

## **Exploiting asynchronous delivery at the tertiary level: Transitioning from the traditional to the flipped model**

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In recent years, educators, particularly those within the tertiary level landscape, have been subject to criticisms for their apparent inability to effectively educate students, in particular, their failure to explore the potential of technology. For the purpose of this paper, education refers to the ability to harness students' ability to engage in written communication, problem-solving, complex reasoning, and critical thinking – all hallmarks of higher education. The educational landscape is characterized by the inclusion of information communication technologies and their potential to facilitate digital learning. Asynchronous learning or Location Independent Learning (LIL) is a student-centered mode of delivery, which posits the idea that students can learn the same material at different times and locations. Compared to the traditional, synchronous mode of delivery, the level of convenience provided by the asynchronous modality offers opportunities for individualized pace and deeper reflection. The 'flipped' or 'inverted' classroom model is proposed as one such way of reaching students by speaking their digital language while at the same time creating opportunities for the development, and harnessing of the critical thinking skills that could allow them to navigate the professional and social world thereafter. The 'flipped' concept proposes that which is traditionally done in class is now done at home, and that which is traditionally done as homework, is now completed in class. This time shift then frees up the face-to-face time and transforms the classroom into a learning space used for discourse and hands-on, authentic learning experiences. Using action research, this study trialed the transition from a partially to fully flipped video classroom format at a tertiary level institution in Trinidad and Tobago, as a potential means to incorporate: 1) an asynchronous component that could allow for more schedule flexibility and appeal to a millennial audience and 2) a synchronous, interactive face-to-face component which focuses on problem-solving, collaboration, crafting and creating. The primary objectives of this study were to determine students' perception of the flipped classroom as well as to map the progression of learning in both iterations.

**Keywords:** flipped classroom; location independent learning; asynchronous learning; educational technology

## Introduction

In recent years, educators, particularly those within the tertiary level landscape, have been subject to criticisms for their apparent inability to effectively educate students, in particular, their failure to explore the potential of technology in the classroom. These criticisms are also within the context of a changing tertiary level education landscape in the Caribbean, where tertiary level institutions, are challenged to accommodate increases in demand for education in the midst of increasing resource constraints (Holm-Nielsen, Brunner, Balán, Thorn, & Elacqua, 2012). The forces of change in the higher education sector within the Caribbean region are diverse and significant. Experts argue that these forces include but are not limited to economics, globalization, technology, increasing student diversity, economics and changing employment trends (Wallace, 2004), creating a 'perfect storm' that requires a transformation of the tertiary education product into one that is affordable, relevant, accessible, and desirable.

Specifically, the incorporation of technology in the tertiary level educational landscape, now affords students the opportunity to interact with their professors and one another, both asynchronously and in real-time, without the need for physical attendance. This in turn, challenges faculty to master changing pedagogical approaches as well as become aware of the changing expectations of engagement. While advocates of the different camps subscribe to either the minimal or guided instruction and instructivism or constructivism, the nuanced and complex nature of learning suggests each approach could be of relevance in different contexts. Asynchronous learning, or Location Independent Learning (LIL), is a student-centered mode of delivery, which posits the idea that students learn the same material at different times and locations. Compared to the traditional, synchronous mode of delivery, where students learn at the same time, the level of convenience provided by the asynchronous modality provides opportunities for individualized pace and deeper reflection. Using the flipped class model as a point of reference, this paper explores the extent to which the asynchronous delivery of content could support effective teaching and learning at the tertiary level.

## Literature Review

In the traditional educational setting, the general belief is that people learn by absorbing and soaking up information that is presented by those who have gained knowledge in the specific discipline (Johnson & Dasgupta, 2005). Authors such as Freire (2005) have argued that education delivered via this mode has resulted in the narration of materials on the part of the "narrating subject" (the teacher) resulting in the presentation of lifeless or irrelevant material to the "listening objects" (students). While the benefits of this form of delivery cannot be understated, Freire (2005, p. 32) posits that once provided with the appropriate tools, "every human being, no matter how *ignorant*" or submerged in the "culture of silence" he or she may be, is capable of looking critically at the world in a dialogical encounter with others", resulting in the erosion of the traditional paternalistic classroom interaction.

The conversation regarding the shift towards non-traditional forms of teaching, such as the asynchronous delivery of content, is also located within a much wider discourse of traditional versus progressive teaching strategies (Dewey, 1938; International Centre for Educators Learning Styles, 2015). In her 2010 writing, Gades defines asynchronous learning or LIL as teaching and learning that occurs when the interaction between the instructor and students is not constrained by time and place (Gades, 2010). On one hand, the cognitive model of media choice proposed that asynchronous delivery provides the receiver with enough time to interpret the message thereby increasing the person's ability to process information (Gades, 2010), on the other hand, it can result in feelings of isolation, resulting in disappointment and low retention rates in online classes (Gades, 2010; Hrastinski, 2008). The design of online teaching therefore requires the careful balance of contending factors. Bali & Meier (2014) cautions instructors against two common misconceptions when designing teaching online: the tendency to think of ways of approximating their face-to-face teaching into an online format as much as possible — instead of considering the possibilities afforded by the new medium, with the diverse opportunities for engagement and communication and the belief that increasing the “human” element of an online course is best done by either showing the face/voice of the teacher, approximating a non-interactive lecture-based face-to-face class, or interacting synchronously (as in Google Hangouts), approximating a discussion-based face-to-face class.

A growing body of literature consistently points to the need to rethink what is taking place in the technology-infused classroom, or in this case, outside of the physical and temporal boundaries of the traditional classroom. This movement was informed by two critical factors: the technological movement that enabled the amplification and duplication of information at an extremely low cost and the ideological movement that sought to remove the artificial, man-made barriers. This is epitomized in the free software movement (Stallman, 2002), which has now transitioned past technologies and tools to content (Bishop & Verleger, 2013). Both factors informed the transformation of the educational landscape now characterized by digital information technologies which have altered the way we work, learn, and communicate (BCampus and Commonwealth of Learning, 2008). Within this digital revolution there are new learning alternatives to the hierarchical, industrial-based models of teaching and learning.

Our digital learners make different demands of our educational system, and by extension, our educators. Today's students are often called 'digital-age learners', directly addressing their technologically savvy and free agent approach to learning (BCampus and Commonwealth of Learning, 2008). Prensky (2001) notes that the digital students are all 'native speakers' of the digital language of computers, video games, and the Internet which in turn informs their ability to access resources and knowledge beyond traditional school structures and practices. These students are much more self-reliant and less dependent on traditional means of education, they are more confident and make more use of internet-based skills to find and

aggregate data. (BCampus and Commonwealth of Learning, 2008; McLaughlin et al., 2014).

The knowledge and skill set of the digital learner as well as the increased presence of technology and digital resources have inevitably forced a shift in the teacher's role from instructional "owner" (the lecturer who owns the content) to instructional "designer" (the facilitator who creates and guides learning experiences). According to Johnson & Dasgupta (2005) the concept of nontraditional learning and teaching comes from shifting the image of the instructor that knows everything, to the students having some input and sharing their own knowledge in addition to the instructor's findings. As such, several educators have presented models that blend both engagement and appropriate guidance in a technologically-enabled era:

1. John Seely Brown's studio or atelier learning – a social view of learning, "we participate, therefore we are" (Open Content Holistic Research Environment, 2007)
2. Clarence Fischer's notion of educator as network administrator – assists learners in forming connections (Blended Learning Toolkit, 2015)
3. Curtis Bonk's notion of educator as concierge – directs learners to resources and activities (Bonk, 2010)
4. George Siemens' notion of educator as curator - creates spaces in which knowledge can be created, explored, and connected (Siemens, 2008)

The flipped classroom, also known "as the inverse, backward, reverse classroom occurs where content is offloaded for students to learn on their own, and physical learning space is now dedicated to engaging students in student-centered learning activities, like problem-based learning and inquiry-oriented strategies" (McLaughlin et al., 2014, p. 1). In brief, the concept of the flipped class is, "that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class" (Bergmann & Sams, 2012, p. Loc 259) where "lecturers are available to students to stimulate and challenge their thinking, guide them in problem solving, and encourage their learning and application of the material" (McLaughlin et al., 2014, p. 1). Philosophically, this approach is tied to the second etymological meaning of education, '*educere*', to draw out, where education is viewed as adopting a critical thinking, problem solving approach, assisting in the creation of solutions to problems yet unknown (Bass & Good, 2004). By offloading content, the flipped classroom encourages students to explore the material and develop new skills on their own, with the understanding that they would apply this new knowledge through various active learning exercises during the face-to-face interactions. Thereby minimizing direct instruction and freeing up time previously used for "sage on the stage", lecturing, to allow for activity-based learning, and problem-solving exercises.

According to the literature, in the flipped session, students are able to pause, rewind, and replay their lessons, lecture-videos can be planned and edited to maintain direction of content, and lastly, video-lectures can be viewed any place

at any time, unlike the traditional lecture format (Clark, 2007). Both teachers and the majority of students feel that the flipped classroom is more beneficial to student learning than a traditional classroom setting (Camel, 2011; McLaughlin et al., 2014). Bergmann & Sams, (2012) contend that the flipped classroom speaks the language of today's students as it: helps students of all abilities to excel; increases student-teacher and peer-to-peer interaction; and allows for differentiated approaches to learning within a single learning space. One of the drawbacks however, which is consistent with asynchronous learning is the inability to obtain immediate feedback (Bergmann & Sams, 2012; G. B. Johnson, 2013).

## **Methodology**

### *Design*

This study adopted the action research approach as it allowed the researcher who, in this case is also the facilitator to examine her own educational practice systematically and carefully, using the techniques of research (Ferrance, 2000, p. 1). In this approach, the researcher examines existing practices from the inside, to conduct research on the facilitator's own practice, and posits solutions for the improvement of practice (Waters-Adam, 2006). This study explores the extent to which asynchronous teaching and learning tools can be used to enhance learning outside of the classroom. The study was conducted over the first two semesters of the 2014/2015 academic year and adopted two distinct formats of delivery across two phases. In Phase 1, a partially flipped model was used, while in Phase II a fully flipped model was used.

In Phase 1 – Cohort I, the delivery of the course took the form of a hybrid, 'partially flipped' format and 'traditional lectures' remained the primary tool for instruction. The structure of the course consisted of 'kernel lectures' or 'short format' lectures that were captured using Mediasite Desktop Recorder<sup>1</sup>, published to the Mediasite test portal<sup>2</sup> and then shared with the Institution's Learning Management System (LMS). These captured lectures were short videos of 5 to 10 minutes in duration and featured the core themes and major 'takeaways' of the topic being covered and ended with deep, in-classroom discussions and interactions along with probing questions. The incorporation of these questions are critical, as it assisted in concretizing key concepts, guided class discussions, prompted students to think about (and prepare for) the next class discussion, and served as the basis for informed, in-class, peer-led instruction.

Originally, this course was delivered via the traditional face-to-face means of delivery over 45 contact hours. At the beginning of the course, students were informed of (a) the change in delivery of the course; (b) the role of the videos in this class; (c) how videos should be used; and (d) the research. Students were asked to complete a consent form. All efforts were made to ensure that student anonymity and confidentiality were maintained. Students also received guidance on the note-taking process using a modified version of the Cornell note-taking method

(DesRochers, 2012) in which they viewed the video, made notes, summarized, reviewed and recorded their questions.

In this first phase of the flipped pilot, only selected lectures were delivered asynchronously. The face-to-face sessions were divided into three phases. First, each class began with a review of the previous lecture via tutorial questions. Second, each class began with a review and discussion of the core concepts delivered via the video. Third, the class received the remainder of the lecture, which linked the core concepts to other theoretical underpinnings. In-class activities included (but were not limited to) group-based activities, presentations, and debates. This required students to engage in critical thought, taking different or opposing sides of a concept and discussing their merits. These activities provided students time to engage with, interpret, and synthesize the flipped material and in-classroom discourse as a whole. Fourth, students engaged in class activities. Using their laptops, tablets and/or smartphones, students worked on difficult concepts and the class focused on questions that may have arisen from viewing the captured content, all guided by the facilitator.

Phase II - Cohort II of the pilot delivery took the form of a fully flipped mode where students accessed the entire lecture asynchronously, prior to the face-to-face session. These 'long format' videos of 25-30 minutes were also captured using Mediasite Desktop Recorder, published to the Mediasite test portal and then shared with the Institution's Learning Management System (LMS). The decision to transition to the fully flipped format was informed by the facilitator's desire for an increased focus on activity-based learning, deeper learning, and mastery. In the face-to-face sessions, now transformed into a learning space, students engaged in individual or group-based class activities geared towards developing and fostering the students' critical thinking skills. Students were also taught how to view the video using the Cornell method. First, similar to the first phase, each session began with a review of the previous lecture via tutorial questions. Second, the class engaged in discussion and clarification of the content delivered via video. Third, the remainder of the class time was dedicated to hands-on, group or individual problem-based activities.

**Table 1.** Comparison of the Class Time Usage in Phase I and Phase II of the Flipped Classroom Pilot

Phase I		Phase II	
Warm-up Activity: Review of Previous Class via Tutorial Questions	20 mins	Warm-up Activity: Review of Previous Class via Tutorial Questions	30 mins
Review of content accessed via video	30 mins	Review of content accessed via video	30 mins
Lecture additional content	40 mins	Guided and independent practical activity	60 mins
Guided and independent practical activity	40 mins		

Mediasite (as an asynchronous technology/tool) was used as the center point of the learning experience primarily for its unique combination of services – content management, content security, the ability to search content, comprehensive data and analytics – some in real time, and finally integration with the institution's learning management system. Critical, key learning concepts were accessed, and consumed by the learner *before* the traditional class, creating an indispensable space *in* the class for active learning to occur. Mediasite was used as the central technology for this study to enhance student learning, by fully immersing the technology into instruction for greatest effectiveness (Baek, Jung, & Kim, 2008).

#### *Main Research Question*

To what extent can asynchronous teaching tools in a flipped model be used to enhance teaching and learning outside of the classroom?

#### *Subsidiary Questions*

1. What are students' perceptions of learning outside of the classroom?
2. How does the asynchronous lecture delivery support student learning?
3. What are some of the benefits of asynchronous delivery?
4. What are some of the challenges of asynchronous delivery?

#### *Setting and Participants*

The research took place at a tertiary level institution in Trinidad and Tobago using small classes that had no more than 11 students enrolled in a Social Research Methods course. The two phases of the pilot extended over Semesters I and II of the 2014/2015 academic year. There were 11 students enrolled in the first phase of the pilot with one person withdrawing during the semester. The gender distribution of the final number was one male and nine females. In the second phase of the pilot, the second cohort consisted of 11 students (one male and ten females).

#### *Data collection*

Assessment of the flipped learning included a rich mixture of questionnaires, student grades, the facilitator's observation, and analytics provided by the Mediasite lecture capture system, which allowed this facilitator to gauge the effectiveness of this initiative. The analytics generated by the Mediasite lecture capture system provided another set of data that allowed the facilitator to identify a number of patterns and linkages between number of views, duration and the resultant student engagement, and learning. Students were required to complete questionnaires at two distinct stages of the process:

1. **Students' Expectation Form** – measured students' expectations of the course and facilitator, technological capabilities, and requirements.
2. **End of Semester Review Questionnaire** – in the first Phase of the pilot, the students' feedback questionnaire evaluated students' study practices, their

perceptions of the flipped format delivery, advantages and disadvantages, and their recommendations for improvement. In the second Phase of the pilot, the questionnaire was later modified to include assessments of their study practices to include where they accessed their videos and note taking practices, their perceptions of in-class activities and their willingness to engage additional technologies in their classroom.

**Data Analysis**

Descriptive type analysis was conducted on the survey responses. Students’ responses to the open-ended questions were coded into themes. These themes were drawn from significant, similar, multiple responses to these open-ended questions. These qualitative responses were also quantified and described as a percentage in terms of the number of students who provided similar responses. All unique responses were coded as ‘Other’ and where relevant highlighted in the discussion. For each question, the number of students who did not respond was also included as a percentage where applicable. Students’ grades were used to determine the relationships among student outcomes, students’ views, class participation, and engagement. The facilitator’s observations took the form of field and reflective notes documented throughout the semester. The Mediasite analytics provided information on:

- Views – the number times that the user watched the video (See Table 2)
- Content coverage – content coverage is, “the amount of a presentation watched by user(s)” Mediasite (2015) (See Table 2).
- Total Time Watched – the total amount of time that the users spent watching the selected presentations (See Table 2).

For example: A user opens a presentation and watches the first 30 minutes of a presentation, pauses the video, returns to the start and watches for 40 minutes. The coverage for this user is 40 minutes. That is, the user spent a total of 70 minutes watching the presentation (total time watched), but in that time the user only ‘covered’ the first 40 minutes of the presentation over 2 total views.

**Table 2:** Sample views, content coverage and total time watched

	Views	Time Watched	Coverage
	6 28.57 %	1:32:34	0:08:59
	4 19.05 %	0:26:10	0:08:59
	2 9.52 %	0:21:53	0:08:59
	2 9.52 %	0:10:30	0:08:59
	2 9.52 %	0:04:23	0:04:47
	2 9.52 %	0:17:42	0:08:55
	1 4.76 %	0:09:18	0:08:30
	1 4.76 %	0:08:40	0:08:59
	1 4.76 %	0:03:55	0:03:56

- The total views – every time a user opens a presentation and clicks the Play button, is counted as 1 view. This data can be generated in real time while students are watching, by the hour, by the day, or a summary over a period of months, allowing inferences to be made as to how students accessed the content in the stretch leading up to the examination period for example (See Figure 1).

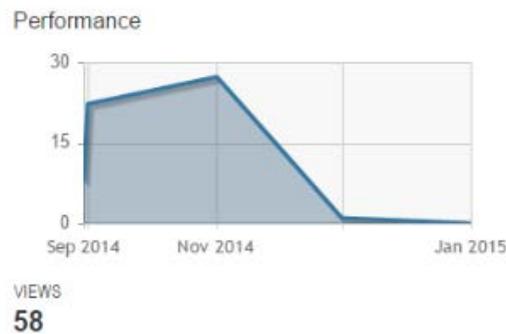


Figure 1. Sample Total Views

- Viewing trends data – students' viewing practices per video is captured. That is, whether the video was viewed in its entirety or whether some aspects of the video were skipped. This is illustrated via a multi-colored intensity (heat) graph with colors representing the amount of views (See Figure 2 and Heat Map Legend<sup>3</sup>).

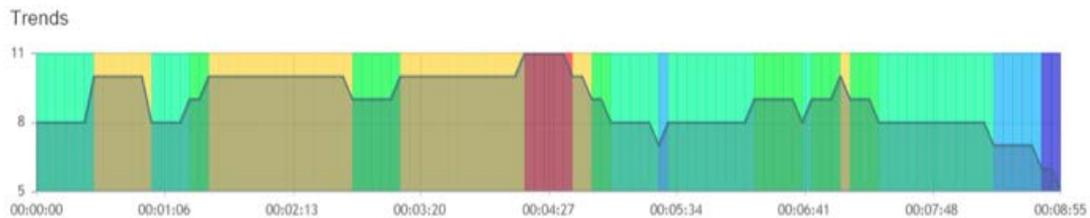


Figure 2. Sample Viewing Trends data

### *Limitations*

Although every precaution was taken to carefully prepare for, and execute this research there were some limitations. First, the number of participants was small, limiting the study's ability to generalize to larger populations. Given that the facilitator was also the researcher in this study, there may be instances of social desirability, where the students may have felt obligated to provide positive responses. The administrative structure of the course did not allow for an instructional redesign of the course to fully compliment the flipped mode nor did it allow for the establishment of a control group. Finally, given that this form of teaching was largely experimental, and the first of its kind at the institution, there was a relatively slow up-take by students. This is particularly due to the fact that these students were generally unfamiliar with the use of this form of technology in their learning. Limitations aside, every attempt was made to ensure that an optimal environment was maintained to facilitate the delivery of the course and the execution of this research while maintaining the integrity of the teaching and learning experience.

### **Findings**

This study investigated the application of an asynchronous approach to support student learning outside of the physical classroom. For the purpose of this study, this paper will report on the results of the survey, students' grades and the facilitator's observations. The Mediasite analytics will be attended to in a forthcoming writing. There was a 90% response rate from participants of Phase I and a 100 % response rate from the participants of Phase II.

### *Questionnaires*

#### Students' Expectations

The Students' Expectation Questionnaire captured students' expectations along two main themes, course content and expectations for online learning. All of the students enrolled in the course at the beginning of Phases I and II of the pilot responded to this questionnaire.

### *Course Content*

According to the data, 81.82% of the respondents in Phase I of the pilot indicated that they anticipated opportunities for active learning, whereas 9.09% disagreed and remained neutral. However, all of the respondents in Phase II anticipated opportunities for active learning (Figure 4). With respect to opportunities for thoughtful, interactive discussions, 81.82% of the respondents in Phase I agreed, while 9.09% disagreed and remained neutral. All of the respondents in Phase II also anticipated thoughtful and interactive discussions. 90.91% of the respondents in Phase I anticipated that the course would provide opportunities for relating theory to practice, while 9.09% remained neutral. All the respondents in Phase II also anticipated the opportunity to relate theory to practice (Figure 3).

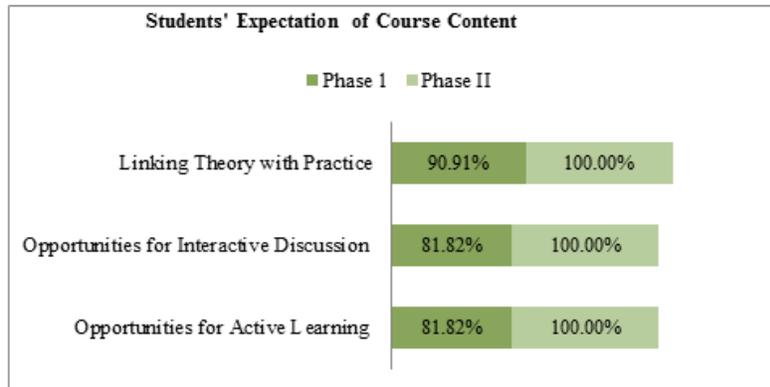


Figure 3. Students' Expectations for Course Content

### Influential Factors for Successful Online Learning

All (100%) of the respondents in both Phases of the study indicated that effective time management will enable them to succeed in this course. When questioned on the level of flexibility anticipated, 81.82% of the respondents in Phase I estimated that the new format of the course would afford them the flexibility required to navigate the course requirements, while 18.18% expressed neutrality regarding the matter. Similarly, 80% of the respondents in Phase II also agreed that the new format would afford them the flexibility required to navigate the course, while 20% remained neutral (See Figure 4).



Figure 4. Influential Factors for Successful Online Learning

### *Feedback on Expectations*

The questionnaire was modified in the second phase of the pilot to include a question which directly queried whether the students' expectations were met. 90% of the respondents in the second phase indicated that their expectations were met (See Figure 5).



**Figure 5.** Expectations Met (Phase II)

### *Students' Feedback*

The Students' Feedback Questionnaire assessed the students' experiences and feedback of the flipped classroom. All of the students enrolled in the course in both Phases completed the questionnaire.

### *Students' Perception of Learning Outside of the Classroom*

77.8% of the respondents in Phase I noted that they felt confident after watching videos but before coming to class, while 22.2% remained neutral. Similarly, 70% of the students in Phase II also agreed that the videos were useful prior to the face-to-face session. 20% remained neutral (See Figure 6).

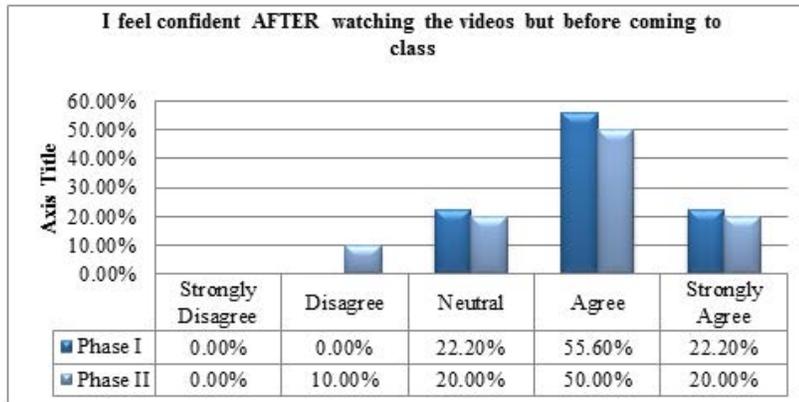


Figure 6. Students' Perception of Viewing the Video BEFORE Attending Class

77.7% of the respondents in Phase I indicated that they felt confident after watching the video and after attending class while 44.4% remained neutral. Correspondingly, 80% of the respondents in Phase II agreed that they felt confident after watching the video and after attending class while 20% disagreed with the statement (See Figure-7).

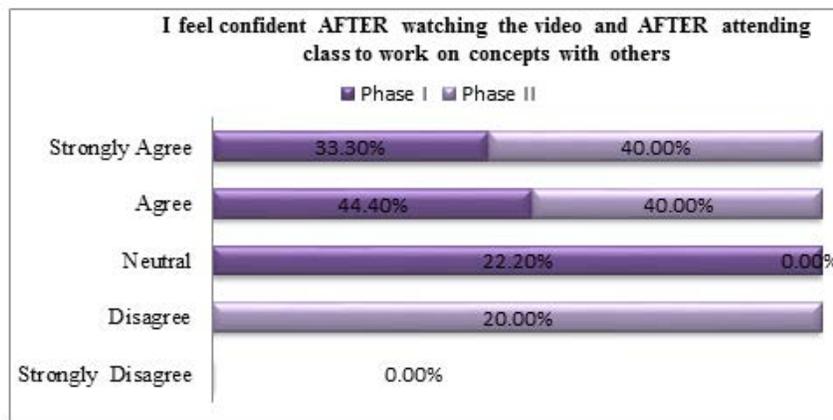


Figure 7. Students' feeling of confidence AFTER watching the videos and after working on the concepts in class

66.6% of the respondents in Phase I of the pilot indicated that they preferred the flipped format of delivery compared to the traditional format of delivery. 33.3% expressed neutrality. With respect to the respondents of Phase II, the feedback was evenly distributed where 33.3% expressed a preference for the flipped format of delivery, 33.3% disagreed and 33.3% expressed neutrality (See Figure 8).

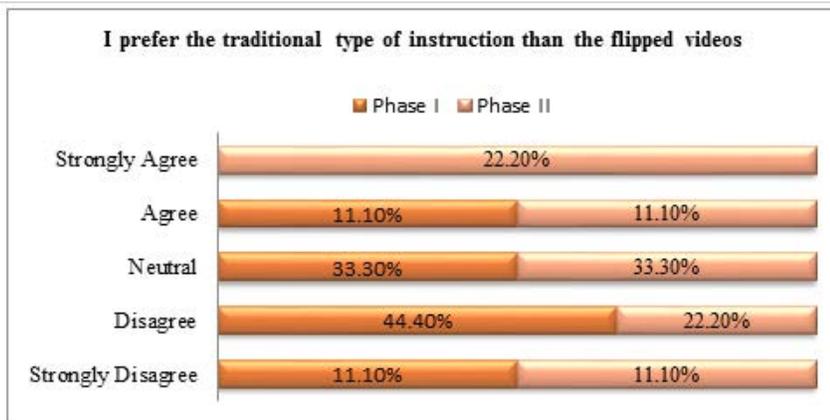


Figure 8: Preference for Traditional versus Flipped

All (100%) of the respondents in Phase I agreed that the flipped class model improved their learning. Conversely, 70% of the respondents in Phase II agreed that the flipped model improved their learning while 20% remained neutral and 10% strongly disagreed (See Figure-9).

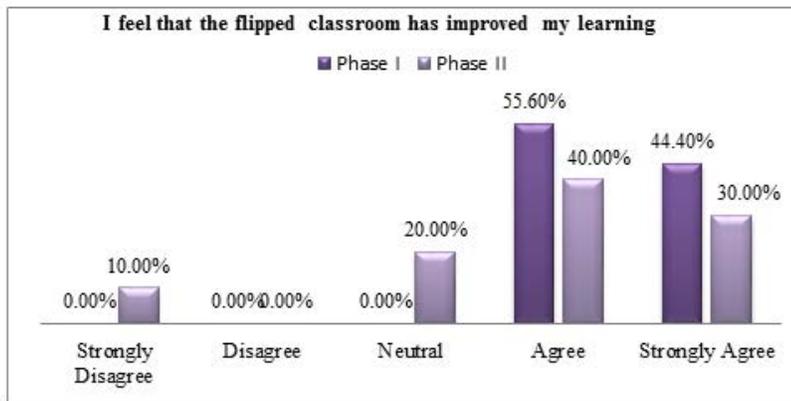


Figure 9. Students' Perception of Whether the Flipped Classroom Improved Their Learning

80% of the respondents in Phase I indicated that they would recommend the flipped session for other subjects. They indicated that it could be useful for complicated courses, assisted in improved learning and provided a useful summary of the concepts. 20% of the respondents did not respond. In the case of Phase II, 60% of the respondents indicated that they would recommend the flipped class for other subjects as it allowed students to prepare before class, provide clarity

on theories and concepts allowing for deeper understanding, served as a useful resource when literature was unavailable and its convenience. 40% of the students did not respond to this question (See Figure-10).

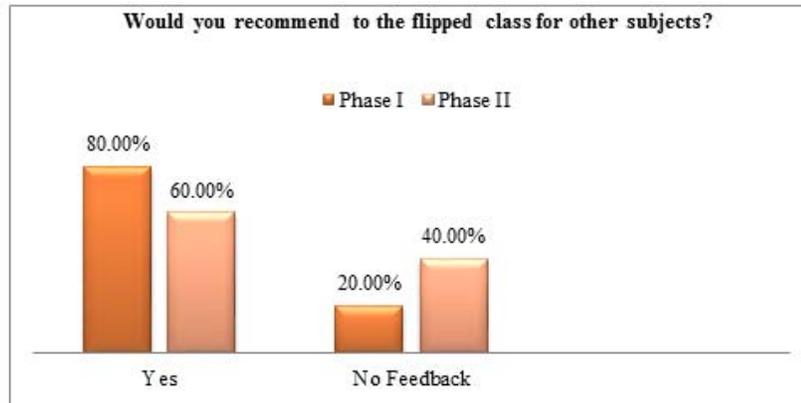


Figure 10. Students' Recommendation of the Flipped Classroom

*Evaluating how asynchronous lecture delivery supports student learning outside of the classroom*

With respect to being able to pace themselves during the course, 55.6% of the respondents in Phase I indicated that they were able to pace themselves through the course, 11.1% disagreed and 33.3% remained neutral. In the case of the Phase II respondents, 40% indicated that they were able to pace themselves throughout the course, while 20% disagreed and 30% remained neutral (See Figure 11).

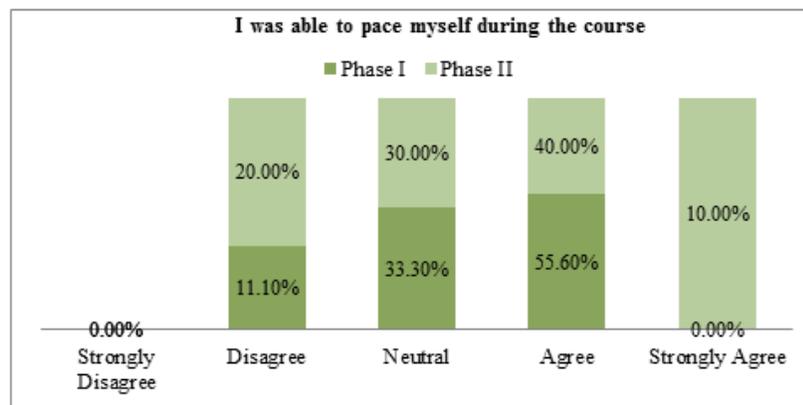


Figure 11. Students' Ability to Pace Themselves During the Course

All (100%) of the students in Phase I indicated that they referred to the videos during examination preparation. While 22.2% of the respondents in Phase II acknowledged that they did not use the video during their examination preparations, 77.7% indicated the videos assisted them in the preparation of their examinations (See Figure 12).

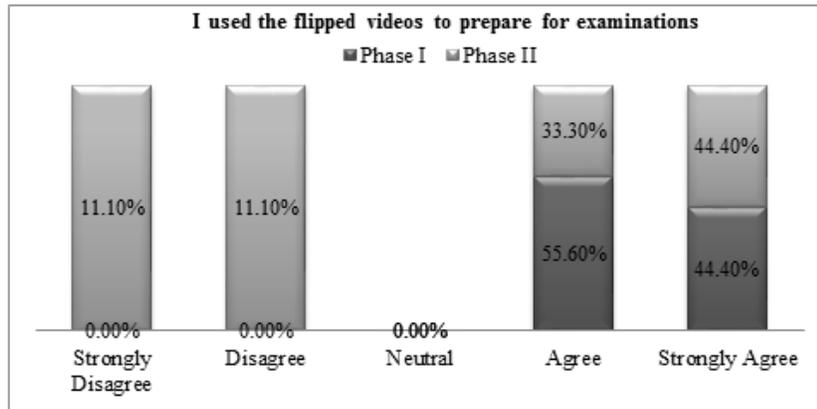


Figure12. Using the Flipped Videos to Prepare for Examination

The data provided in the paragraphs that follow captures the sentiments of Phase II respondents regarding the in-class activities. These questions were included based on a modification of the questionnaire after Phase I of the pilot.

50% of the respondents in Phase II indicated that the classroom activities assisted them in learning and understanding the content presented in the unit. The other respondents did not respond. Some of the benefits of these activities included: the explanation of concepts, accessibility, convenience, reinforcement of note taking and learning skills, reflexivity, and it encouraged reading and research before classes.

40% of the respondents acknowledged that the classroom activities assisted them in maintaining their interest and attention during the session, 10% disagreed and none of the other respondents provided an answer to the question. Some of the reasons posited by the 40% included: clear understanding and an ability to ask further questions and engage in independent research, encouraged focus, the unique technique of the lecturer to keep the students alert and engaged, the incorporation of the tutorial sessions, motivation drawn from the learning process itself. Those who disagreed indicated that the sessions were too long and contained too much information.

### Advantages of the Flipped Classroom

Respondents in both Phases were also asked to identify some of the advantages of the videos. While a number of the advantages were identified, the primary advantages identified by both groups included: convenience, preparation before class, access on demand, detailed explanation of concepts, improved learning, increased confidence with the material and examination preparation (See Figure 13).

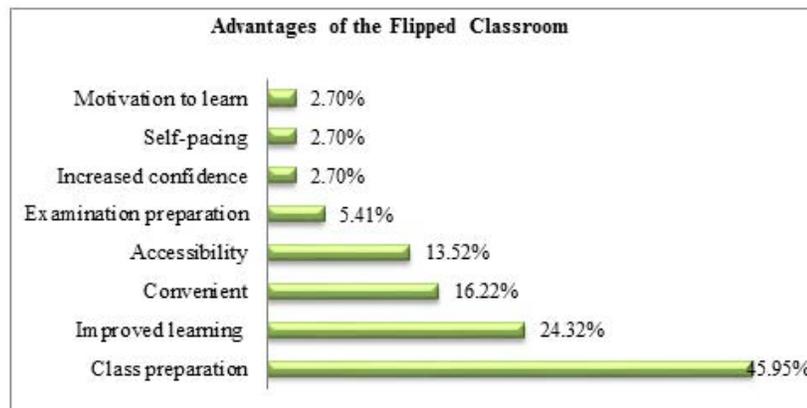


Figure 13. Advantages of the Flipped Classroom

### Disadvantages of the Flipped Classroom

The questionnaire also asked respondents to identify the limitations of the flipped classroom. In the case of the first Phase, students expressed concerns regarding the lack of immediate feedback or clarification when required, difficulties surrounding Internet access and the need for longer videos. They also suggested that videos be prepared for each session rather than selected sessions. In the case of the second Phase, students identified issues regarding the quality of the audio, the length of the video as well as access to the Internet.

### Summary of Final Examination Grades

#### Phase I

In Phase I, the final examination scores recorded a pass rate of 80%, with a distribution as follows: B+ (10%), B (40%), C (30%), and D (20%) (See Figure 14).

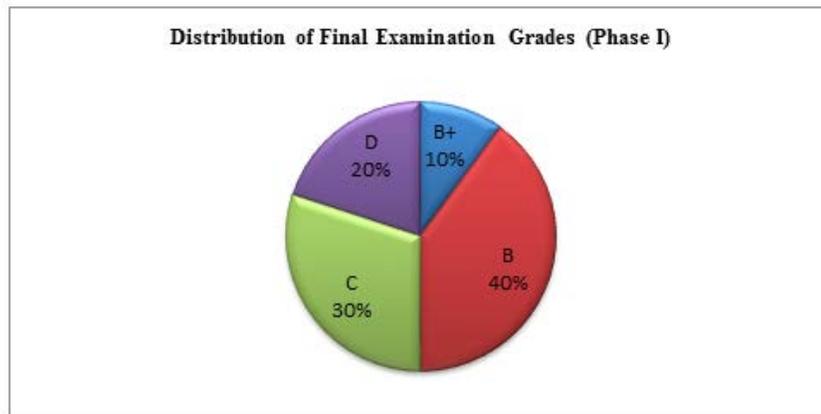


Figure 14. Distribution of Final Examination Scores (Phase I)

#### Phase II

Phase II recorded a final examination rate of 90% with a distribution of grades as follows: A (60%), B+ (10%), B (20%), F (10%) (See Figure 15).

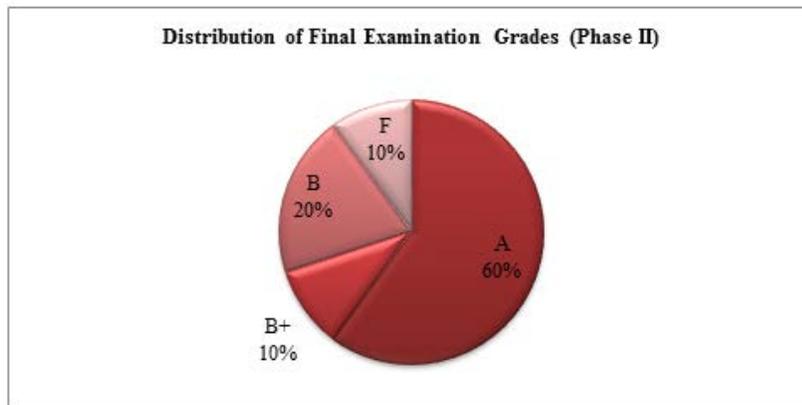


Figure 15. Distribution of Final Examination Grades (Phase II)

### *Facilitator's Observations and Reflection*

Three main observations will be highlighted in this section. First, it became easy to identify the students who internalized the content prior to class, and those who did not, by their level of engagement and degree of class participation,. The distinction was even more glaring in the second phase of the pilot where the face-to-face sessions were primarily structured around the problem-solving activities. For instance, those who internalized the content would ask different types and depths of question (clarification/deeper understanding) than those who did not internalize the content (knowledge acquisition). The students who were trailing the class were provided with one-on-one sessions and a personalized revision sheet, which addressed their specific areas of weakness. Second, as the semester developed and students became familiar with the mode of delivery, there was an observed increase in student-to-student interactions and peer-led instruction. It was observed that the stronger and more confident students were the students that had internalized the content prior to class and were able to assist the students that did not engage themselves with the said content. Third, in the first phase, flipping the core concepts of the session removed the time that would be required to deliver the same content in the classroom. This available time created the opportunity for increased teacher to student and student-to-student interactions in the face-to-face sessions. The additional classroom time acquired by flipping all of the lectures in Phase II allowed the facilitator to harness the additional time for deeper understanding and mastery and to provide specialized attention to the struggling students.

### *Strengths*

While the use of this asynchronous tool provided the obvious benefits of exposing the students to the content prior to the class, other benefits were identified throughout the course of delivery. The first was students' motivation to learn and ownership of the learning process. After internalizing the content students were motivated to find other sources of information to continue working in the asynchronous mode and were quite eager to report on their research during the face-to-face session. This is in comparison to those who did not access the content and required additional and continuous persuasion. Second, the physical learning space was now transformed into a space for active learning, resulting in increased engagement and interaction between the lecturer and student, student-to-student, and eventually increased overall student confidence with the material.

### *Challenges*

Although prior research and anecdotal information provided some insight into the amount of time required for the planning and development of this product, it still did not prepare the facilitator for the reality of the exercise. It should be stressed that the successful execution of this mode of delivery required careful

planning and strict adherence to lecture timelines. Third, there were the occasions where students' personal challenges such as time management and access to the Internet often affected the delivery of the lecture featured on that day. As such, there were instances where the content of face-to-face sessions were a replica of the flipped content, much to the chagrin of those students who already internalized the content prior to the face-to-face interaction. Fourth, the challenge of gaining students' buy-in was tied to three critical factors:

- The degree of familiarity and comfort associated with the traditional mode of the delivery.
- Students' unfamiliarity with the use of technology to support their learning and by extension being responsible for their learning.
- Students' adaptation to a new type of face-to-face interaction that focused primarily on activity-based learning as students were unable to rationalize the need for the face-to-face session if the content, could be accessed asynchronously.

### **Discussion**

Generally, students agreed that viewing the video prior to the face-to-face session increased their level of confidence with the content. The data show that this degree of confidence was further heightened after participating in the problem solving activities in the face-to-face sessions. When asked to reflect on their experience, students indicated that they benefitted from the explanation of concepts, accessibility and convenience, reinforcement of note taking and learning skills and reflexivity. As the level of confidence with the material is increased students are also able to engage in mastery of concepts and deeper understanding (Bergmann & Sams, 2012 ; Johnson, 2013). This level of confidence in the material was also reflected in their success in the course, specifically, in the case of the increased distribution of grades (where 60% scored above 90%) for those who were exposed to a modified version of the flipped class in Phase II. The improved distribution of scores was also supported by the data, which suggested that students' learning improved over time. The degree of satisfaction and confidence with the content of the course was evident in their willingness to seek out supporting resources, provide support to their peers as well as to recommend the flipped format delivery for other subjects. Overall, students agreed that their expectations of the flipped class were met.

The study shows that students are willing to take advantage of the opportunity to engage with material outside of the classroom as it contributed to their learning and motivated them to engage with the content. Their adaptation to this mode of learning was demonstrated as they used the content to assist in the preparation of their various assessments, to inform their contribution to class activities, discussions, and to even to support their peer in their learning. The majority of respondents agreed that the flipped mode of delivery was the preferred

mode compared to the traditional form. This is consistent with the literature that reported that those who were exposed to the flipped sessions expressed preference for this mode of delivery.

According to the data, the majority of the respondents identified a number of advantages of being able to consult the material asynchronously. Students identified the ability to access the material on-demand, at their convenience, repeatedly, and more importantly in the case of missed sessions as some the key benefits of this tool. These facilities provided opportunities for clarification and revision that often contributed towards improved learning. The results also drew focus on how the respondents used the tool to support their preparation for examinations. In this context, students accessed the content to retrieve teaching materials and lecture notes, reinforce concepts, to refresh their memory, and for the purpose of individual tutoring. Quite consistent with the cognitive model of media choice (Gades, 2010), students noted that they benefitted from the fact that they were able to proceed throughout the course at their own pace.

The study however, was not without its drawbacks. As is consistent with the asynchronous mode of delivery, the students raised concerns regarding the lack of immediate feedback from the lecturer when accessing the content. This concern proved to be a standard concern that was also highlighted in the literature. Although this problem was rectified as the semester progressed, the quality of the audio provided some major challenges during the early stages of the second phase of the pilot. Obtaining student buy-in and orienting them towards Mediasite, providing training on how to view the video and any new processes also required some investment in time. For example, although the lecture timeline outlined the dates of the flipped sessions, a reminder was still required. Finally, although technology is now regarded as ubiquitous and access is now *passé*, many of the students indicated that they were unable to access the content due to the lack of Internet access.

Developing, executing and supporting the asynchronous model of delivery is hardly an easy process. This study shows that the asynchronous delivery provided support to the students by allowing students to proceed throughout the course at their own pace and convenience. When paired with the flipped class concept the asynchronous mode of delivery, provides opportunity for increased student interaction and collaboration. Students were able to improve their learning and develop mastery skills, which in this case, seems to have influenced their overall success in the course. The success is also contingent on the facilitator's willingness to re-conceptualize his or her role as a "teacher" and create a set of opportunities and reward structures that encourage students to look upon their interactions with their peers as valuable resources for learning, rather than focusing on memorizing lecture-type material presented by an instructor. It therefore means that the asynchronous approach is tied to a systematic and deliberate planning process involving some degree of instructional redesign and adequate technological support.

### **Lessons Learned**

1. Flipping takes time: planning, preparation, flexibility, and time.
2. Flipping is an explicitly defined process. The extent of the flip varies according to the extent of the instructional re-design that the facilitator has performed, where the facilitator will shift as much or as little content out of the face-to-face interaction as they see fit. The extent of how much content is flipped should depend on (a) the facilitator's access to technology; (b) the facilitator's comfort with technology; (c) the degree of the facilitator's control of the course; (d) the students' access to technology; (e) student's comfort with technology; (f) the stability and reliability of the institution's ICT resources.
3. Although we are operating in an educational landscape characterized by the use of ICT, there are a number of, "givens" that cannot be taken for granted:
  - Students' ability to navigate the technology.
  - Students' motivation to incorporate technology in their learning.
  - Their access to technology.
  - An institutional practice of stable and reliable technological support.
4. Critical to the success of this exercise is the students' willingness to take responsibility for their learning.
5. Successfully flipping, where success is tied to improving student outcomes, can only be achieved with adequate and consistent support and guidance by the facilitator.

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