitative response to the statement “The online content for this course provided me opportunities to reflect on the topics and be able to apply them to other contexts appropriately”, 100% of the students responded, “Somewhat Agree”, “Agree” or “Strongly Agree” to it (see Fig. 2.6). The survey question addresses three specific dimensions of critical thinking of Moore (2013), explicitly on understanding, judgement and reflection/action respectively.

When we examined the astoundingly positive feedback on this question of “reflection and application”, three primary themes emerged. Firstly, the design embeds the process of engaging students through deep thinking and reflective questions in an interactive manner; next, there is another collaborative element that students must synergize their thoughts through challenging their thinking process before putting them together to address the questions posed. Thirdly, they are to show their deep understanding of the concepts through applying with real-life examples and/or experiences. These three aspects are the fundamental elements that enable students to exercise critical thinking in their learning process via the pre-class online which results in the positive experiences.

![Fig. 2.6 Students’ responses to their ability to reflect and apply the content learnt](image_url)
Facilitating the learning process for students to surpass the surface-level thinking is a challenging and complex process. Willingham (2008) emphasized that critical thinking skills require learners to acquire adequate context knowledge and could be easily deployed at will or in any context respectively. The study results reiterate that despite the challenges and limitations to be dealt with to develop critical thinking skills via online learning environments, as validated by research scholars (Delmas et al., 2007; Halpern, 2007; Willingham, 2008; Kahneman, 2011; Byrnes & Dunbar, 2014; Miele & Wigfield, 2014), it is clearly possible by learning through applied practice and to intervene with more organized and deliberate patterns of thought process incorporated.

2.5.2.4 Effectiveness

Learning happens in numerous varying forms and is shaped by personal, social, cultural, psychological and contextual influences (Rajaram, 2020). The effectiveness of learning, in our context, perceived learning effectiveness, is influenced by the learning circumstances, for example learning environment (Dunlosky et al., 2013), the approach of how the instructional techniques are effectively adopted and used based on the profile, and characteristics of the learners (Rajaram, 2020). A balanced approach and compatibility are required between the learning styles of students and correct mix of instructional delivery approaches for effective learning to occur (Rajaram & Collins, 2013).

Effectiveness in this survey could be defined explicitly as perceived effectiveness from how the students are experiencing and valuing the pre-class learning process. Effectiveness could be further understood from the context through addressing the following questions, namely: Do the students perceive the pre-class online learning enabling them to acquire the contents knowledge productively in terms of quality, ease, convenient and efficient? Many students found the online presentation of the course materials to be clear, concise and easy to understand. They felt that the course material was relevant to the workplace of the future and was “an effective way to learn information-heavy topics”. For self-reported effectiveness, 96.61% of students (57 out of 59 students) answered, “Somewhat Effective”, “Effective” or “Very Effective” (see Fig. 2.7).

When we examined to sieve out the common supporting justifications on the inclination of effectiveness, five primary themes stand out, namely: (a) the clarity and ease in comprehending the contents presented in an online learning context. The clarity comprises of clear instructions, and explicit guidelines that enable students to achieve the intended learning outcomes and customized learning design embedded with simplified and relatable contents presented in small clusters enable the ease in understanding; (b) contemporary and up-to-date contents that enabled students’ learning engaging; (c) heavy contents’ delivery that was taken out of the class time where the class time is used to have meaningful dialogues, conversation and intense interactions on the applicability of concepts in real world and the challenges, real issues that have to be dealt with; (d) the formative feedback that was incorporated
Fig. 2.7  Students’ responses regarding the effectiveness of the approach

through the interactive quizzes in the online learning process as it allows students
perform a self-assessment on the concepts learned; (e) the design that enables students
to appreciate the connectivity of topics across all 13 lessons covered over the semester.
This is done via the reflection journals that are embedded with a mini case study that
links the various lesson topics to show the connectivity amongst them.

Research scholars (Felder & Silverman, 1998; Rajaram, 2020) advocate that three
primary variables that affect students’ learning, namely (a) preparation prior to the
class; (b) innate competency of learner; and (c) the fit between students’ learning
style and the teaching approach. This process adds to further complexity due to
the varying instructional styles that different instructors adopt based on what they
perceive to be effective from their past experiences (Rajaram, 2020). However, in our
context, the complexity could be mitigated as the asynchronous pre-class learning
design is standardized without any instructors’ intervention and the innate ability
of students does not apply in our context of study as all students are of a certain
profile where they have been filtered through before being enrolled into this course.
As such, only one influencing element of “prior preparation of students” remained
as the core influencing factor, which seemed to be positive. The design of our online
learning adopted a developmental growth process to shift or transform learners’
mindset beyond their preferred learning style as advocated by Frontczak (1999) and
Kolb (1984).
2.5.2.5 Further Reflections from Students

Generally, the inclusion of the pre-class learning element has received highly positive feedback from the students, where most of the primary aspects are covered at depth prior to this section. It was noted that many students found the pre-class online learning a very “efficient” method of learning as it allowed them to manage their time outside the classroom and “it minimised unnecessary time in class”. Students prefer the face-to-face class time to be more engaging, interactive on the application aspects, i.e. through instructors’ experience sharing where they could relate and apply the theory concepts learned with a deeper understanding. Hence, the pre-class online learning facilitates higher level of meaningful interactivity as the contents are brought out of the class. Students highlighted that the requirement for them to complete the pre-class activities within the stipulated timeline and the scores tied for the interactivity quizzes to be graded makes them to go through the contents in detail and apply critical thinking skills. Although a minority of them do highlight that this approach is slightly more demanding than the normal traditional method of attending the lectures. Again, we found that these minority students are usually the weaker ones who prefer not to be put through a rigorous learning process rather spoon-fed that only builds grit and competencies amongst these learners to get them job-ready.

2.6 Phase 2 of the Study

2.6.1 Prior Versus After Implementation of Flipped Learning

In this experiment, we had two primary goals: (1) to compare fundamentally the effect of learning outcomes by comparing prior and after implementation of the flipped learning and (2) to compare the difference in the outcomes with a shorter versus a longer intervention of the post-flipped learning to see if there is a difference in learning outcomes.

Experiment 1: A time phase of 4 weeks of flipped learning intervention was applied across 11 classes

In this experiment, a time phase of 4 weeks of flipped learning was applied. We performed a comparative analysis of students’ performance on their group project, comparing with those who have not gone through the improvised flipped approach versus those who have done so. A total of $n = 343$ students’ (prior to the flipped learning) and $n = 362$ students’ (after implementation of the flipped learning) records were used as a basis to perform the analysis. For this experiment, the flipped learning is exposed to students over a 4-week period. Table 2.1 presents the findings of the analysis.
### Table 2.1 Comparative analysis of students’ group project report performance before and after flipped learning, with 4 weeks of flipped learning applied across 11 classes

| Critical thinking, problem solving and analytical skills | Prior to the flipped Learning (n = 343) | After intervention with flipped learning embedded with technology-enabled learning (n = 362) |
|--------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------|
| Mean score (total rating score = 3)                    |                                        |                                                                                          |
| Assessment criteria                                    |                                        |                                                                                          |
| Problem identification                                 | 2.19                                   | 2.67                                                                                     |
| Problem analysis                                       | 2.33                                   | 2.49                                                                                     |
| Problem solving                                        | 2.24                                   | 2.61                                                                                     |
| Evaluation and review                                  | 2.28                                   | 2.52                                                                                     |
| Average                                                | 2.26                                   | 2.57                                                                                     |

From the results, it is evident that the approach made a positive impact as there was an improvement in the mean scores across all four assessment criteria for the control group prior and after intervention of flipped learning. For the assessment criteria “Problem Analysis” and “Evaluation and Review”, there was a minor improvement within a range of 5.3–8%. As for the assessment criteria “Problem identification” and “Problem Solving”, there was a significant positive improvement in the range of 12.3–16%. There was also a 10.3% overall positive impact on the enhancement of Critical Thinking, Problem Solving and Analytical Skills that reaffirmed and validated the adoption of flipped learning. We could acknowledge that flipped learning has enabled students to think critically, apply what they learnt in a holistic context and perform quality analysis that has enabled them to achieve higher average scores.

**Experiment 2:** A time phase of 4 weeks of flipped learning intervention was applied across 3 classes

In this experiment, a time phase of 4 weeks of flipped learning was applied. We performed a comparative analysis of students’ performance on their group project report, comparing the reports of those who have not gone through the flipped learning versus those who have done so. A total of n = 112 students’ (prior to the flipped learning) and n = 112 students’ (after implementation of the flipped learning) records were used as a basis to perform the analysis. For this experiment, the flipped learning is exposed to students over a 4-week period. Table 2.2 presents the findings of the analysis.

From the results, it is evident that the approach made a positive impact as there was an improvement in the mean scores across all four assessment criteria for the control group prior and after intervention of flipped learning. For the assessment criteria “Problem Analysis” and “Evaluation and Review”, there was an adequate improvement within a range of 7.67–10%. As for the assessment criteria “Problem identification” and “Problem Solving”, there was a significant positive improvement.
Table 2.2: Comparative analysis of students’ group project report performance before and after flipped learning, with 4 weeks of flipped learning applied across 3 classes

| Critical thinking, problem solving and analytical skills | Prior to the flipped learning (n = 112) | After intervention with flipped learning embedded with technology-enabled learning (n = 112) |
|--------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------|
| Mean score (total rating score = 3)                     |                                        |                                                                                                |
| Assessment criteria                                    |                                        |                                                                                                |
| Problem identification                                 | 2.12                                   | 2.52                                                                                           |
| Problem analysis                                       | 2.23                                   | 2.46                                                                                           |
| Problem solving                                        | 2.15                                   | 2.59                                                                                           |
| Evaluation and review                                  | 2.13                                   | 2.43                                                                                           |
| Average                                                | 2.16                                   | 2.5                                                                                           |

in the range of 13.33–14.67%. There was also a 11.33% overall positive impact on the enhancement of Critical Thinking, Problem Solving and Analytical Skills that reaffirmed and validated the adoption of flipped learning. We could acknowledge that flipped learning has enabled students to think critically, apply what they learnt in a holistic context and perform quality analysis that has enabled them to achieve higher average scores.

Experiment 3: A time phase of 11 weeks of flipped learning intervention was applied across 3 classes

In this experiment, a time phase of 11 weeks of flipped learning was applied. We performed a comparative analysis of students’ performance on their group project report, comparing the reports of those who have not gone through the improvised flipped approach versus those who have done so. A total of n = 113 students’ (prior to the flipped learning) and n = 116 students’ (after implementation of the flipped learning) records were used as a basis to perform the analysis. For this experiment, the flipped learning is exposed to students over a 11-week period. Table 2.3 presents the findings of the analysis.

From the results, it is evident that the approach made a positive impact as there was an improvement in the mean scores across all four assessment criteria for the control group prior and after intervention of flipped learning. For the assessment criteria “Problem Identification”, “Problem Solving” and “Evaluation and Review”, there is significant improvement of 18.33% for all three elements. As for the assessment criteria “Problem Analysis”, there is satisfactory improvement of 15.67%. There was also a 17.67% overall positive impact on the enhancement of Critical Thinking, Problem Solving and Analytical Skills that reaffirmed and validated the adoption of flipped learning. We could acknowledge that flipped learning has enabled students to think critically, apply what they learnt in a holistic context and perform quality analysis that has enabled them to achieve higher average scores.
### Table 2.3  Comparative analysis of students’ group project report performance before and after flipped learning, with 11 weeks of flipped learning applied across 3 classes

| Critical thinking, problem solving and analytical skills | Prior to the flipped Learning (n = 113) | After implementation of flipped learning (n = 116) |
|----------------------------------------------------------|----------------------------------------|-----------------------------------------------|
| Mean score (total rating score = 3)                      |                                        |                                               |
| Assessment criteria                                      |                                        |                                               |
| Defining the problem                                     | 2.18                                  | 2.73                                         |
| Devise strategies to solve the problem                   | 2.21                                  | 2.68                                         |
| Assess implementation feasibility                        | 2.17                                  | 2.72                                         |
| Evaluate outcomes                                        | 2.09                                  | 2.64                                         |
| Average                                                  | 2.16                                  | 2.69                                         |

#### 2.6.2 Interview Findings

As for the face-to-face seminar, the research team randomly selected and interviewed 12 students from the course. Overall, students felt that the framework was effective as there was a lot more time during class for hands-on activities. They found it more “useful” and less “boring” as compared to traditional lectures. There was also more scope to learn from one another, as well as to learn through engagement with the instructor. The students also commented that the class supported by the framework “[changed] the whole dynamics of the class”. With the course content being offered prior to the class and available to view at any time, it meant that class time was freed up for students to participate in more active learning activities (Abeysekera & Dawson, 2015).

Collaborative learning capitalizes on the energizing confidence displayed by millennials, seeing them as accomplished, creative and self-starting (Wilson & Gerber, 2008). Most students commented that the approach provided more opportunities for classroom collaborations and allowed an expansion of the discussion group to more students. More learning was achieved through interaction with peers which enabled specific mechanisms to affect the cognitive process (Arbaugh & Benbunan-Fich, 2006). These included resolution of conflicts during group discussions, acknowledging varying perspectives provided by more knowledgeable peers and enabling a process of self-reflection Benbunan-Fich, Hiltz and Turoff (2003). There was less resistance to typing out one’s answer to mobile devices as compared to speaking in front of the whole class. Warschauer (1996) reported that quiet and reserved learners seemed to contribute more on online platforms than classroom discussions. Furthermore, with the technology-enabled in-class learning within the scaffolding support system, it enabled a two-pronged approach, first by allowing students to input their preliminary thoughts via the online platform and second, by enabling opportunities for collaborative engagement through students verbalizing
ideas collated from their group members. Students who work in groups online were able to reflect on others’ written contributions and encourage elaboration of thoughts before writing it (Harasim, 1990). The key benefit of this approach is the learners’ contributions being displayed concurrently on the device’s screen. As such, everyone in the group can view this without any overlaps, similar to face-to-face dialogues. This exchange of ideas enabled learners to be exposed to varying perspectives of a topic, which widens students’ thinking abilities and reasoning skills (Bakhtin, 1986).

On the flip side, there is a possibility of causing slight confusion during the editing of text and making contributions concurrently, although learners eventually adapt to the digital flow of sharing and/or editing the inputs. Collaboration, knowledge building and meaningful learning are the expected outcomes from such blended learning interventions.

Students felt that the class was now more engaging compared to a traditional classroom in which only some students actively participated. They also felt more competent as active participants in the creation and dissemination of knowledge. The online platform also gave quieter students the opportunity to actively participate and provide their reflections in a conducive space without fear of being overshadowed by their more vocal peers (Kim, 2014). Students felt their opinions were valued and therefore felt more engaged. The scaffolding process ensures that students are fully engaged in the learning activities and were less distracted. Students also indicated that the collaborative aspect of learning, which characterized this approach, exposed them to diverse opinions and offered them opportunities to develop their critical thinking skills. They also mentioned that the peer review exercise, which included giving and receiving feedback as well as applying the feedback to improve their own answers, and considering different perspectives, enabled them to think more critically. This process led to the honing of higher-order thinking skills (Webb, 1980), deeper reflection and discussions, and better collaboration. It also brought the group members closer together.

Further comments included how the framework enhanced efficiency and quality of learning as the inputs from team members were typed out concurrently instead of being offered in a staggered fashion as it usually occurs during a discussion. In addition, students commented on how the discussions challenged them to have a deeper consideration of the course materials. Generally, students who experienced the use of the scaffolding support system in class felt that there was a shift towards a more collaborative and engaging learning climate, the former enabling them to be more focused and participative in class. Furthermore, by being exposed to more diverse viewpoints and analysing others’ answers, students felt that their critical thinking skills were being developed. Table 2.4 in Appendix F reports students’ responses to their experiences on the use of activity support system.
### Table 2.4  Student responses to the use of scaffolding support system

| Themes         | Student responses                                                                 | Explanation                                                                                                                                 |
|----------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| **Engagement** | “ensures that the whole group is able to write down their thoughts”                 | Students felt that the class was more engaging as compared to a traditional classroom that only involved participation of some students. It allowed quiet students to type and express themselves. Students felt their opinions being valued, and therefore, they felt more engaged. The activities they participated in also required constant attention from the students, making sure they are more engaged and less distracted. |
|                | “allows entire class to bring our discussion further, without stifling our opinions and thoughts” |                                                                                                                                             |
|                | “it allows you to be constantly aware of what is going on”                         |                                                                                                                                             |
|                | “students feel their viewpoints are valued”                                         |                                                                                                                                             |
|                | Students felt that the class was more engaging as compared to a traditional classroom that only involved participation of some students. It allowed quiet students to type and express themselves. Students felt their opinions being valued, and therefore, they felt more engaged. The activities they participated in also required constant attention from the students, making sure they are more engaged and less distracted. |
| **Collaboration** | “makes the whole experience more collaborative”                                    | Most students commented that there were more opportunities for collaboration in class and it allowed an expansion of the discussion group to more students. There was lower resistance for the less vocal students to type out one’s answer onto mobile electronic devices as compared to speaking up in front of the whole class. This led to more discussion and therefore better collaboration which enhanced the groups’ cohesiveness. |
|                | “brings our group members closer together”                                         |                                                                                                                                             |
|                | “allows students to collaborate as a team, before coming out with a well-constructed answer” |                                                                                                                                             |
|                | “fosters collaboration and discussion, this is because there is a lower resistance when we type out our answers as compared to when we speak up” |                                                                                                                                             |
| **Critical thinking** | “allows us…to critically analyze each other’s answers”                              | Students expressed that the collaboration aspect of learning exposed them to more diverse opinions and developed their critical thinking skills. They also commented that by reviewing works of others, receiving feedback and then improving their own answers while taking into consideration of different perspectives, they are thinking more critically. Furthermore, one student commented on how discussions challenged the materials they were learning and brought learning to a higher level |
|                | “this collaboration, it leads to more critical thinking”                            |                                                                                                                                             |
|                | “allows members to think of different ways to tackle the same issues, this allows for higher critical thinking skills” |                                                                                                                                             |
|                | “by looking at other perspectives, it provides fresh insights into the issue”      |                                                                                                                                             |

(continued)
Table 2.4 (continued)

| Themes                          | Student responses                                                                                     | Explanation                                                                                                                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specific activity sequences     | **Collaboration activity sequence**<br>• “gives us the adequate experience”<br>**Jigsaw activity sequence**<br>• “this resembles workplace scenario, and I think this is extremely useful and beneficial”<br>**Peer review activity sequence**<br>• “as a group we might be prone to groupthink, so we might be conforming to the common ideas within our group, by looking at other perspectives, it provides fresh insights into the issue”<br>• “meaningful” | Students felt that activity sequences such as collaboration and jigsaw prepare them for their future work. As more and more discussion and collaboration in workplace now take place online instead of face to face, collaboration activity sequence provides students with a chance to practice communicating through technological devices. Also, for jigsaw activity sequence, many times the discussion within a group would need to be later aligned with the bigger group views. Therefore, students find themselves acquiring “real-life” experiences. In particular, many students found peer review activity sequence to be engaging, allowed fresh insights to be gained while avoiding groupthink. One student felt that it was a “meaningful” activity that allowed students to overcome their own uncertainty and shyness to openly debate about other students’ answers. This would facilitate discussions without stifling any student’s own thoughts. The peer review activity sequence also allowed the student to think about answers from another student’s perspective and use that to improve their own answers. |
| Other general comments          | **“enhancing efficiency of learning”**                                                                 | The system allows concurrent and simultaneous input from students; hence, discussions are facilitated at a faster speed and presentations can be conducted easily.                                                    |
The study performed was timely and vital to respond continuously and embrace changes in line with the rapid evolution in the higher education arena. We could draw out some insightful reflections which are to be advocated for adoption in our learning design, curriculum innovation and delivery approaches. The findings were thoroughly examined and proposed as action-able recommendations as follows:

Firstly, the online part must be mindfully designed by understanding the profile of the participants and the socio-cultural aspects, for example, the mixture of ethnic, cultural backgrounds, their learning cultures and so on. This is vital to align and design the contents to be more engaging and how the contents are to be disseminated in the best possible way to others. Explicitly, if you are designing the online contents for non-native English-speaking participants, especially when their first language is not English, then we need to be mindful of how the contents can reach them. For example, the voice-over presentations or animations could have voice text appearing on the screen while the audio is being played. This helps students to read and hear which enables them to understand what is being said with higher clarity. Another vital aspect is to be aware that the examples cited within the illustrations provided need to be global or something which all students can easily relate to; otherwise, students may be confused as there is someone for them to immediately clarify at that time of their learning. Another approach to address this issue would be to clearly inform them to jot down these questions and clarifications and allocate a specific time within the class to address them explicitly.

Secondly, the technology-enabled part of online learning needs to be interactive and engaging for students to dedicate their time and enjoy the learning process. Again, a general advice would be to comprehend thoroughly the context and profile of the participants involved to craft the contents more appropriately and emphasize the aspects inline with the learning goals to be attained on the pre-class online learning portion. One vital element in the design of online learning is the engagement between the learners and the contents they acquire. Presenting the complex, theoretical and dry concepts into simpler, easy to understand format makes the students learn effectively. One way is to intervene with a few strategies like (a) adopting animations to design the content delivery and (b) ensuring the voice-over videos created are kept to not more than 5 min. These videos should be creatively presented with visuals supported with succinct yet clear explanations; (c) adopting varying types of interactive quizzes that provide immediate formative feedback for students to reflect and learn. The mini-case scenario type multiple-choice type quizzes were well received by students. This is largely because students can perform a quick self-assessment of their understanding of concepts acquired through a deeper level. In addition to this, a timed quiz is also encouraged where the questions presented here will be designed to have the students work on these questions in a time-pressure context that helps to develop the competency to work under tight timelines; (d) including a reflection journal as
the final part of the pre-class activity. This acts as a powerful avenue where the key learnings could be captured and evaluated to be given feedback for improvements. Also, the design for this reflection journal for each lesson should be connected through the topics across the semester, where the case study story builds on that which enables the students to appreciate how the scope and context of the same case shape up and intertwine to the varying topics.

Thirdly, with the flipped approach, one-third of the total time allocated for the Academic Unit (AU) will be for the online portion and the remaining two-third time will be for the face-to-face class part. The face-to-face class must be designed that entails (a) application of concepts with ample opportunities to have inter- and intra-group interactions with group reviews as well as interactions, sharing of insights at both individual and group levels; (b) debates where the entire class is involved in providing their comments or exchange of perspectives on contemporary issues pertaining the topics. The assessment design for the class participation should emphasize the quality contributions of views, asking challenging yet critical thinking questions and advocating the learning culture to articulate confidently. This learning design will develop their confidence and condition them to think and articulate well in terms of quality contributions. The activities for the flipped classroom should emphasize experiential and active learning, so that students are able to optimize the time on deep learning through real-life cases, experiential and problem-based activities.

2.8 Limitations, Conclusions and Future Reflections

The survey results indicated three main areas of improvement for the pre-class online learning. First, many students found it to be lengthy with many concepts to grasp. Second, they preferred to have more interactions with their peers during the online learning. Also, they encountered occasional technical glitches which needed rectification.

We find that the first two points echo what Karakas et al. (2015) had suggested as the three key challenges in teaching management today: it is difficult to maintain students’ attention for a long period of time and they desire more collaborative activities. Another possible reason for their feedback might be attributed to their expectations of classroom design. Students may not fully understand that the content dissemination they tend to associate with classroom teaching will now take place outside the classroom, leaving actual classroom time for collaborative and active learning activities. They may be expecting to see traditional pre-class online activities that aim to pique their interest rather than conducting actual teaching. As for the third feedback item, we will work with the development team and ensure less technical glitches occur for future classes. One suggestion to enhance the scaffolding system was to provide colour coding of the inputs typed in; although students felt that it was creative, they suggested using a much lighter colour coding, perhaps in shades of the same colour.
2.8 Limitations, Conclusions and Future Reflections

For future research directions, this study will be conducted with multiple sections to better understand the effectiveness of such a framework with the students as well as with instructors. Also, the research may be conducted to examine whether more collaborative activities during the pre-class online learning may enhance students’ learning experience.

Acknowledgements This project was funded by Nanyang Technological University (NTU) for the flipped classroom pedagogy transformation and the NTU Educational Excellence Grant for the flipped classroom and/or team-based scaffolding support system. The author extends his gratitude to Ms. Huang, Research Associate, for her administrative assistance. The author would also like to thank the anonymous reviewers and editors for providing valuable feedback and guidance.

Appendix A: Post-TEL Survey

(Extracted from the post-survey performed by students attending a TEL course)

Survey Questions
1. The online learning experience I had for this course is _______________________.
   a. Very Positive
   b. Positive
   c. Somewhat Positive
   d. Somewhat Negative
   e. Negative
   f. Very Negative

   Please key in any comments you may have for this question in the box below.

   ___________________________________________________________________________
   ___________________________________________________________________________

2. The online learning approach in this course is a/an ___________________ way to learn.
   a. Very Effective
   b. Effective
   c. Somewhat Effective
   d. Somewhat Ineffective
   e. Ineffective
   f. Very Ineffective

   Please key in any comments you may have for this question in the box below.

   ___________________________________________________________________________
   ___________________________________________________________________________
   ___________________________________________________________________________
3. My general thoughts and feelings about the online learning experience I had for this course:

__________________________________________________________________________
__________________________________________________________________________

4. Online delivery for this course provided a flexible learning environment to help me understand the topics better.

a. Strongly Agree  
b. Agree  
c. Somewhat Agree  
d. Somewhat Disagree  
e. Disagree  
f. Strongly Disagree

5. Learning objectives were clearly defined in the online content for this course and I know what I need to achieve.

a. Strongly Agree  
b. Agree  
c. Somewhat Agree  
d. Somewhat Disagree  
e. Disagree  
f. Strongly Disagree

6. The instructions given in the online content for this course were clear and I understood what was required of me.

a. Strongly Agree  
b. Agree  
c. Somewhat Agree  
d. Somewhat Disagree  
e. Disagree  
f. Strongly Disagree

7. The online content for this course included good examples to illustrate the concepts taught.

a. Strongly Agree  
b. Agree  
c. Somewhat Agree  
d. Somewhat Disagree  
e. Disagree  
f. Strongly Disagree
8. The online content for this course provided me learning opportunities to apply what I have learnt, to meet the learning objectives.
   a. Strongly Agree
   b. Agree
   c. Somewhat Agree
   d. Somewhat Disagree
   e. Disagree
   f. Strongly Disagree

9. There were opportunities for collaboration with fellow students in the online delivery of this course.
   a. Strongly Agree
   b. Agree
   c. Somewhat Agree
   d. Somewhat Disagree
   e. Disagree
   f. Strongly Disagree

10. The online content for this course provided me opportunities to reflect on the topics and be able to apply them to other contexts appropriately.
    a. Strongly Agree
    b. Agree
    c. Somewhat Agree
    d. Somewhat Disagree
    e. Disagree
    f. Strongly Disagree

11. The online content for this course was made available for an appropriate length of time.
    a. Strongly Agree
    b. Agree
    c. Somewhat Agree
    d. Somewhat Disagree
    e. Disagree
    f. Strongly Disagree

12. The forum and/or chat facilities included in the online content for this course were important in providing authentic scenarios for open-ended discussions.
    a. Strongly Agree
    b. Agree
    c. Somewhat Agree
    d. Somewhat Disagree
    e. Disagree
    f. Strongly Disagree
13. Collaborating with fellow students enhanced my learning in the online delivery of this course.

a. Strongly Agree  
b. Agree  
c. Somewhat Agree  
d. Somewhat Disagree  
e. Disagree  
f. Strongly Disagree

14. The lecture recordings were clear and loaded smoothly.

a. Strongly Agree  
b. Agree  
c. Somewhat Agree  
d. Somewhat Disagree  
e. Disagree  
f. Strongly Disagree

15. I like to see more of this type of course delivery, which has both online and face-to-face learning activities.

a. Strongly Agree  
b. Agree  
c. Somewhat Agree  
d. Somewhat Disagree  
e. Disagree  
f. Strongly Disagree

16. What I liked most about the online content for this course was:

__________________________________________________________________________  
__________________________________________________________________________

17. What I think could be done to improve the online content for this course:

__________________________________________________________________________

Appendix B: Interview Questions

1. What are your experiences of using this real-time in-class e-scaffolding support system?
2. How does it explicitly enhance (a) higher levels of collaboration; (b) make you think more critically; (c) better engagement with your peers in your group and others in the class?
3. What are your perspectives of the different activity sequences that this scaffolding support system supports and how do you learn better through the various activity sequences embedded in your group and class discussions?
4. What are your experiences on the flipped classroom embedded with technology-enabled learning design?
Appendix C: LAMS, “doKumaran” Tool, and Active Support System

Learning Activity Management System (LAMS)

LAMS software is an online system that allows for planning of online digital lessons (“sequences”) using learning activities. LAMS has been an open resource learning design system since February 2005 (LAMS Foundation, 2004). LAMS belongs to the LAMS Foundation, a foundation based in Macquarie University, Australia, as part of the Macquarie E-learning Centre of Excellence.

The user-friendliness of LAMS allows professors and course designers to use them without much complexity and hassle. The authoring page for the LAMS comprises several features, for example, “Mindmap”, “doKumaran” tool and “Q&A”, that can be used to create the desired activity sequences. To create an activity sequence from scratch using LAMS, instructors can “drag and drop” the built-in features within LAMS. Then, they use the connecting arrows to organize the relevant features into a learning sequence (Fig. 2.7 presents a sample screenshot of the authoring platform in LAMS). Students may then participate in learning activities embedded within the platform based on how these activities are sequentially designed as planned by the instructors. Alternatively, instructors can also upload a pre-designed activity sequence from an array of activity templates (sequences) into the workspace. These activity sequences have been pre-designed and saved in a publicly accessible open drive.

LAMS operates as a standalone system and/or can be integrated with other learning management systems or virtual learning environments such as Moodle and Blackboard. LAMS has been adapted as a platform for designing inquiry-based learning activities (Levy et al., 2009), as an environment for collaborative digital story-telling (Kordaki & Agelidou, 2010) or as an environment for blended learning in secondary education (Rossiou, 2012).

Britain (2004) reviewed and reported that LAMS is “the most comprehensive implementation of the concept of learning design available to date”. Early feedback from trials conducted in Australia and the United Kingdom suggested that LAMS enabled many instructors to move their teaching to an online teaching environment due to its highly supportive design for both instructors and students (Philip & Dalziel, 2004).

The “doKumaran” Tool

The “doKumaran” tool (dKT) is a new feature and integration tool within the LAMS that allows teachers to create powerful and collaborative learning designs on a “real-time” document (see Fig. 2.8 for a sample screenshot). It allows students to collaborate on single or multiple documents in “real-time”, attaining a learning outcome
while influencing each other’s thoughts. Each contributor’s input will be highlighted in different colours to differentiate the authors (see Fig. 2.9 for a sample screenshot).

**Activity support system.** Five types of activity sequences have been created on the dKT:

1. **Group/Instructor-centric activity sequence.** This is the activity sequence where students are able to work within their group for any tasks assigned (see Fig. 2.10, for a sample screenshot and Fig. 2.11 for the process flow of the group/instructor-centric activity sequence). The activity sequence will be as follows:

   ![Figure 2.10](image)

   **Fig. 2.10** A sample screenshot of the group/instructor-centric activity sequence.

   ![Figure 2.11](image)

   **Fig. 2.11** Process flow of the group/instructor-centric activity sequence.

   ![Figure 2.9](image)

   **Fig. 2.9** A screenshot of capturing concurrent contributions highlighted in different colours for each contributor.
Fig. 2.10  Screenshot of a group/instructor-centric activity sequence

Fig. 2.11  Process flow of the group/instructor-centric activity sequence
2. **Peer review activity sequence.** With this activity sequence, students can work in their group first and their completed work would be viewed by another group for critical feedback. When the group being reviewed receives the comments and critiques, they may reflect on and edit their work accordingly (see Fig. 2.12 for a sample screenshot and Fig. 2.13 for the process flow of the peer review activity sequence). The activity sequence will be as follows:

a. Group formation  
b. Selection of group leader and scribe  
c. Group works together to answer question(s) based on a case study  
d. Instructor reviews the work done in the activity with the class.

g. When all the groups in the class have completed their evaluations, all groups return to review the evaluations given  
h. As a group, assess the evaluation and incorporate or reject the suggestions, giving justifications for both  
i. Instructor reviews the work done in the activity with the class.

3. **Collaboration activity sequence.** This activity sequence allows different groups in a class to work together concurrently. For example, two groups can work on one document together at one time. Students will therefore be exposed to teamwork with bigger teams using this activity sequence (see Fig. 2.14 for a sample screenshot and Fig. 2.15 for the process flow of the collaboration activity sequence). The activity sequence is as follows:

a. Group formation  
b. Selection of group leader and scribe  
c. Selection of topic to cover  
d. Collaboration with another group to answer question(s) based on a case study  
e. Instructor reviews the work done in the activity with the class.
Fig. 2.13  Process flow of the peer review activity sequence

Fig. 2.14  A screenshot of a collaboration activity sequence
4. **Jigsaw activity sequence.** When simulating tasks that can be broken down into stages, such as planning processes or employment cycles, this activity sequence allows different groups in the class to each take on a different stage of the task. After each group has worked on their assigned stage of the task, the class can work together on the whole task together. This would enable students to see the big picture, particularly the links and connectivity between each stage of the task. Thereafter, each group can critically reflect on the overall flow of the stages in order to fine-tune their work (see Fig. 2.16 for a sample screenshot and Fig. 2.17 for the process flow of the Jigsaw activity sequence). The activity sequence is as follows:

- a. Group formation
- b. Selection of group leader(s)
- c. Instructor assigns groups to each of the parts of the question
- d. Each group will answer the assigned parts of the question, based on a case study
- e. Instructor reviews the answers from the class
- f. Using the instructor’s feedback, work with the other groups to create a coherent answer connecting all parts of the question
- g. Instructor reviews the work done by the class.
5. **Unstructured activity sequence.** This activity sequence allows the class to be grouped differently. For example, the entire class may be split up into two teams, with more than one group of students in one team. With more members in one team, the team dynamics would be more diverse (see Fig. 2.18 for a sample screenshot and Fig. 2.19 for the process flow of the unstructured activity sequence). The activity sequence is as follows:

   a. Group formation
   b. Selection of group leader and scribe
   c. The class works together in groups to answer question(s) based on a case study
   d. Instructor reviews the work done in the activity with the class.

Appendix E furnishes a URL link which includes video trailers on the five activity sequences of the scaffolding support system, including a value proposition of the “doKumaran” tool and the technical description on the functionality of “doKumaran” tool.

**Appendix D: Video Trailer for Flipped Classroom**

The video trailer for Flipped Classroom embedded with technology-enabled learning could be viewed via the link https://www.youtube.com/watch?v=0TJJrhlpFYc.
Fig. 2.17 Process flow of the jigsaw activity sequence

Fig. 2.18 Sequence in LAMS for unstructured activity sequence
Appendix E: The Process Flows of the 5 Activity Sequences

The process flows of the 5 activity sequences, namely (1) group-/instructor-centric; (2) peer review; (3) collaboration; (4) jigsaw; and (5) unstructured activity sequence, can be viewed in the video trailers in the furnished link:

- dKT Learning Blog Site: https://blogs.ntu.edu.sg/learning-innovations/dokumaran/
- Research Lab for Learning Innovation and Culture of Learning: https://learningintervention.wixsite.com/researchlab/dk.

Fig. 2.19  Process flow of the unstructured activity sequence
Appendix F: Student Responses to the Use of the Scaffolding Learning Support System

See Table 2.4.

References

Abeysekera, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. Higher Education Research & Development, 34(1), 1–14. http://dx.doi.org/10.1080/07294360.2014.934336.

Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., & Ananthanarayanan, V. (2017). NMC Horizon Report – 2017 Higher (Education ed.). Austin, TX: New Media Consortium.

Albert, M., & Beatty, B. J. (2014). Flipping the classroom applications to curriculum redesign for an introduction to management Course: Impact on grades. Journal of Education for Business, 89(8), 419–424. https://doi.org/10.1080/08832323.2014.929559.

Alebaikan, R., & Troudi, S. (2010). Blended learning in Saudi universities: Challenges and perspectives. ALT-J, 18(1), 49–59. http://dx.doi.org/10.1080/09687761003657614.

Al-Harbi, K. A. S. (2011). E-Learning in the Saudi tertiary education: Potential and challenges. Applied Computing and Informatics, 9(1), 31–46. https://doi.org/10.1016/j.aci.2010.03.002.

Arbaugh, J. B., & Benbunan-Finch, R. (2006). An investigation of epistemological and social dimensions of teaching in online learning environments. Academy of Management Learning & Education, 5(4), 435–447. http://dx.doi.org/10.5465/AMLE.2006.23473204.

Ashby, J., Sadera, W. A., & McNary, S. W. (2011). Comparing student success between developmental math courses offered online, blended, and face-to-face. Journal of Interactive Online Learning, 10(3), 128–140. http://www.ncolr.org/jiol/issues/pdf/10.3.2.pdf.

Austerschmidt, K. L., & Bebermeier, S. (2019). Implementation and effects of flexible support services on student achievements in statistics. Zeitschrift für Hochschulentwicklung, 14(3), 137–155. https://doi.org/10.3217/zfhe-14-03/09.

Baepler, P., Walker, J. D., & Driessen, M. (2014). It’s not about seat time: Blending, flipping, and efficiency in active learning classrooms. Computers & Education, 78, 227–236. https://doi.org/10.1016/j.compedu.2014.06.006.

Bakhtin, M. M. (1986). Speech genres and other late essays (V. McGee, Trans). Austin, TX: University of Texas Press.

Bawaneh, S. S. (2011). The effects of blended learning approach on students’ Performance: Evidence from a computerized accounting course. International Journal of Humanities and Social Science, 1(6), 63–69.

Bedwell, W. L., Fiore, S. M., & Salas, E. (2014). Developing the future workforce: An approach for integrating interpersonal skills into the MBA classroom. Academy of Management Learning & Education, 13(2), 171–186. http://dx.doi.org/10.5465/amle.2011.0138.

Bergamin, P., Ziska, S., & Groner, R. (2010). Structural equation modeling of factors affecting success in student’s performance in ODL-programs: Extending quality management concepts. Open Praxis, 4(1), 18–25.

Bergamin, P. B., Ziska, S., Werlen, E., & Siegenthaler, E. (2012). The relationship between flexible and self-regulated learning in open and distance universities. The International Review of Research in Open and Distributed Learning, 13(2), 101–123. https://doi.org/10.19173/irrodl.v13i2.1124.

Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: From the general to the
Berney, S., & Bétrancourt, M. (2016). Does animation enhance learning? A meta-analysis. *Computers & Education, 101*, 150–167. [http://dx.doi.org/10.1016/j.compedu.2016.06.005](http://dx.doi.org/10.1016/j.compedu.2016.06.005).

Benbunan-Fich, R., Hiltz, S. R., & Turoff, M. (2003). A comparative content analysis of face-to-face vs. asynchronous group decision making. *Decision Support Systems, 34*(4): 457–469. [https://doi.org/10.1016/S0167-9236(02)00072-6](https://doi.org/10.1016/S0167-9236(02)00072-6).

Bishop, J. L., & Verleger, M. A. (2013). *The flipped classroom: A survey of the research*. Paper presented at the ASEE National Conference, Atlanta, GA.

Blöncz, A.-M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students’ experiences of blended learning in higher education. *The Internet and Higher Education, 10*(4), 231–244. [http://doi.org/10.1016/j.iheduc.2007.08.001](http://doi.org/10.1016/j.iheduc.2007.08.001).

Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals*. *Handbook 1: Cognitive do-main*. London: Longman.

Blue, C., & Henson, H. (2015). Millennials and dental education: Utilizing educational technology for effective teaching. *American Dental Hygienists Association, 89*, 46–47. Retrieved from [http://jdh.adha.org/content/89/suppl_1/46](http://jdh.adha.org/content/89/suppl_1/46).

Boase-Jelinek, D., Parker, J., & Herrington, J. (2013). Student reflection and learning through peer reviews. *Issues in Educational Research, 23*(2), 119–131. Retrieved from [http://www.iier.org.au/iier23/boase-jelinek.pdf](http://www.iier.org.au/iier23/boase-jelinek.pdf).

Boelens, R., De Wever, B., & Voet, M. (2017). Thematic Review: Four key challenges to the design of blended learning: A systematic literature review. *Educational Research Review, 22*, 1–18. [http://dx.doi.org/10.1016/j.edurev.2017.06.001](http://dx.doi.org/10.1016/j.edurev.2017.06.001).

Britain, S. (2004). *A review of learning design: Concept, specifications and tools*. A report for the JISC E-learning Pedagogy Programme (2004). Retrieved from [http://www.jisc.ac.uk/media/documents/programmes/elearningpedagogy/learningdesigntoolsfinalreport.pdf](http://www.jisc.ac.uk/media/documents/programmes/elearningpedagogy/learningdesigntoolsfinalreport.pdf).

Brooks, D. C. (2015, October). *ECAR Study of Faculty and Information Technology*. Louisville, CO: ECAR.

Busteed, B., & Seymour, S. (2015, September 23). Many college graduates not equipped for workplace success. Retrieved from [Gallup Business Journal](http://www.gallup.com/businessjournal/185804/college-graduates-not-equippedworkplace-success.aspx).

Byrnes, J. P., & Dunbar, K. N. (2014). The nature and development of critical-analytic thinking. *Educational Psychology Review, 26*, 477–493.

Cain, S., & Klein, E. (2015). Engaging the quiet kids. *Independent School, 75*(1), 64–71. Retrieved from [https://www.nais.org/magazine/independent-school/fall-2015/engaging-the-quiet-kids/](https://www.nais.org/magazine/independent-school/fall-2015/engaging-the-quiet-kids/).

Carini, R. M., Kuh, G. D., & Klein, S. P. (2006). Student engagement and student learning: Testing the linkages. *Research in Higher Education, 47*(1), 1–32. [http://dx.doi.org/10.1007/s11162-005-8150-9](http://dx.doi.org/10.1007/s11162-005-8150-9).

Caspi, A., Chajut, E., Saporta, K., & Beyth-Marom, R. (2006). The influence of personality on social participation in learning environments. *Learning and Individual Differences, 16*(2), 129–144. [https://doi.org/10.1016/j.lindif.2005.07.003](https://doi.org/10.1016/j.lindif.2005.07.003).

Chai, C.-S., Koh, J. H.-L., & Tsai, C.-C. (2013). A review of technological pedagogical content knowledge. *Educational Technology & Society, 16*(2), 31–51. Retrieved from [https://www.j-ets.net/ETS/journals/16_2/4.pdf](https://www.j-ets.net/ETS/journals/16_2/4.pdf).

Chen, P., Lambert, A., & Guidry, K. (2010). Engaging online learners: The impact of web-based learning technology on college student engagement. *Computers & Education, 54*, 1222–1232. [https://doi.org/10.1016/j.compedu.2009.11.008](https://doi.org/10.1016/j.compedu.2009.11.008).

Coates, H. (2006). *Student engagement in campus-based and online education: University connections*. New York, NY: Routledge.

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world* (Chapter 2, pp. 29–43). London: Kogan Page.
Cook, B. R., & Babon, A. (2017). Active learning through online quizzes: better learning and less (busy) work. *Journal of Geography in Higher Education, 41*(1), 24–38. http://dx.doi.org/10.1080/03098265.2016.1185772.

Crossan, M., Mazutis, D., Seijts, G., & Gandz, J. (2013). Developing leadership character in business programs. *Academy of Management Learning & Education, 12*(2), 285–305. https://doi.org/10.5465/amle.2011.0024a.

Crouch, C. H., & Mazur, E. (2001). Peer instruction: Ten years of experience and results. *American Journal of Physics, 69*, 970–977.

Delcker, J., Honal, A., & Ifenthaler, D. (2017). *Mobile device usage in university and workplace learning settings*. Paper presented at the ACET 2017, Jacksonville, FL.

Delmas, R., Garfield, J., Ooms, A., & Chance, B. (2007). Assessing students’ conceptual understanding after a first course in statistics. *Statistics Education Research Journal, 6*, 28–58.

DeLozier, S. J., & Rhodes, M. G. (2017). Flipped classrooms: A review of key ideas and recommendations for practice. *Educational Psychology Review, 29*(1), 141–151. http://dx.doi.org/10.1007/s10648-015-9356-9.

Deperlioglu, O., & Kose, U. (2013). The effectiveness and experiences of blended learning approaches to computer programming education. *Computer Applications in Engineering Education, 21*(2), 328–342. https://doi.org/10.1016/j.cae.20476.

Deslauriers, L., Schelew, E., & Wieman, C. (2011). Improved learning in a large-enrollment physics class. *Science, 332*(6031), 862–864.

Dixson, M. D. (2015). Measuring student engagement in the online course: The online student engagement scale (OSE). *Online Learning, 19*(4), 1–15.

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students’ learning with effective techniques: promising directions from cognitive and educational psychology. *Associations for Psychological Science, 14*(1), 4058.

Enfield, J. (2013). Looking at the impact of the flipped classroom model of instruction on undergraduate multimedia students at CSUN. *TechTrends, 57*, 14–27.

Felder, R. M., & Silverman, L. K. (1998). Learning and teaching styles in engineering education. *Engineering Education, 78*, 674–681.

Fleckhammer, L., & Wise, L. Z. (2010, December 4–7). The role of tutors in facilitating online student engagement. In *Proceedings ASCILITE*. Sydney.

Freeman, M., Blayney, P., & Ginns, P. (2006). Anonymity and in class learning: The case for electronic response systems. *Australasian Journal of Educational Technology, 22*(4). https://doi.org/10.14742/ajet.1286.

Frank, E. (1999). Students evaluation of an experiential learning technique: the marketing plan assignment. In M. Curren & K. Harich (Eds.), *Proceedings of the Western Marketing Educators’ Association*. Palm Springs, CA.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95–105. https://doi.org/10.1016/j.iheduc.2004.02.001.

Gaughan, J. E. (2014). The flipped classroom in world history. *History Teacher, 47*(2), 221–244.

Gibbs, G. (2014, May 1). Student engagement, the latest buzzword. *Times Higher Education*. https://www.timeshighereducation.com/news/student-engagement-the-latest-buzzword/2012947.article.

Gilboy, M. B., Heinerichs, S., & Pazzaglia, G. (2015). Enhancing student engagement using the flipped classroom. *Journal of Nutrition Education and Behaviour, 47*(1), 109–114. https://doi.org/10.1016/j.jneb.2014.08.008.

Ginns, P., & Ellis, R. (2007). Quality in blended learning: Exploring the relationships between online and face-to-face teaching and learning. *The Internet and Higher Education, 10*(1), 53–64. https://doi.org/10.1016/j.iheduc.2006.10.003.

Gokhale, A. A. (1995). Collaborative learning enhances critical thinking. *Journal of Technology Education, 7*(1), 22–30. https://doi.org/10.1007/978-1-4419-1428-6_910.
Kim, I.-H. (2014). Development of reasoning skills through participation in collaborative synchronous online discussions. *Interactive Learning Environments, 22*(4), 467–484. http://dx.doi.org/10.1080/10494820.2012.680970.

Kim, M. K., Kim, S. M., Khera, O., & Getman, J. (2014). The experience of three flipped classrooms in an urban university: An exploration of design principles. *Internet and Higher Education, 22*, 37–50. https://doi.org/10.1016/j.iheduc.2014.04.003.

Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: What is “enhanced” and how do we know? A critical literature review. *Learning, Media and Technology, 39*(1), 6–36. https://doi.org/10.1080/10494820.2013.770404.

Kolb, D. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice-Hall.

Kong, S. C. (2014). Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: An experience of practicing flipped classroom strategy. *Computers & Education, 78*, 160–173. https://doi.org/10.1016/j.compedu.2014.05.009.

Kordaki, M., & Agelidou, E. (2010). A learning design-based environment for online, collaborative digital storytelling: An example for environmental education. *International Journal of Learning, 17*(5), 95–106.

Korr, J., Derwin, E. B., Greene, K., & Sokoloff, W. (2012). Transitioning an adult-serving university to a blended learning model. *The Journal of Continuing Higher Education, 60*(1), 2–11. http://dx.doi.org/10.1080/07377763.2012.649123.

Krause, K.-L. (2005). Understanding and promoting student engagement in university learning communities. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.659.6304&rep=rep1&type=pdf.

Kuh, G. D. (2003). What we’re learning about student engagement from NSSE: Benchmarks for effective educational practices. *Change: The Magazine of Higher Learning, 35*(2), 24–32. http://dx.doi.org/10.1080/00091380309604090.

Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education, 31*(1), 30–43. http://dx.doi.org/10.1080/00220480091380309604090.

Lawson, M. A., & Lawson, H. A. (2013). New conceptual frameworks for student engagement research, policy, and practice. *Review of Educational Research, 83*(3), 432–479. http://www.jstor.org/stable/24434165.

Levy, P., Aiyegbayo, O., & Little, S. (2009). Designing for inquiry-based learning with the learning activity management system. *Journal of Computer Assisted Learning, 25*(3), 238–251. https://doi.org/10.1111/j.1365-2729.2008.00309.x.

Li, K. C., & Wong, B. Y. Y. (2018). Revisiting the definitions and implementation of flexible learning. In K. Li, K. Yuen, & B. Wong (Eds.), *Innovations in open and flexible education* (pp. 3–13). Singapore: Springer.

Little, C. (2015). The flipped classroom in further education: literature review and case study. *Research in Post-Compulsory Education, 20*(3), 265–279. http://dx.doi.org/10.1080/13596748.2015.1063260.

Lowell, J., Utah, B., Verleger, M. A., & Beach, D. (2013). The flipped classroom: A survey of the research. In *Proceedings of the Annual Conference of the American Society for Engineering Education* (p. 6219). Retrieved from http://www.asee.org/public/conferences/20/papers/6219/view.

Maarop, A. H., & Embi, M. A. (2016). Implementation of blended learning in higher learning institutions: A review of literature. *International Education Studies, 9*(3), 41. https://doi.org/10.5539/ies.v9n3p41.

Macquarie University Learning and Teaching Centre. (2009). *Student engagement principles*. https://www.mq.edu.au/lish/pdfs/Engagement_Principles.pdf.
Manson, et al. (2013). Comparing the effectiveness of an inverted classroom to a traditional classroom in an upper-division engineering course. *IEEE Transactions on Education, 56*(4), 430–435.

Mazur, E. (2009). Farewell, lecture? *Science, 323*, 50–51.

McGarry, B. J., Theobald, K., Lewis, P. A., & Cover, F. (2015). Flexible learning design in curriculum delivery promotes student engagement and develops meta cognitive learners: An intergrated review. *Nurse Education Today, 35*(9), 966–973.

McLaughlin, J. E., Griffin, L. M., Esserman, D. A., Davidson, C. A., Glatt, D. M., Roth, M. T., & Mumper, R. J. (2013). Pharmacy student engagement, performance, and perception in a flipped satellite classroom. *American Journal of Pharmaceutical Education, 77*(9), 196. http://dx.doi.org/10.5688/ajpe779196.

Miele, D. B., & Wigfield, A. (2014). Quantitative and qualitative relations between motivation and critical-analytic thinking. *Educational Psychology Review, 26*, 519–541.

Moore, T. (2013). Critical thinking: Seven definitions in search of a concept. *Studies in Higher Education, 38*(4), 506–522. http://hdl.handle.net/1959.3/215763.

O’Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. *The Internet and Higher Education, 25*, 85–95. https://doi.org/10.1016/j.iheduc.2015.02.002.

Owston, R., York, D., & Murtha, S. (2013). Student perceptions and achievement in a university blended learning strategic initiative. *The Internet and Higher Education, 18*, 38–46. https://doi.org/10.1016/j.iheduc.2012.12.003.

Patrick, S., & Martin, E. (2015). Aspects to be considered when implementing technology-enhanced learning approaches: A literature review. *Future Internet, 7*(1), 26–49. https://doi.org/10.3390/fi7010026.

Paulhus, D. L., Duncan, J. H., & Yik, M. S. M. (2002). Patterns of shyness in East-Asian and European-heritage students. *Journal of Research in Personality, 36*(5), 442–462. http://dx.doi.org/10.1016/S0092-6566(02)00005-3.

Philip, R., & Dalziel, J. (2004). *Designing activities for student learning using the learning activity management system (LAMS)*. Paper presented at the International Conference on Computers in Education.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education, 93*(3), 223–231. http://dx.doi.org/10.1002/j.2168-9830.2004.tb00809.x.

Rajaram, K. (2015a, May 22–23). A paradigm shift in culture of learning via mobile learning and flipped classroom: Hybrid e-learning framework for management studies in higher education. Paper presented at International Mobile Learning Festival 2015: Mobile Learning, MOOCs and 21st Century Learning Conference, Hong Kong SAR China.

Rajaram, K. (2015b, May 22–23). Is there a need for a paradigm shift? Teaching in higher education in the new millennium. Paper presented at International Mobile Learning Festival 2015: Mobile Learning, MOOCs and 21st Century Learning Conference, Hong Kong SAR China.

Rajaram, K. (2015c, May 22–23). A transformation in the culture of learning and learning culture for teaching in higher education. Paper presented at International Mobile Learning Festival 2015: Mobile Learning, MOOCs and 21st Century Learning Conference, Hong Kong SAR China.

Rajaram, K. (2020). *Educating Mainland Chinese Learners in Business Education: Pedagogical and Culture Perspectives, Singapore Experiences*. Springer. https://www.springer.com/gp/book/9789811533938.

Rajaram, K., Bednall, T. C., Honal, A., & Rundshagen, V. M. (2017). *Exemplary practices for 21st century classroom (technology) enhanced learning approaches*. Paper presented at the 77th Annual Meeting of the Academy of Management, Atlanta, Georgia.

Rajaram, K., & Collins, J. B. (2013). Qualitative identification of learning effectiveness indicators among mainland Chinese students in culturally dislocated study environments. *Journal of International Education in Business, 6*(2), 179–199.
Reeve, J., & Tseng, C. M. (2011). Agency as a fourth aspect of students’ engagement during learning activities. Contemporary Educational Psychology, 36(4), 257–267. https://doi.org/10.1016/j.cedpsych.2011.05.002.

Rhodes, C., & Nevill, A. (2004). Academic and social integration in higher education: A survey of satisfaction and dissatisfaction within a first-year education studies cohort at a new university. Journal of Further and Higher Education, 28(2), 179–193. https://doi.org/10.1080/0309877042000206741.

Roach, T. (2014). International Review of Economics Education Student perceptions toward flipped learning: New methods to increase interaction and active learning in economics. Biochemical Pharmacology, 17, 74–84. https://doi.org/10.1016/j.icep.2014.08.003.

Rossiou, E. R. U. G. (2012). Digital natives…are changed: An educational scenario with LAMS integration that promotes collaboration via blended learning in secondary education. In Proceedings of the European Conference on e-Learning (pp. 468–479).

Schnotz, W., & Lowe, R. K. (2008). A unified view of learning from animated and static graphics. In Learning with Animation: Research Implications for Design (pp. 304–356). Retrieved from http://hdl.handle.net/20.500.11937/11414.

Siemens, G. (2004). Connectivism: A learning theory for a digital age. http://www.itdl.org/journal/jan_05/article01.htm.

Sims, G. K. (1989). Student peer review in the classroom: A teaching and grading tool. Journal of Agronomic Education, 18(2), 105–108.

Sloman, M. (2007). Making sense of blended learning. Industrial and Commercial Training, 39(6), 315–318. https://doi.org/10.1108/00197850710816782.

Smyth, S., Houghton, C., Cooney, A., & Casey, D. (2012). Students’ experiences of blended learning across a range of postgraduate programmes. Nurse Education Today, 32(4), 464–468. https://doi.org/10.1016/j.nedt.2011.05.014.

Soffer, T., Kahan, T., & Nachmias, R. (2019). Patterns of students’ utilization of flexibility in online academic courses and their relation to course achievement. The International Review of Research in Open and Distributed Learning, 20(3). https://doi.org/10.19173/irrodl.v20i4.3949.

Spanjers, I. A. E., Könings, K. D., Leppink, J., Verstegen, D. M. L., de Jong, N., Czabanowska, K., & van Merriënboer, J. J. G. (2015). Review: The promised land of blended learning: Quizzes as a moderator. Educational Research Review, 15, 59–74. http://dx.doi.org/10.1016/j.edurev.2015.05.001.

Stebner, F., Kühl, T., Höfler, T. N., Wirth, J., & Ayres, P. (2017). The role of process information in narrations while learning with animations and static pictures. Computers & Education, 104, 34–48. https://doi.org/10.1016/j.compedu.2016.11.001.

Suda, K. J., Sterling, J. M., Guirguis, A. B., & Mathur, S. K. (2014). Student perception and academic performance after implementation of a blended learning approach to a drug information and literature evaluation course. Currents in Pharmacy Teaching and Learning, 6(3), 367–372. https://doi.org/10.1016/j.cptl.2014.02.017.

Taylor, L., & Parsons, J. (2011). Improving student engagement. Current Issues in Education, 14(1). http://cie.asu.edu/.

Thai, N. T. T., Wever, B. D., & Valcke, M. (2017). The impact of a flipped classroom design on learning performance in higher education: Looking for the best “blend” of lectures and guiding questions with feedback. Computers & Education, 1, 113–126.

Tucker, B. (2012). The flipped classroom. Education Next, 12(1), 82–83.

Tune, J. D., Sturek, M., & Basile, D. P. (2013). Flipped classroom model improves graduate student performance in cardiovascular, respiratory, and renal physiology. AJP: Advances in Physiology Education, 37(4), 316–320. http://doi.org/10.1152/advan.00091.2013.

Vaughan, N., & Garrison, D. R. (2005). Creating cognitive presence in a blended faculty development community. The Internet and Higher Education, 8(1), 1–12. https://doi.org/10.1016/j.iheduc.2004.11.001.
Vernadakis, N., Giannousi, M., Derri, V., Michalopoulos, M., & Kioumourtzoglou, E. (2012). The impact of blended and traditional instruction in students’ performance. *Procedia Technology, 1*, 439–443. https://doi.org/10.1016/j.protcy.2012.02.098.

Wamboye, E., Adekola, A., & Sergi, B. S. (2015). Internationalisation of the campus and curriculum – Evidence from the US institutions of higher learning. *Journal of Higher Education Policy & Management, 37*(4), 385–399. https://doi.org/10.1080/1360080X.2015.1056603.

Warschauer, M. (Ed.). (1995). *Virtual connections: Online activities and projects for networking language learners*. Honolulu, HI: University of Hawai’i, Second Language Teaching and Curriculum Center.

Warschauer, M. (1996). Comprising face-to-face and electronic discussion in the second language classroom. *CALICO Journal, 13*(2), 7–26. Retrieved from http://education.uci.edu/uploads/7/2/7/6/72769947/comparing_face-to-face_and_electronic_discussion.pdf.

Webb, N. M. (1980). An analysis of group interaction and mathematical errors in heterogeneous ability groups. *British Journal of Educational Psychology, 50*(3), 266–276. http://dx.doi.org/10.1111/j.2044-8279.1980.tb00810.x.

Willingham, D. T. (2008). Critical thinking: Why is it so hard to teach? *Arts Education Policy Review, 109*, 21–32.

Wilson, M., & Gerber, L. E. (2008). How generational theory can improve teaching: strategies for working with the millennials. *Currents in Teaching and Learning, 1*(1), 29–44. https://tigerweb.towson.edu/garcia/past%20semesters%20of%20intro/intro/2011%20fall%20intro/wilson%20and%20gerber.pdf.

Zacharis, N. Z. (2015). A multivariate approach to predicting student outcomes in web-enabled blended learning courses. *The Internet and Higher Education, 27*, 44–53. https://doi.org/10.1016/j.iheduc.2015.05.002.