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

Lyn R. Keith

Abstract

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. These criticisms have generated even more concern as the educational landscape is characterized by the inclusion of information communication technologies and their potential to facilitate digital learning. The asynchronous 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, the level of convenience provided by the asynchronous modality provides opportunities for individualized pace and deeper reflection. The 'flipped' or 'inverted' classroom 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. Using action research, this study reports on the transition from a partial 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-face component which focuses on problem-solving, collaboration, crafting and creating. The primary objectives of this study were to determine student's perception of the flipped classroom as well as to map the progression of learning in both iterations.

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 changing higher education landscape in the region. The forces of change in the higher education sector within the Caribbean region are diverse and significant. 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. The democratization of higher education, introduction of diverse learners, the explosion of knowledge, coupled with varied sources of and access to knowledge, and the ability of students to interact with professors and one another both asynchronously and in real-time, without the need for physical presence combined have placed new demands on our higher education sector in the region. Faculty are now challenged to master these changing pedagogical approaches and modes of 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. The asynchronous 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, 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 can support effective teaching and learning at the tertiary level.

In the traditional educational setting, people learned by absorbing and soaking up information that is presented by people 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 critically exploring the world through dialogical encounters, resulting in the erosion of the traditional paternalistic classroom interaction.

The transition to non-traditional forms of teaching is 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. 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 also result in feelings of isolation, resulting in disappointment and low retention rates (Hrastinski, 2008; Gades, 2010;). The design of online teaching therefore requires the careful balance of competing factors. Bali & Meier (2014) cautions instructors against two common misconceptions when designing teaching online: the tendency of approximating their

face-to-face teaching into an online format as much as possible — instead of considering the possibilities for engagement and communication afforded by the new medium 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.

The nature of the technology infused classroom within the context of the physical and temporal boundaries underscores the need for new thinking. The two main drivers of this phenomenon were 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 in particular, the new software movement (Stallman, 2002), which has now transitioned past technologies and tools to content (Bishop & Verleger, 2013). Technologies now impact the way we work, learn, and communicate (BCampus and Commonwealth of Learning, 2008) driving academics to consider new learning alternatives to the post Freire era.

Our digital learners make different demands on the educational system, and on educators. Known for their technologically savvy and free agent approach to learning (BCampus and Commonwealth of Learning, 2008), Prensky (2001) notes that these digital learners 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 "less dependent upon traditional education institutions for knowledge acquisition and are much more self-reliant, exercising their internet-based skills to aggregate data and information (BCampus and Commonwealth of Learning, 2008; McLaughlin et al., 2014), resulting in an inevitable shift in the teacher's role from instructional "owner" to instructional "designer or facilitator" (Johnson & Dasgupta, 2005; BCampus and Commonwealth of Learning, 2008). 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 (BlendedLearningToolkit, 2015)
3. Curtis Bonk's notion of educator as concierge – direct learners to resources and activities (Bonk, 2010)
4. George Siemens' notion of educator as curator - create spaces in which knowledge can be created, explored, and connected (Siemens, 2008)

The flipped classroom, also known as the inverse, backward, reverse classroom is one method of asynchronous delivery which is proposed as a solution to the need for the redesign of the physical learning space into one which fosters active learning exercises such as teamwork, debates, reflections, and case studies. It occurs where content is offloaded for students to learn on their own, dedicating class time is dedicated to, "engaging students in student-centered learning activities, like problem-based learning and inquiry-oriented strategies" (McLaughlin et al., 2014, p. 1). The flipped class posits, "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).

This approach is tied to the second Latin root word of education, '*educere*', to draw out, where education adopts a critical thinking, problem solving approach, informing 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 learning and problem-solving activities 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 class, 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 students believe 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; it caters to diverse learners, and increases student-teacher and peer-to-peer interaction within a single learning space. One noted drawback which is generally consistent with asynchronous learning is the inability to obtain immediate feedback (Bergmann & Sams, 2012; 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 posit 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.

This flipped class pilot extended over the first two semesters of the 2014/2015 academic year and adopted two distinct formats of delivery across the two phases. 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). Mediasite was selected for its unique combination of services – content management, content security, the ability to search content, comprehensive data and analytics – some in real time. In Phase I, the delivery of the course took the form of a hybrid, 'partially flipped' format where 'traditional lectures' remained the primary tool for instruction. The delivery of this course consisted of 'kernel lectures' or 'short format' lectures that were captured using Mediasite Desktop Recorder, published to the Mediasite test portal 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 deeper than normal in-classroom discussions and interactions along with probing questions. The incorporation of these questions is 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, summarize, review and recorded their questions

In Phase I of the pilot, only selected lectures were delivered asynchronously. The face-to-face sessions were divided into four phases. First, each class began with a review of the previous lecture via tutorial questions. Second, a review and discussion of the core concepts delivered via the video. Third, the lecture is delivered linking the core concepts to other theoretical underpinnings. Fourth, using their laptops, tablets and/or smartphones students engaged in class activities (collaborative or individual activities, presentations, and debates) all guided by the facilitator.

The second phase 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 were of 25-30 minutes duration. The decision to transition to the fully flipped format was informed by the facilitator's desire for an increased focus on deeper learning and mastery. In the face-to-face sessions, now transformed into a learning space, students engaged in individual or collaborative 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. Similar to Phase I, each session began with a review of the previous lecture via tutorial questions followed by a discussion and clarification of the content delivered via video. The remainder of the class time was dedicated group or individual problem-based activities.

Table 1: Comparison of the Class Time Usage in Phase 1 and Phase 2 of the Flipped Classroom Pilot

Phase 1		Phase II	
Warm-up Activity: Review of Previous Class via Tutorial Questions	20mins	Warm-up Activity: Review of Previous Class via Tutorial Questions	30mins
Review of content accessed via video	30mins	Review of content accessed via video	30mins
Lecture additional content	35mins	Guided and independent practical activity	40mins
Guided and independent practical activity	40mins		

Research Questions

Grand Tour Questions: To what extent can asynchronous teaching tools be used to enhance teaching and learning?

Subsidiary Questions
1.   What are the students' evaluations of learning outside of the classroom*?*
2.   How does the asynchronous lecture delivery support student learning?
3.   What are the benefits of asynchronous delivery?
4.   What are 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 final year students enrolled in a Social Research Methods course. This pilot extended over Semesters I and II of the 2014/2015 academic year. There were 11 students (one male and ten females) enrolled in the first phase of the pilot with one withdrawing during the semester. The gender distribution of the final number was one male and nine females. In the second phase of the pilot, there were 11 students (one male and ten females) enrolled in the course.

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. Students were required to complete questionnaires at two stages of the process:
1.   **Students' Expectation Form** - measured students' expectations of the course and facilitator, technological capabilities, and requirements.
2.   **End-Semester Review Questionnaire** - in Phase I, the students' feedback questionnaire evaluated students' study practices, their perceptions of the flipped format delivery, advantages and disadvantages, and their recommendations for improvement. In Phase II , the questionnaire was later modified to include assessments on their study practices inclusive of point of access of videos, their note taking practices and their perceptions of in-class activities..

Data Analysis

Survey instruments, students' grades, facilitator's observations, and Mediasite analytics data were used in this process. 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.

Limitations

1.   The small number of participants limited the ability to generalize to larger population.
2.   The facilitator, also the researcher increased the likelihood of social desirability.
3.   The administrative structure of the course did not allow for the establishment of a control group or instructional redesign to fully compliment the flipped mode.
4.   Given the experimental nature of this form of teaching and the first initiative of its kind at this institution, there was a relatively slow up-take by students in the first instance who were also generally unfamiliar with the use of this form of technology in their learning.
5.   The degree of dedication of these final year students to this course was impacted by external variables such as course load, internship and professional obligations.
6.   The low response rate to the open-ended segment of the End of Semester Questionnaire could be attributed to the fact that students were asked to complete the questionnaire after the final examination, the last point of contact with the facilitator.

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 use of an asynchronous tool 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 facilitator's observations. Specific details regarding the usage of 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 (11 in Phase I and 10 in Phase II) responded to the questionnaire.

Course Content
According to the data, 81.82% of the respondents in Phase I indicated that they anticipated opportunities for active learning, whereas 9.09% disagreed and 9.09% remained neutral. However, all of the respondents in Phase II anticipated opportunities for active learning. 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 (Figure 4).
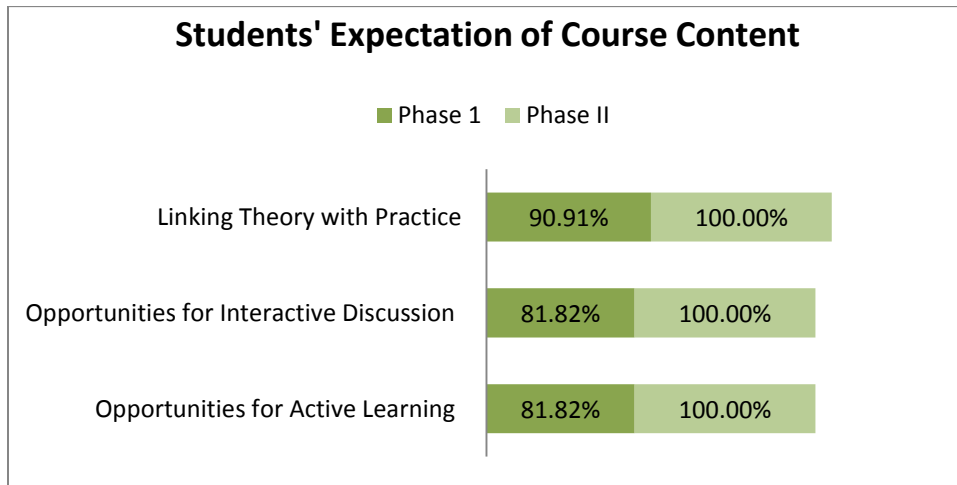
Students' Expectation of Course Content

Phase 1 ■ Phase II

	Phase 1	Phase II
Linking Theory with Practice	90.91%	100.00%
Opportunities for Interactive Discussion	81.82%	100.00%
Opportunities for Active Learning	81.82%	100.00%

Figure 1: 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 will 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 will afford them with the flexibility required to navigate the course, while 20% remained neutral.
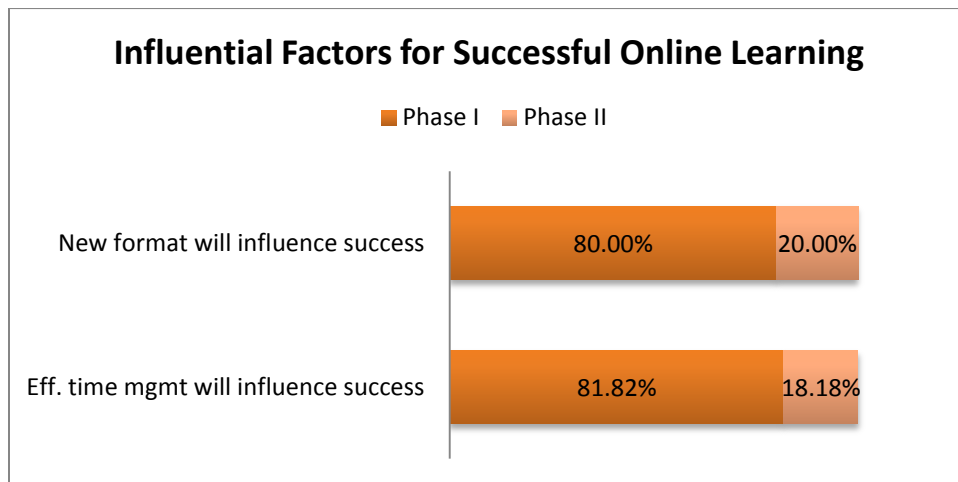
Influential Factors for Successful Online Learning

Phase I ■ Phase II

	Phase I	Phase II
New format will influence success	80.00%	20.00%
Eff. time mgmt will influence success	81.82%	18.18%

Figure 2: 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 or not students' expectation were met. 90% of the respondents in the second phase indicated that their expectations were met while 10% disagreed (Figure 6).

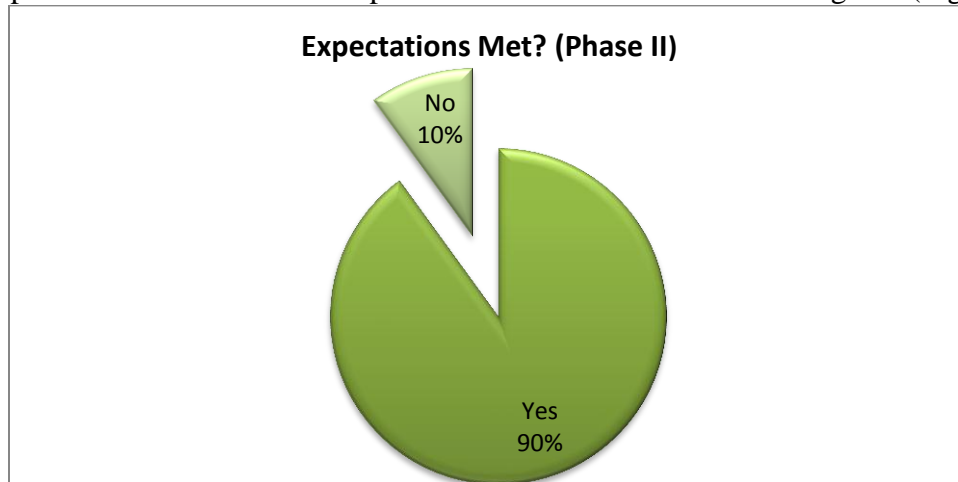**Expectations Met? (Phase II)**

No
10%

Yes
90%

Figure 3: 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.

What are students' evaluation 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 (Figure 6).

I feel confident AFTER watching the videos but before coming to class

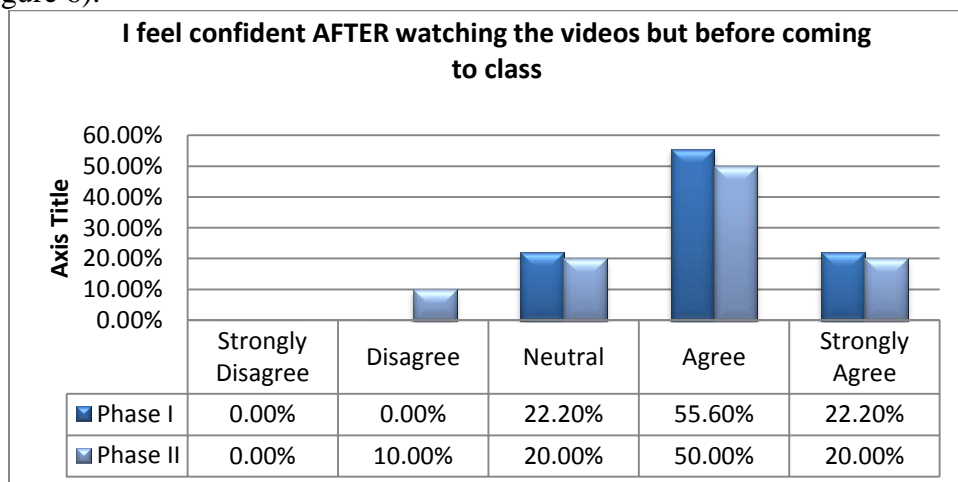|	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Phase I	0.00%	0.00%	22.20%	55.60%	22.20%
Phase II	0.00%	10.00%	20.00%	50.00%	20.00%

Figure 4: 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 (Figure 7).

I feel confident AFTER watching the video and AFTER attending class to work on concepts with others

Phase I   Phase II

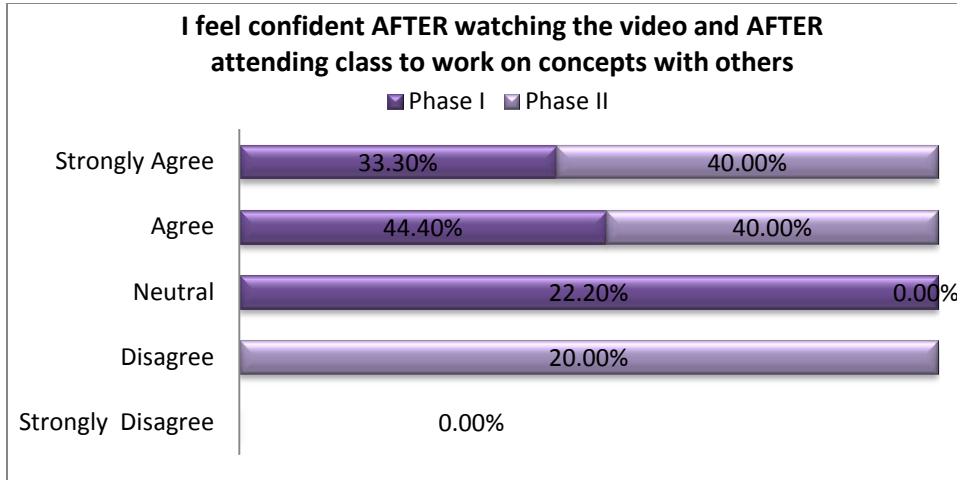|	Phase I	Phase II
Strongly Agree	33.30%	40.00%
Agree	44.40%	40.00%
Neutral	22.20%	0.00%
Disagree		20.00%
Strongly Disagree	0.00%	

Figure 5: Students' feeling of confidence AFTER watching the video and AFTER working on the concepts in class

66.6% of the respondents in Phase I indicated that they preferred the flipped format of delivery over the traditional format. 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 (Figure 8).

I prefer the traditional type of instruction than the flipped videos

Phase I   Phase II

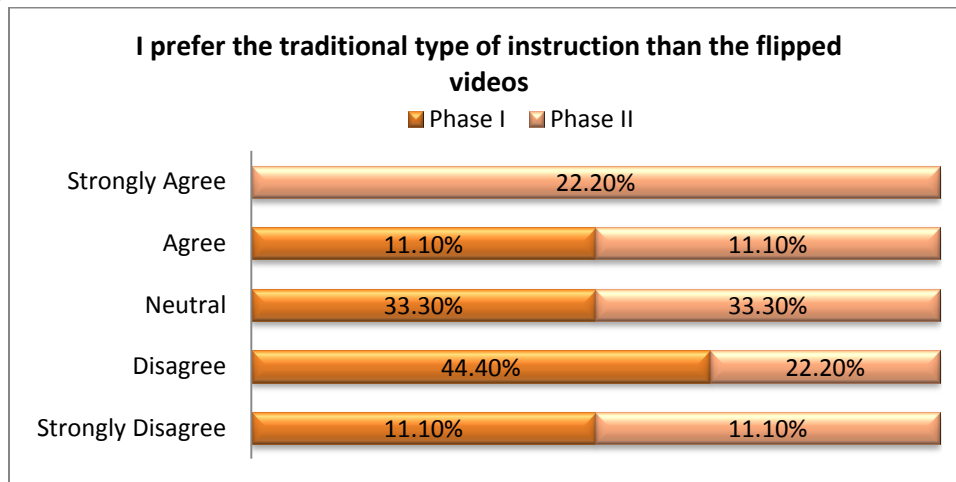|	Phase I	Phase II
Strongly Agree		22.20%
Agree	11.10%	11.10%
Neutral	33.30%	33.30%
Disagree	44.40%	22.20%
Strongly Disagree	11.10%	11.10%

Figure 6: Students' preference for the flipped classroom

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 (Figure 9).
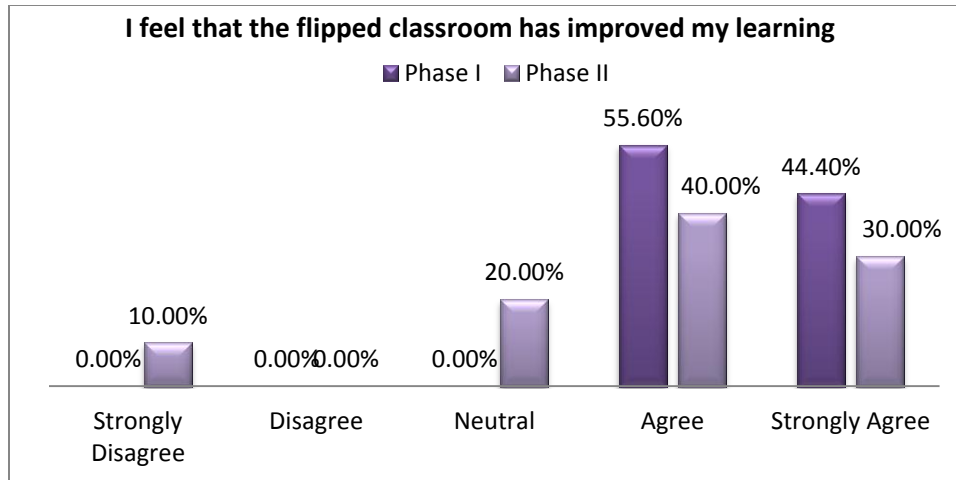
Figure 7: Students' perception of whether the flipped classroom improved their learning

80% of the respondents in Phase I indicated that they would recommend the flipped session for other subjects. They indicated that it provided a useful summary of the concepts, improved learning and could be useful for courses which carried a high degree of complexity. In the case of Phase II, 60% of the respondents indicated that they would recommend the flipped class for other subjects as it provided access on demand, allowed students to prepare before class and provided clarity on theories and concepts. 40% of the students did not respond to this question (Figure 10).
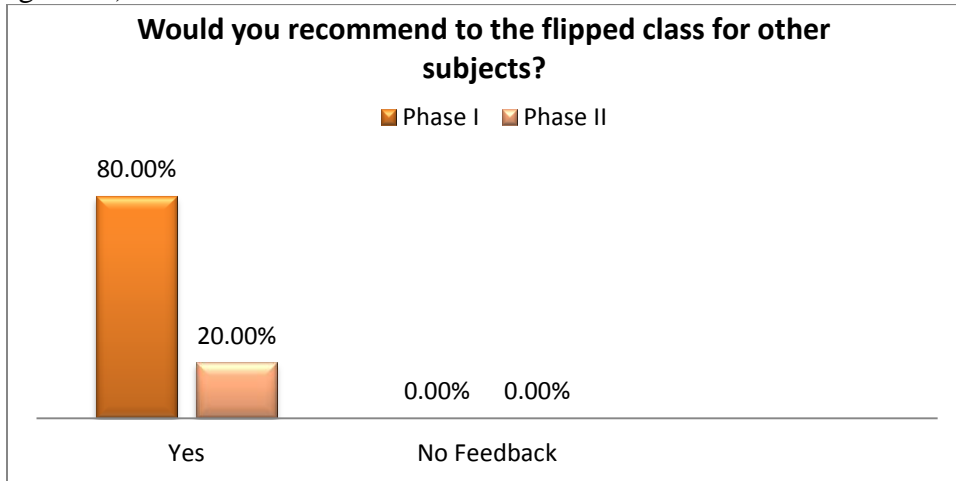

Figure 8: Should the flipped class be recommended for other subjects

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 (Figure 10).

I am able to pace myself during the course

Phase I   Phase II

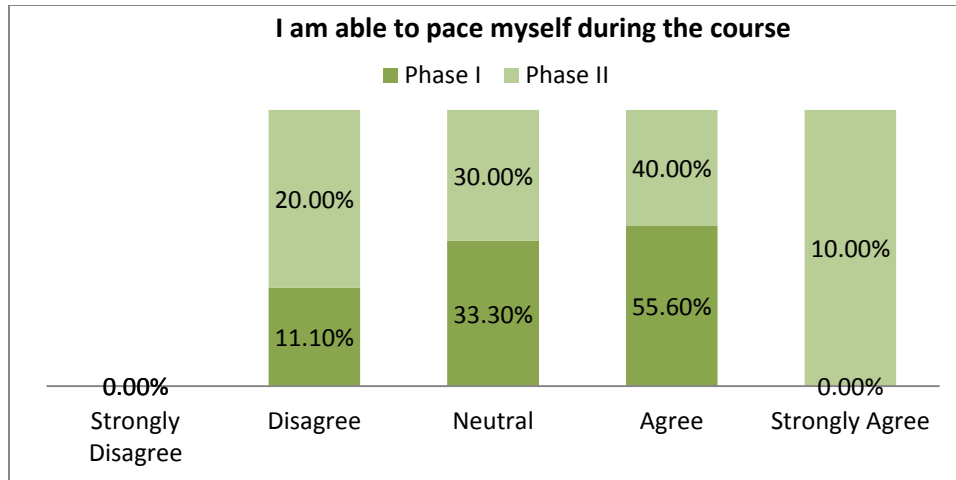|	Phase II	Phase I
Strongly Disagree	0.00%	0.00%
Disagree	20.00%	11.10%
Neutral	30.00%	33.30%
Agree	40.00%	55.60%
Strongly Agree	10.00%	0.00%

Figure 9: 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 (Figure 11).

I used the flipped videos to prepare for examinations

Phase I   Phase II

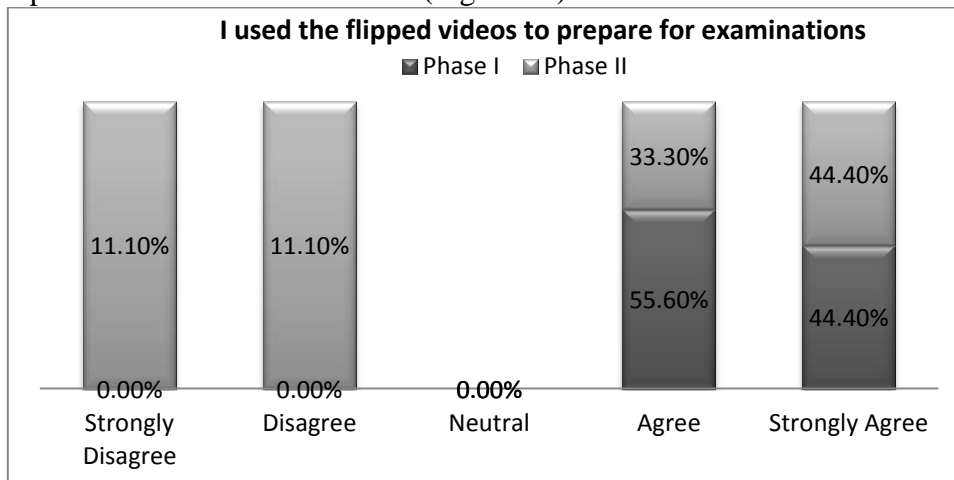|	Phase II	Phase I
Strongly Disagree	11.10%	0.00%
Disagree	11.10%	0.00%
Neutral		0.00%
Agree	33.30%	55.60%
Strongly Agree	44.40%	44.40%

Figure 10: Using flipped videos to prepare for examination

The data provided in the paragraphs that follows 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 in-class activities assisted them in learning and understanding the content presented in the unit. The other participants did not respond. Benefits of the in-class activities included: explanation of concepts, accessibility, convenience, reinforcement of note taking and learning skills, reflexivity and research before classes.

40% of the respondents acknowledged that in-class activities assisted them in maintaining their interest and attention during the session, 10% disagreed and none of the other respondents

provided a response. Reasons posited by the 40% included: opportunities for clarification and independent research, increased confidence and the unique technique of the lecturer to keep the students alert and engaged. Those who disagreed indicated that the duration of the sessions were too long and carried too much content.

Advantages of the Flipped Classroom

Some of the main advantages identified by the respondents in both Phases included: convenience, preparation before class, access on demand, detailed explanation of concepts, improved learning, increased confidence with the material and examination preparation (Figure 12).
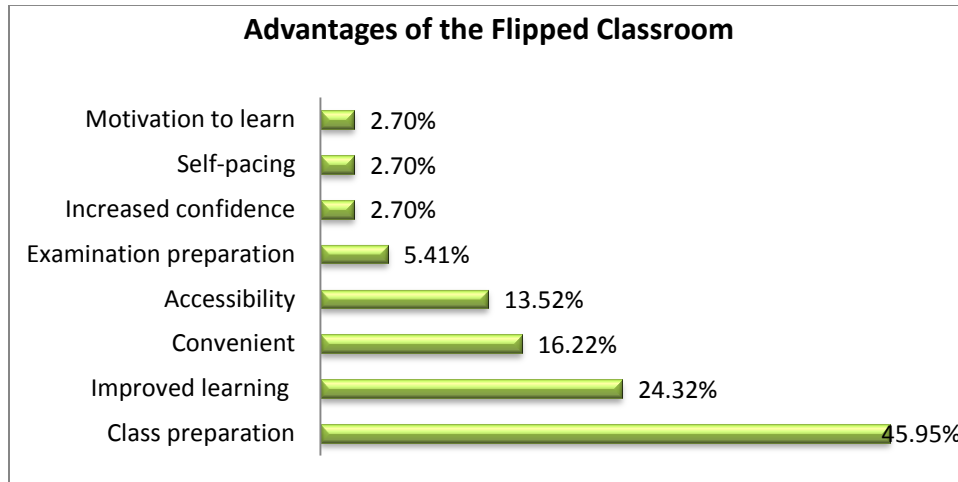
Advantages of the Flipped Classroom

Category	Percentage
Motivation to learn	2.70%
Self-pacing	2.70%
Increased confidence	2.70%
Examination preparation	5.41%
Accessibility	13.52%
Convenient	16.22%
Improved learning	24.32%
Class preparation	45.95%

Figure 11: Advantages of the Flipped Classroom

Disadvantages of the Flipped Classroom

Respondents were asked to identify the limitations of the flipped classroom. Students in Phase I expressed concerns regarding the lack of immediate feedback or clarification when required, difficulties regarding internet and longer videos. They also suggested that videos be prepared for each session rather than selected sessions. Respondents in Phase II 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

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%).
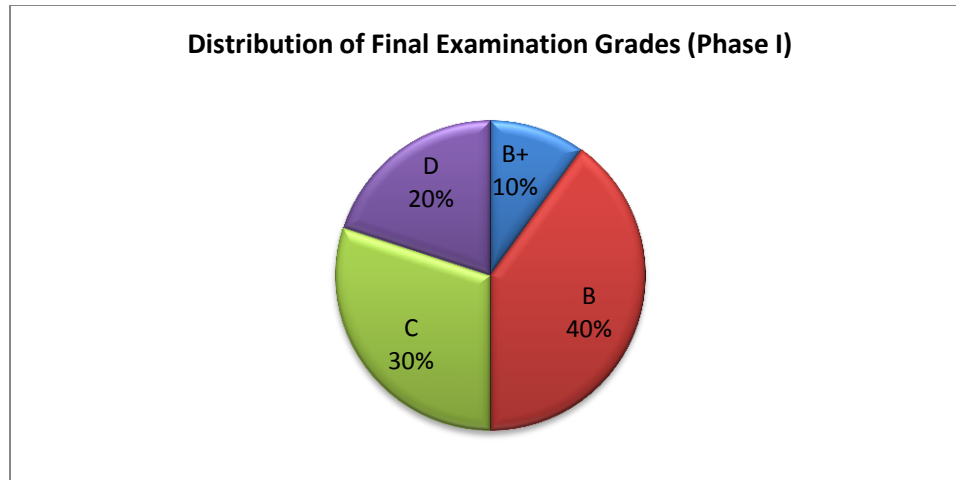
Figure 12: Distribution of Final Examination Scores (Phase I)

Phase II recorded a final examination pass rate of 90% with a distribution of grades as follows: A (60%), B+ (10%), B (20%), F (1)%) (Figure 15).
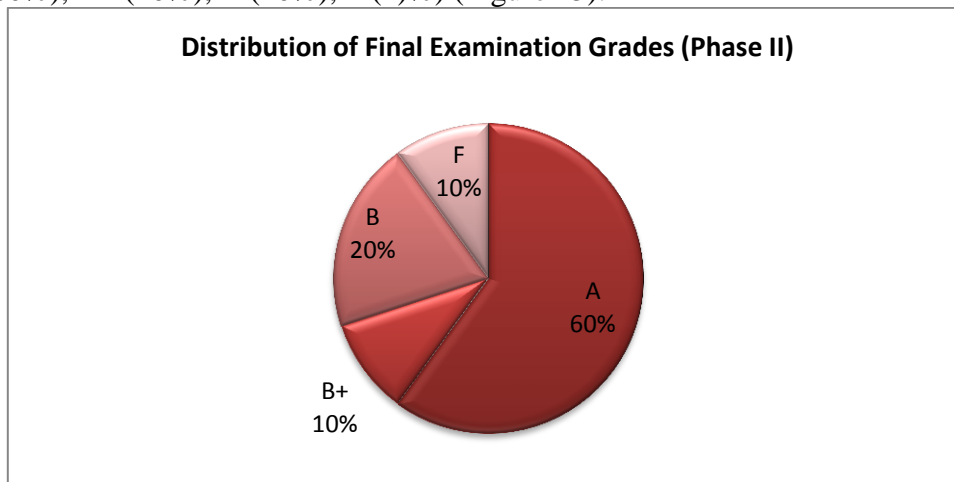

Figure 13: Distribution of Final Examination Grades (Phase II)

Facilitator's Observations and Reflection

Observation

Three main observations will be highlighted in this section. First, it became easy to identify by their level of engagement and degree of class participation, the students who consumed the content prior to class, and those who did not. 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 consumed the content would ask different types and depths of question (clarification/deeper understanding) than those who did not consume the content (knowledge acquisition). 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 those that consumed the content prior to class and were able to assist the students that did not engage themselves with the said content. Third, in Phase I, flipping the core concepts of the session reduced the time 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. However, the additional face-to-face time acquired by flipping the all of the lectures in Phase II allowed the facilitator to harness the additional time for deeper understanding and mastery and in some cases to direct specialized.

Strengths

While the use of this asynchronous tool provided the obvious benefits of exposing the student to the content prior to the class, other benefits were identified throughout the course of delivery. The first was students' motivation to learn and their ownership of the learning process. After consuming 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 transformed, 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. 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 was a replica of the flipped content, much to the chagrin of those students who already consumed the content prior to the face-to-face interaction. The challenge of gaining students' buy-in was tied to three critical factors:
1. The degree of familiarity and comfort associated with the traditional mode of the delivery.
2. Students' unfamiliarity with the use of technology to support their learning and by extension being responsible for their learning.
3. 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.
4.
Discussion

The data shows that while students exhibited some degree of confidence after watching the video, their sense of confidence was largely manifested after participating in the problem solving/in-class activities. It can be inferred that exposure and participation in the in-class activities provided opportunities for the reinforcing of concepts exposed to asynchronously,

thereby increasing confidence. The degree of satisfaction and confidence with the content of the course was evident in their willingness to seek out additional resources, provide support to their peers as well as their willingness to recommend to the flipped format delivery to other subjects. As the level of confidence with the material increased, students were able to engage in mastery of concepts and deeper understanding (Bergmann & Sams, 2012 ; Johnson, 2013*).* This level of confidence with the material was also reflected in their final grade where 60% of the students in Phase II scored above 90%. The improved distribution of scores also supported the data which suggested that students' learning improved over time. One can surmise that this increase in the distribution of the scores can be attributed to the change in format of the flipped class in Phase II which focused on deeper learning and mastery.

The data reflected a preference among the students for the flipped class against the traditional form. The study identified a number of advantages of being able to consult the material asynchronously: the ability to access the material on-demand, at their convenience, repeatedly, for revision and more importantly in the case of missed session as some the key benefits of this tool. Supporting these advantages were the observed willingness of the student to engage the material outside of the classroom. The results also illustrated how the respondents used the tool to support their preparation for examinations. Students were able to: retrieve teaching materials and lecture notes, reinforce concepts, and to refresh their memory. In spite of these advantages students cautiously agreed that they were able to pace themselves which, at a surface level conflicts with (Gades, 2010) cognitive model of media choice. This researcher surmises that the inability to fully pace oneself may be attributed to external variables such as internship and professional obligations as well as the competing workload of the other courses.

The study however, was not without its limitations. 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, a known limitation of asynchronous learning. 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. While this issue may appear trivial, it is important to note that it can significantly impact on the in-class activities tied to these lectures

Developing, executing and supporting asynchronous model of delivery is hardly an easy process. Obtaining student buy-in and orienting them towards Mediasite and training them on how to view the video required a significant investment in time. This study shows that the asynchronous delivery provided support to the students by allowing them to proceed throughout the course at their own pace and convenience. When paired with the flipped class, the use of the asynchronous mode of delivery provided opportunities for increased student interaction and collaboration. Students were able to improve their learning and develop mastery skills which influenced their overall success at the course. This success is also contingent on the facilitator's willingness to re-conceptualize 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 learning my rote. The success of the asynchronous approach must also be tied to a systematic and deliberate planning process involving some degree of instructional redesign and adequate technological support.

The purpose of this study was to evaluate the extent to which the asynchronous delivery of content using the flipped mode to advance teaching and learning in 21st century. The general goal of the flipped classroom approach was to create a student-centered approach moving the

learning process from the passive to active phase. Although the size of the group does not allow for generalizations, the paper achieved its aim in exploring the possibilities for teaching and learning which can be achieved within a tightly structured and coordinated framework. It also introduced for consideration, critical issues that educators often overlook when designing asynchronous delivery.

Lessons Learned

1. Flipping takes time: planning, preparation, flexibility.
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; (e) 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:
1. Students' ability to navigate the technology.
2. Students' motivation to incorporate technology in their learning.
3. Students' access to technology.
4. An institutional practice of stable and reliable technological support.
5. Students' willingness to take responsibility for their learning.
6. Students' ability to view academic content in a deliberate, systematic and logical way.
7. 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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