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To Flip or Not to Flip, That's the Question: Findings From an Exploratory Study Into Factors That May Influence Tertiary Teachers to Consider a Flipped Classroom Model

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Abstract

The term "flipping the classroom" is relatively recent, although elements of the underlying principles have been around for many years. It is generally accepted that the "flipped classroom model" consists of replacing direct instruction, or lectures, with video clips to be watched off campus, and using face-to-face class time to engage students in active learning activities. Flipping the classroom has been made easier by access to video technologies. The model was initially adopted for use in secondary education, but is increasingly considered by teachers in higher education. However, there is both confusion and scepticism about the concept, and whether there are any benefits in adopting it. In this exploratory study, the main focus was on identifying what staff in three institutions of higher education in New Zealand considered to be the reasons for adopting, and/or for not adopting, or challenges in adopting, this model. In this article, we will report on the findings from the survey part of this mixed-methods study. The findings suggest some respondents saw no value in adopting a flipped classroom model; some considered active learning to be the main idea behind the flipped classroom model (and that this was an old idea in a new guise); and some had or would like to implement the model, but had encountered or were anticipating some challenges in doing so. The findings also suggested a range or lack of common understanding of what the flipped classroom model means. This highlighted the importance of clarifying a definition in any research project and reporting exactly what is meant by "flipped classroom model" in order to avoid conceptual confusion.

Keywords: flipped classroom model; video clips: active learning; recorded lectures

Introduction

The term, "flipped classroom model", was first introduced in 2007 by two high-school teachers in Colorado. Bergmann and Sams (2012) used recorded lectures for students who often missed classes due to sports or other activities. Both teachers realised they needed to find an alternative to ensure these students did not miss any lessons. At that time, YouTube and online video were in their infancy. Taking note of these developments, they began to use screen-capture software to record their lectures, and posted them online so their students could access them. This was the beginning of what became known as the flipped classroom model.

However, before the term was coined, other teachers experimented with similar activities, using terms such as "inverted classroom" (e.g., see Lage, Platt, & Treglia, 2000).

In this model, course content is typically introduced—not through live lectures, but through recorded lectures or shorter video clips that the students are required to watch in their own time. After the self-directed activity of watching the video clips, classroom time focuses on engagement with the lecture content through more active learning approaches. "Active" means that students do not just "consume" what is delivered didactically from the front of the class—they are actively engaged in making sense of the material. This engagement can be achieved through a variety of approaches such as problem-based activities, brainstorming, or group/pair work.

Over time, "flipped classroom model" has been defined in many different ways. Each definition accentuates different characteristics, which has led to considerable confusion about its defining characteristics. In their scoping study, O'Flaherty and Phillips (2015) found that there was no agreed model of the flipped classroom model. The Flipped Learning Network (2014) provides the following definition of the flipped classroom:

> Flipped Learning is a pedagogical approach in which a direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter. (p.1)

This definition does not refer to developments in technology as a prompt for the increasing adoption of a flipped model. However, the studies by O'Flaherty and Phillips (2015), Abeysekera and Dawson (2015), and Missildine, Fountain, Summers, and Gosselin (2013) did emphasise using technology as typically being one of the defining characteristics of a flipped classroom model, often through the use of video-recorded lecture material.

Considering the number of ways the term, "flipped classroom model", has been used, we must clearly define how we have used it in this project. We adopted a definition derived from Missildine et al. (2013):

> The Flipped Classroom Model is a hybrid approach to learning, using video recordings to move lecture-type direct instruction to 'self-directed' status and using face-to-face classroom time for interactive learning.

We have opted for this definition to guide our research because it specifically refers to the technological affordances provided by video-recording technology, and the general increase of students' access and use of technology. In this context the term "technological affordance" can be defined as "possibilities for action" (e.g., see Limperos, Buckner, Kaufman, & Frisby, 2015). Technological affordances may have led to the quick rise and adoption of a flipped classroom model of teaching. Although the basic principle of moving lecture material to homework and using contact time for more interactive learning approaches existed before video technology became readily available and students' access to technology increased, we argue that the rapid rise in technological affordance in the educational space probably prompted the sharp rise and use of the flipped model.

Our choice to adopt a definition that includes the intentional use of technology also reflects our assumption that using technology can positively affect students' learning. Student engagement and active participation in the classroom increase student success (Milman, 2012) and using technology as an instructional tool can be a catalyst for their learning. It may also be particularly attractive to today's students, who have grown up in a technology-rich environment (Pierce & Fox, 2012).

Many institutions of higher learning are increasingly interested in implementing a flipped approach, be it in education, medicine, sciences, or social science (Fulton, 2012; Roehl, Reddy,

& Shannon, 2013) with a clear intention of enhancing students' learning. Steen-Utheim and Foldnes (2018) examined students' engagement in a flipped classroom and traditional classroom, and showed that students were positive about the flipped methods and developed a better understanding of the coursework. Day and Foley (2006) described the positive effect of flipped classrooms and reported on the students' satisfaction and their improved final grades. Research by Tune, Sturek, and Basile (2013)—based on the effectiveness of a traditional lecture-based curriculum with a modified flipped classroom curriculum of cardiovascular, respiratory, and renal physiology for first-year graduate students—indicated that active learning and student participation were the primary focus for the flipped classroom. The results from these studies showed that, by having activities such as frequent quizzes and extra time for classroom discussion, students' performance in flipped classrooms increased more than the students in traditional classrooms.

However, despite reported advantages, challenges have also been identified. Teachers have identified barriers in implementing flipped classrooms, including an increased workload relating to content preparation, their discomfort with technology, and lack of access to technology (Chellapan & van der Meer, 2015). Overall, research on the challenges and the rationale for adopting or not adopting this model in higher education learning environments is still relatively scarce (Abeysekera & Dawson, 2015; O'Flaherty & Phillips, 2015; Chellapan & van der Meer, 2015).

The findings reported in this article are from a small pilot study in three higher education institutions. This study may contribute to the emerging research efforts in this area.

In particular, to start developing an understanding of the considerations that come into play when university teaching staff encounter a new pedagogiocal approach such as this model, we sought to understand the rationale of university teachers for adopting or not adopting the flipped model, what they considered to be the challenges in implementing this model in their courses, and whether they had particular views of teaching and learning that led them to adopt/resist the flipped classroom model. We were also interested in finding out whether there is a relationship between general technology use and adoption of the flipped classroom model. In other words, to what extent does teachers' understanding of, and comfort levels with, technology and related pedagogical approaches determine their adoption or resistance to adopt the flipped model? Insights into these questions could also inform staff development in this area, especially when new approaches to teaching are introduced.

Methodology

This paper reports on the survey findings from a larger study that employed a mixed-method design that also included interviews. Mixed-methods research is recognised as the third major research approach or research paradigm used today (Doyle, Brady, & Byrne, 2016; Klassen, Creswell, Plano Clark, Smith, & Meissner, 2012). This method has been described in a number of ways, but, in general, it involves using quantitative and qualitative research techniques, methods, and approaches in a single study. The survey in this study asked questions about teachers' pedagogical practices in relation to the use of technology, lectures (particularly the use of video recordings), and respondents' possible reasons for adopting or resisting the flipped model.

Questionnaire

The instrument used in this study was a 69-item questionnaire designed to measure university teachers' current teaching practices, technology use, and preferences for adopting or not adopting the flipped model. The online survey used Likert-type questions on a five-point scale, anchored by "strongly disagree" and "strongly agree". The survey also included a few open-ended

questions developed through an iterative process by the main researcher's discussion with a range of staff knowledgeable in this area, and initial feedback from a small group of lecturers. In the first part of the survey, respondents were asked to indicate their level of agreement with statements about technology in teaching and learning; in the second part, their agreement with statements about the lecture mode of teaching; in the third part, their agreement with statements about implementing pedagogical change; in the fourth part, their agreement with statements about their perception of students' learning and study habits; and, in the last part, their agreement with statements about the use of video technology.

To ensure the content validity of the instrument, including the relevance and clarity of the items or wording, the instrument was reviewed by the authors and a number of their colleagues. After multiple revisions, the questionnaire was piloted with 30 lecturers who were not participants in the main study. To ensure the clarity of the questions, lecturers were asked to comment on any ambiguous items. Based on the feedback, some questions were rephrased, reworded, or omitted. However, we deliberately left a number of similar questions in the survey to allow the creation of scales that would capture a number of key constructs, and reliability testing of those scales.

Participants

Because this was an exploratory study, a convenience sample approach was used. Invitations were sent to teachers on the mailing list of colleagues of some of the authors in two New Zealand universities, and to staff in the authors' home institution. A total of 84 responses were received: 27 from one university; 48 from the second university; and 11 from the third university.

Procedure

Ethical approval was sought and granted. The questionnaire was administered online with Google Forms. Interested participants received information about the project in their email invitation. Participants who clicked on the survey link and completed the survey were deemed to have consented to participate.

Data analysis

The data was statistically analysed using SPPS version 23. We first analysed the descriptive statistics of the individual questions. We then performed a principal component analysis (PCA) to explore and identify the questions that loaded onto different components or factors (Jolliffe & Cadima, 2016). We then performed a two-way correlation to identify relationships between the factors. Lastly, we performed analyses of variance to explore the relationship between the answers on a number of key categorical questions and the scale results.

Findings

Descriptive statistics of survey items

The survey was designed to enquire into the respondents' experience and views of technology, their experience and views on teaching, and students' learning and study behaviour.

Table 1 shows the descriptive statistics of questions that related directly to technology. As can be seen, most respondents seemed reasonably comfortable with technology. For example, 64.6% agreed with the statement that they were comfortable using a range of technologies in their teaching.

Table 1 Questions related to technology

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. I think that using technology improves my overall teaching performance	6.0%	7.1%	28.6%	34.5%	23.8%
2. I am comfortable using a range of technologies in my teaching	0.0%	9.8%	25.6%	30.5%	34.1%
3. Interacting with technology does not require a lot of mental effort for me	6.0%	16.7%	26.2%	39.3%	11.9%
4. I believe that I can effectively use technology tools to deliver an engaging course	0.0%	10.8%	16.9%	53.0%	19.3%
5. I am able to use learning technology tools with minimum support and assistance	3.6%	18.1%	27.7%	31.3%	19.3%
6. The availability of technology tools helped me to change my course delivery to a more interactive approach	15.7%	19.3%	24.1%	27.7%	13.3%
7. Technology-enhanced pedagogies allow for a more interactive learning environment	10.7%	20.2%	26.2%	31.0%	11.9%

The results relating to questions about lectures, as shown in Table 2, suggest that, for most respondents, lectures remain an essential part of teaching in higher education: 71.4% agreed or strongly agreed with a statement related to this. However, 42.7 % indicated that lectures might not be the best way to teach students.

Table 2 Questions related to lectures

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
8. I prefer the lecture mode as my primary teaching approach	20.2%	17.9%	29.8%	22.6%	9.5%
9. Lectures are currently an essential part of my course	8.3%	4.8%	15.5%	32.1%	39.3%
10. Lectures have been proven to be the best method to teach students because they enhance students' understanding of the course material	25.0%	26.2%	31.0%	14.3%	3.6%
11. I am comfortable with continuing with my lectures; they have served me well for a long time	12.3%	25.9%	27.2%	21.0%	13.6%
12. I find it easier to deliver my course content in a lecture-based teaching method.	13.1%	17.9%	22.6%	31.0%	15.5%
13. Lecturing is the only way for me to get through the content of the course(s) I teach	36.1%	20.5%	20.5%	15.7%	7.2%
14. The tutorials provide enough interaction in my course — none is needed in my lectures.	48.8%	26.8%	17.1%	4.9%	2.4%
15.Teaching formats other than lectures would take too much time in preparing course materials	21.4%	31.0%	21.4%	20.2%	6.0%
16. Providing students with video clips of lecture content is just spoon feeding them	37.3%	22.9%	22.9%	10.8%	6.0%
17. Lectures are not the best way to teach students	4.9%	14.6%	37.8%	24.4%	18.3%

Responses to the questions about consideration of possible changes, as shown in Table 3, suggest respondents had a distinct interest in making some changes, especially in developing more interactive lectures. Nearly 80% agreed or strongly agreed that lectures could be more effective if they were more interactive.

Table 3 Questions related to possible changes

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
18. Most lectures should be abolished and replaced by interactive tutorials or workshops	31.3%	19.3%	15.7%	16.9%	16.9%
19. Lectures could be more effective if they would be more interactive	3.6%	3.6%	13.3%	37.3%	42.2%
20. Short video clips would be a better way to deliver course material rather than just through lectures	16.7%	16.7%	36.9%	20.2%	9.5%
21. In my institution/department, I don't have enough opportunities and support to develop new teaching approaches	17.1%	32.9%	13.4%	24.4%	12.2%
22. The only reason I lecture is because my institution requires this of me	32.9%	25.6%	24.4%	12.2%	4.9%
23. The only reason I lecture is because other teaching formats take up too much staffing	23.2%	24.4%	29.3%	14.6%	8.5%
24. Limitations on available smaller classroom spaces limits my opportunities to make many changes in my approach to teaching	26.6%	25.3%	22.8%	13.9%	11.4%
25. Short video clips in addition to one or more lectures would be a better way to deliver course material rather than just through lectures alone.	10.8%	10.8%	31.3%	25.3%	21.7%

As can be seen in Table 4, respondents were positive about educational technology and its role in enhancing student academic engagement (59.8%) and providing for self-paced instruction (61.3%).

Table 4 Questions related to educational technology

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
37. The introduction of technologies in higher education has enhanced students' engagement	14.5%	10.8%	36.1%	27.7%	10.8%
38. I believe that technology enhanced pedagogies develop a more positive attitude towards learning in students	12.0%	13.3%	38.6%	26.5%	9.6%
39. Technology enhanced pedagogies can contribute to students' academic engagement	6.1%	11.0%	23.2%	36.6%	23.2%
40. Using technology in teaching and learning is likely to enhance students' motivation	9.5%	15.5%	33.3%	31.0%	10.7%
41. Technology use in teaching and learning is likely to satisfy students' learning needs	8.6%	18.5%	38.3%	24.7%	9.9%
42. Technology can provide for a self-paced instructional setting that could support mastery learning for students	3.8%	11.3%	23.8%	38.8%	22.5%

The responses to the questions relating to students' learning and study habits show an interesting mixture of negative perceptions as well as recognition of the type of teaching that might best serve students' learning. Some of the negative perceptions seem to express a deficit view of students as being lazy, disengaged, not capable, and expecting to be provided with the 'right' knowledge. Other views seem to express an idea that lecturers need to guide students and plan for their active engagement.

Table 5 Questions related to students' learning and study habits

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
26. Most students do not prepare before coming to lectures	0.0%	10.7%	10.7%	33.3%	45.2%
27. Students prefer to get a copy of the lecture PowerPoint slides rather than attempt to make their own notes	3.6%	6.0%	10.7%	36.9%	42.9%
28. Even though students often take notes, I believe that many students do not look at them after class.	11.9%	23.8%	28.6%	23.8%	11.9%
29. Most students find it difficult to maintain their attention during lectures if there are no activities.	4.8%	10.7%	19.0%	35.7%	29.8%
30. My experience is that students in lecture-based classes are often disengaged (e.g., texting, sleeping, not bothered to attend to lecture)	7.1%	22.6%	33.3%	23.8%	13.1%
31. Students depend on teachers to provide them with appropriate learning materials (e.g., lecture notes/slides, websites with resources, reading materials)	2.4%	6.0%	10.7%	52.4%	28.6%
32. My students prefer to learn through lectures, rather than through active engagement (e.g., brainstorming, discussion…)	15.5%	38.1%	29.8%	15.5%	1.2%
33. Most students prefer to be told what they have to know, rather than develop their own understanding of the course materials	8.3%	14.3%	31.0%	27.4%	19.0%
34. Many students find it difficult to make good notes in lectures	1.2%	10.7%	38.1%	34.5%	15.5%
35. Students learn best by me explaining the material in lectures	13.1%	23.8%	53.6%	6.0%	3.6%
36. A change in pedagogy is necessary as many students in the 21st century do not feel engaged by just listening and taking notes.	9.5%	10.7%	25.0%	34.5%	20.2%

Lastly, in line with the definition of the flipped model we adopted for this project, a range of questions were asked about the use of and usefulness of recorded lectures or video clips. As can be seen in Table 6, respondents overall seemed positive about this particular use of technology to enhance support for students and provide more time in class for other activities. However, respondents clearly felt that video clips, on their own, did not enhance students' understanding. Nor did they believe that students would automatically pace their own learning.

Table 6 Questions related to video use

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
43. Pre-recorded lectures enable students to pause and replay video segments to help their understanding	2.4%	6.0%	30.1%	30.1%	31.3%
44. The use of video clips/podcasts for homework allows the class time to be used for activities such as problem solving, discussion and developing students' understanding	6.0%	4.8%	31.3%	30.1%	27.7%
45. Activities in the classroom such as solving problems, and peer-led discussions can help students to develop a deeper understanding of the course material	1.2%	1.2%	12.0%	31.3%	54.2%
46. Students are responsible themselves for learning from the lecture material	0.0%	4.8%	22.9%	44.6%	27.7%
47. Students learn best by active engagement with the material	0.0%	0.0%	4.8%	30.1%	65.1%
48. Using pre-recorded/video clips lectures does not guarantee students' understanding	0.0%	1.2%	12.0%	28.9%	57.8%
49. Using pre-recorded/video clips lectures does not necessarily guarantee that students will pace their own learning effectively	1.2%	3.6%	10.8%	28.9%	55.4%
50. A problem with providing video clips might be that many students will be easily distracted while watching the videos	4.9%	18.3%	39.0%	25.6%	12.2%
51. Having to watch video clips or podcasts independently may be overwhelming for some students	8.4%	20.5%	31.3%	31.3%	8.4%
52. I don't believe most students have the self-motivation to watch video-clips by themselves	17.1%	22.0%	35.4%	19.5%	6.1%
53. Most first-year students need to receive guidance from teachers into how to become independent learners	1.2%	3.7%	17.3%	44.4%	33.3%
54. The use of video clips with course content may be especially helpful for first-year students as they may find it difficult to make good notes in lectures	7.3%	8.5%	42.7%	32.9%	8.5%
55. The use of video clips with course content may be especially helpful for international students as they may find it difficult to make good notes in lectures	5.0%	6.3%	30.0%	41.3%	17.5%

Scales

The large number of questions, with some apparent duplication, was intended to allow us to reduce them into a number of meaningful scales that would encapsulate some broader concepts, attitudes, or beliefs. To do this, we performed a Principal Component Analysis (PCA) with Varimax Rotation using the variables from Table 1–6 that loaded on a component with a value of .40 or above. The KMO measure of sampling adequacy was .624 and Bartlett's test of

sphericity was significant ($\chi 2$ = 1585.395, p < .001). From these results we created seven scales with reliability exceeding .70 (see Table 7).

Table 7 Scale descriptives

Scale name	Number of items in scale	Cronbach α	N	Mean
technology_positive	8	.93	76	3.19
lecture_preference	8	.87	80	2.86
student_deficit	5	.78	84	3.71
techno_comfortable	3	.84	81	3.55
video_clip_positive	4	.81	80	3.41
change_challenge	5	.76	77	2.57
student_active_learning	4	.82	80	4.09

To identify any relationship between respondents' perceptions of pedagogy and technology, and their students' perceptions, we performed a correlation analysis. The correlation matrix in Table 8 shows that respondents' beliefs and ideas about students' active learning strongly correlate with positive ideas about technology, being technologically comfortable, not preferring the lectures as teaching mode, and using video clips. Positive ideas about using video clips also strongly correlate with a generally positive attitude to technology and not preferring lectures. On the other hand, we can see correlation between a preference for lectures and having a deficit view of students. All of this together may suggest that thoughts about aspects relating to the flipped model may be connected to comfort levels about technology, and respondents' views of students' approaches to learning.

Table 8 Scale correlations

	technology_ positive	lecture_ preference	student_ deficit	techno_ comfortable	change_ challenge	student_ active_ learning
technology_positive	1					
lecture_preference	-0.77	1				
student_deficit	-0.013	.263*	1			
techno_comfortable	0.111	-0.173	-0.023	1		
change_challenge	0.034	0.120	.290*	-.231*	1	
student_active_learning	.526**	-.463**	-0.119	.292**	-0.035	1
video_clip_positive	.669**	-.310**	-0.022	0.164	-0.017	.582**

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 9 Mean results between respondents who answered Yes/No to the question: Do you use video clips instead of lectures?

		technology_ positive	lecture_ preference	student_ deficit	techno_ comfortable	video clip_ positive	change_ challenge	student_ active_ learning
No	**Mean**	3.09	2.99	3.85	3.54	3.29	2.63	3.98
	N	61	64	68	67	64	61	65
	Std. dev.	0.96	0.79	0.73	0.96	0.85	0.83	0.70
Yes	**Mean**	3.63	2.33	3.14	3.60	3.91	2.31	4.57
	N	14	16	16	14	16	16	15
	Std. dev.	0.88	0.88	0.78	0.81	0.98	1.17	0.65
F value		3.77	8.57**	11.83**	.045	6.34*	1.59	8.86**

*$p < 0.05$ ** $p < 0.01$

Table 10 Mean results between respondents who answered Yes/No to the question: Do you use video clips in addition to lectures?

		technology_ positive	lecture_ preference	student_ deficit	techno_ comfortable	video clip_ positive	change_ challenge	student_ active_ learning
No	**Mean**	2.86	2.82	3.81	3.42	3.10	2.65	3.93
	N	41	40	42	42	40	39	40
	Std. dev.	1.04	0.92	0.85	1.04	0.95	0.91	0.75
Yes	**Mean**	3.58	2.90	3.61	3.68	3.73	2.48	4.26
	N	35	40	42	39	40	38	40
	Std. dev.	0.71	0.79	0.72	0.78	0.75	0.91	0.66
F values		11.83**	1.54	1.42	1.64	10.68**	.61	4.41*

*$p < 0.05$ ** $p < 0.01$

These results suggest that the respondents who used video clips *instead of* lectures, or *in addition to* lectures, were not significantly more comfortable with technology than those who *did not lecture* (mean difference of 0.54, $p > 0.05$). However, those who used the video clips *in addition* to lectures seemed more positive about technology than those who used video clips *instead of* lectures (mean difference of 0.72, $p = 0.001$). Both groups were also more positive about active learning approaches and positive about using video clips. In addition, those who used video clips instead of lectures were less inclined to have a deficit view about students.

Discussion

We sought to understand the rationale of teachers in higher education institutions for adopting or not adopting the flipped model, and what they considered to be challenges in implementing this model in their courses. We were also interested to find out whether there may be a relationship between technology use in general and adoption of the flipped classroom model because of the close relationship between using technology and adopting the flipped classroom model. Taken together, the findings of this study suggest that it is not comfort levels with technology, but

general positive ideas about using technology and valuing students' active learning, that seem to have led respondents in this sample to adopt or consider adopting the flipped model and/or the use of video clips.

The respondents in this study seemed to feel comfortable using technology as part of their pedagogical toolbox. However, this did not necessarily translate into an overwhelming use of video clips instead of lectures. Few respondents in this survey had replaced lectures with video clips, but seemed to use video clips in addition to lectures. It could therefore be argued that few had fully adopted the flipped classroom model, if the flipped model is interpreted to mean replacing lectures with video clips. Reasons for this (as far as the survey results allow for interpretation) could be manifold. The requirement to record lectures, monitor student activity online, prepare materials, and change their teaching approaches may be perceived to have too great an impact on teachers' workload and time. The responses to questions about adopting the flipped classroom model in their teaching lend some support to these consequences. Furthermore, perceived ideas about the value of lectures, and views about students' motivation and willingness to put effort into their studies, may provide some other explanations for a limited uptake of the fully flipped classroom.

The literature about the flipped classroom model seems to confirm some of these findings—that most of those who have adopted the approach in higher education by using video clips do so because of their interest in students' active learning in the classroom and because they are positive about technology (Abeysekera & Dawson, 2015). Although traditional methods have some flexibility in promoting students' engagement based on the types of activities that teachers conducted in the classroom, a flipped approach allows for a wide range of variation (Lo & Hew, 2017). Ferreri and O'Connor (2013) suggest that teaching approaches that go beyond the traditional method seem to be more effective. Students who actively participate in the learning process are more visible in a flipped classroom (Siegle, 2014; Zappe, Leicht, Messner, Litzinger, & Lee, 2009).

Respondents who had a deficit view of students may have had limited positive experiences with students and the use of technology in their classroom. If students experience technology tools as beneficial, they are more willing to put more time into their study (Chen, Wang, Kinshuk, & Chen, 2014). However, for technology to lead to positive learning changes it must be presented in the right way (Zainuddin & Halili, 2016). Lockwood and Esselstein (2013) suggested that if teachers explain how videos will be used in the flipped classroom at the initial stage of the course, students will have a basic understanding of the flipped classroom concept and its intention. This might enhance their motivation to participate in their learning. In general, students may be less motivated to engage in activities or a pedagogical approach if they do not have a clear rationale for doing so (van der Meer, 2012). Hung's (2015) study respondents reported that they appreciated the videos as a replacement of the lecture because they were able to view the content as often as needed and the classroom time was used for discussions and brainstorming. Although creating videos for the flipped classroom seemed to be daunting and challenging for some teachers (Unruh, Peters, & Willis, 2016), those who have adopted the model tend to focus more on active participation and students' engagement in the classroom (Jamaludin & Osman, 2014; Tucker, 2012) rather than worrying about technology use per se.

Students' engagement in the flipped classroom is not just about using videos. It is also about replacing a passive learning approach with a more active learning and collaborative approach in the classroom (Bergmann & Sams, 2014). Those adopting the flipped classroom model are likely to see the classroom atmosphere begin to change because of the greater focus on interactive learning; for example, there is more time for classroom activities such as brainstorming, peer discussion, group discussion, and other more interactive learning activities (Moravec, Williams, Aguilar-Roca, & O'Dowd, 2010).

In summary, the survey results of this small exploratory study seem to suggest that levels of technological comfort may be less of a barrier than an interest in the pedagogical benefits of the flipped classroom model.

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Appendix 1: Scales items	Scales						
Questions	**1**	**2**	**3**	**4**	**5**	**6**	**7**
40. Using technology in teaching and learning is likely to enhance students' motivation	v						
38. I believe that technology enhanced pedagogies develop a more positive attitude towards learning in students	v						
7. Technology-enhanced pedagogies allow for a more interactive learning environment	v						
37. The introduction of technologies in higher education has enhanced students' engagement	v						
41. Technology use in teaching and learning is likely to satisfy students' learning needs	v						
39. Technology enhanced pedagogies can contribute to students' academic engagement	v						
6. The availability of technology tools helped me to change my course delivery to a more interactive approach	v						
1. I think that using technology improves my overall teaching performance	v						
8. I prefer the lecture mode as my primary teaching approach		v					
11. I am comfortable with continuing with my lectures; they have served me well for a long time		v					
10. Lectures have been proven to be the best method to teach students because they enhance students' understanding of the course material		v					
9. Lectures are currently an essential part of my course		v					
12. I find it easier to deliver my course content in a lecture-based teaching method		v					
35. Students learn best by me explaining the material in lectures		v					
32. My students prefer to learn through lectures, rather than through active engagement (e.g., brainstorming, discussion…)		v					
13. Lecturing is the only way for me to get through the content of the course(s) I teach		v					
45. Activities in the classroom such as solving problems, and peer-led discussions can help students to develop a deeper understanding of the course material			v				
42. Technology can provide for a self-paced instructional setting that could support mastery learning for students			v				
43. Pre-recorded lectures enable students to pause and replay video segments to help their understanding			v				
47. Students learn best by active engagement with the material			v				
27. Students prefer to get a copy of the lecture PowerPoint slides rather than attempt to make their own notes				v			
33. Most students prefer to be told what they have to know, rather than develop their own understanding of the course materials				v			
28. Even though students often take notes, I believe that many students do not look at them after class				v			

26. Most students do not prepare before coming to lectures				v			
31. Students depend on teachers to provide them with appropriate learning materials (e.g., lecture notes/slides, websites with resources, reading materials)				v			
3. Interacting with technology does not require a lot of mental effort for me					v		
5. I am able to use learning technology tools with minimum support and assistance					v		
2. I am comfortable using a range of technologies in my teaching					v		
21. In my institution/department, I don't have enough opportunities and support to develop new teaching approaches						v	
22. The only reason I lecture is because my institution requires this of me						v	
23. The only reason I lecture is because other teaching formats take up too much staffing						v	
24. Limitations on available smaller classroom spaces limits my opportunities to make many changes in my approach to teaching						v	
15. Teaching formats other than lectures would take too much time in preparing course materials						v	
55. The use of video clips with course content may be especially helpful for international students as they may find it difficult to make good notes in lectures							v
20. Short video clips would be a better way to deliver course material rather than just through lectures							v
25. Short video clips in addition to one or more lectures would be a better way to deliver course material rather than just through lectures alone							v
44. The use of video clips/podcasts for homework allows the class time to be used for activities such as problem solving, discussion and developing students' understanding							v

Columns

1: Technology_positive

2: Lecture_preference

3: Student_active_learning

4: Student_deficit

5: Techno_comfortable

6: Change_challenge

7: Video_clip_positive