Flipping the Classroom to Meet the Diverse Learning Needs of Library and Information Studies (LIS) Students

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This paper provides an overview of a teaching and learning project that explored the flipped classroom model to determine if it was an effective teaching and learning method to use with library and information studies (LIS) students with diverse learning needs. The project involved developing a range of videos in different styles for students to watch before class. These were used in conjunction with a range of student centred and interactive in class activities. The flipped model was evaluated in order to understand the students learning preferences and to evaluate if the model was effective. Results from these evaluations and student feedback, indicated that the flipped classroom model proved to be an effective way to teach Masters LIS students with diverse learning needs, due to it's interactive and student centred approach. The video style lectures, also suited students who speak English as a second language (ESL), as it enabled them to re-watch the videos and learn at their own pace. Utilizing the flipped classroom model holds advantages for LIS faculty as it allows them to engage students in innovative ways, both inside and outside the classroom, and to employ a range of modern teaching tools and approaches.

Keywords: Flipped classroom; LIS education; Learning preferences; Diverse classrooms

Introduction

The flipped classroom project emanated from a teaching and learning grant. The project aim was to explore the effectiveness of using video lectures and the flipped classroom when teaching diverse groups of students in an international LIS classroom at University College London Qatar.

The research question for this teaching and learning project was: Is the flipped classroom an effective teaching model for LIS students with diverse learning needs?

The project also aimed to evaluate which elements of the flipped classroom suited the learning preferences of the students. The project was trialed in the collection management class, which is a core course in the program and involved all thirteen of the Masters of Library and Information Studies (LIS) enrolled in the program. Students in the course came from a diverse range of social and cultural backgrounds, including nationality, gender, first language, education, age and current employment. A large number of the students (eleven of the thirteen) speak English as second language (ESL). This was the first time this teaching method had been employed in the collection management class and in the degree program, which was in its second year of enrolments. The aim of the project was to pilot this style of teach-

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ing in the collection management class, and if it proved successful, to utilize the method of teaching in other courses.

Previous research on flipped classrooms and their use in the field of LIS have explored the overall effectiveness of this model in teaching content and student's satisfaction with this model of teaching. There is, however, limited research investigating which specific elements of the flipped classroom meets the needs of students with diverse learning needs and styles. As well as investigating if the flipped classroom was an effective model for learning content in the LIS classroom, this study was also interested in whether the flipped classroom would suit diverse learning needs, including English as a Second Language (ESL) students and students who are dependent, collaborative or independent learners. According to the Grasha-Reichmann learning styles questionnaire (GRLSQ), dependent learners require a large amount of direction from the teacher, whereas collaborative learners work best when learning as part of a team. Independent learners learn best when left to his or her own devices (Grasha, 1996). Lage, Platt, & Treglia (2000) argue that the "inverted classroom explicitly allows for students of all learning styles to use a method or methods that are best for them". In order to test this, the lecturer developed and evaluated a number of different in and out of the classroom elements of the flipped classroom.

Flipping the classroom involves, "[i] nteractive group learning activities inside the classroom and direct computer-based individual instruction outside of the classroom" (Bishop & Verleger, 2013). Video lectures should ideally give hints on how ideas and examples will be explored further in the classroom (Tucker, 2012), while the pre-class study should be framed in class with the appropriate activities like hands-on and problem-solving exercises, open discussions, creative projects or guest speakers (Educause, 2012; Kim, Kim, Khera, & Getman, 2014; Lage, Platt, Treglia, 2000). A combination of video lectures, reading materials, PowerPoint with sound and PowerPoint handouts allow students to choose the best method for their learning process (Lage, Platt, Treglia, 2000). Teachers can also urge their students to come to class with questions on the material studied at home (Lage, Platt, Treglia, 2000; Tucker, 2012), or can start the in-class activities with short quizzes or polls to check the students recall. The flipped classroom meets a diverse range of students learning needs by allowing students to engage with lecture material in innovative and interactive ways, both in and out of the classroom, as well as exposing them to a range of teaching methods and digital tools.

Literature Review

The "Flipped Classroom" consists of an active learning pedagogical approach where the traditional in-class instruction takes place at home as a form of an individual computer-based platform, while in-class time is replaced with interactive group learning activities and tasks to help students comprehend the key concepts of the lectures, previously studied at home (Abeysekera & Dawson, 2015; Bishop & Verleger, 2013; Datig & Ruswick, 2013; Educause, 2012). The potential for using this new teaching approach was identified in 2000, when professors Lage, Platt and Treglia used this model, which they named "inverted classroom", to teach microeconomics in Miami University.

Evaluation of the flipped model has proven that there are significant improvements in learning outcomes compared to the traditional classroom. Bishop & Verleger (2013) found that students supplied with optional video lectures came to class better prepared than those that had been given only textbook readings. Kong (2014) also found that students had shown statistically significant growth in critical thinking skills and literacy competency. Moreover, students have identified the ad-

vantages of the flipped model. In Bishop & Verleger's 2013 study, students acknowledged that although they preferred live lectures to video lectures, they preferred video lectures to textbook readings and liked more interactive class time more than in-person lectures. Students recognize the convenience and pedagogical advantages of flipped classrooms, (Pierce & Fox, 2012) and generally they seemed quite often to prefer the flipped classroom method to the traditional one (Gilboy, Heinerichs, & Pazzaglia, 2015; Lage *et al.*, 2000). In research conducted by Speak Up in 2013, almost three-quarters of K-12 students seemed to agree with the idea that a flipped class was a good way to learn (Project Tomorrow, 2014). Even students not exposed to the flipped model appeared open to the idea and identified potential benefits (Phillips & Trainor, 2014).

The flipped classroom has also shown to suit the learning needs and preferences of a range of learners. Lage, Platt, & Treglia (2000) found that it allows for students of all learning styles to use a method or methods that are best for them. He also found that the inverted classroom explicitly incorporates experiments and group work exercises for collaborative learners, while maintaining the strengths of the traditional classroom. The flipped classroom techniques allow students to study at their own will, as they are given the chance to pause, stop or rewind the video lectures (Lage, Platt, & Treglia, 2000). Thus, students can effectively manage their cognitive load to meet their own learning requirements (Abeysekera & Dawson, 2015; Enfield, 2013). As a result of this inverted methodology, teachers have the advantage of saving valuable time in class, which allows them to work more with their students on an individual level (DeRuisseau, 2013; Enfield, 2013; See & Conry, 2014).

As well as the positive elements of the flipped classroom, it should be noted that there are also some challenges that have been noted in the literature. Several authors indicate that using the flipped classroom requires a large time commitment from faculty, including recording lectures and developing both in and out of classroom activities (Educause, 2012; Phillips & Trainor, 2014). To counter this, Phillips & Trainor suggest starting small by flipping one lesson at a time and to record shorter videos. Faculty may also face some challenges learning new technology and learning a new style of teaching delivery (Educause, 2012). Some other limitations of the flipped classroom include poor quality of video lectures compared to face to face lectures, issues with technology, students not watching the videos and not having tutors available during the videos to ask questions or follow up on points (Phillips & Trainor, 2014). One specific challenge faced by library instructors in an information literacy classroom was the distribution of pre-instruction session materials to students by faculty. To counter this, they showed the students during class where the materials were located so that students who hadn't accessed the materials could find them later (Arnold-Garza, 2014). Another challenge of the flipped classroom is the switch of the responsibility of learning from the faculty to the students. Some students who are used to the rote style of learning may be uncomfortable with this more student centred style of learning and may feel unsupported by faculty. Some students may also feel that if lectures are available online, they do not need to attend the class or that there is no value of lecturers that are available online for anyone to see (Educause, 2012; Phillips & Trainor, 2014). Finally, the cost of delivering a flipped classroom may be higher than a traditional lecture, especially if the cost of technology, staff time and supplemental materials are taken into consideration (Lage *et al.*, 2000).

Flipped classes have been practiced extensively during recent years to teach a wide variety of disciplines in higher education, such as Health Care, Mathematics/ Algebra, Law and Economics. Recently, we have also seen the first attempts to use

this model in the library and information field both in information literacy classes and in the LIS classroom, although most of the literature exists surrounding information literacy instruction with limited data on using the flipped model in the LIS classroom. Datig & Ruswick (2013) illustrate how this model can be used to teach library students necessary skills, rather than through traditional librarian led demonstrations. The authors flipped the classroom, because they wanted the students to engage more with the materials. They found that students appreciated the interactive hands on approach of the classes. Arnold-Gaza (2014) describes a flipped model for library/information literacy instruction that included classes on general orientation of library collections to several sessions on more advanced research courses at a university library. Rivera (2015) also describes how he flipped the classroom in a non-credit bearing seven week library competency course. He found there was a higher increase in the pre and post test scores in the flipped classes versus the non-flipped ones. Welsh (2014) discusses a flipped classroom project for teaching cataloguing techniques in a Masters LIS program. She found that the flipped classroom model helped both beginning and more advanced cataloguers learn more rapidly. In general, the literature surrounding library instruction shows that the flipped classroom allows students to engage and learn more through interactive hands on activities and that there was a positive correlation between learning the content and using the flipped model. What the literature does not explore is how this model specifically meets the learning needs of diverse groups of learners in both the library instruction and LIS classrooms.

Method

The research question for this teaching and learning project was: Is the flipped classroom an effective teaching model for LIS students with diverse learning needs? In order to explore this research question, the method employed in this teaching and learning study was to set up a flipped classroom and then evaluate it's effectiveness as a teaching and learning method for students with diverse learning needs studying in an international LIS program. The lecturer wanted to explore how effective this model was for teaching LIS students with diverse learning needs, as well as to investigate which elements of the flipped classroom were the most effective in helping students understand the topic. The lecturer also wanted to explore if a specific style of video lectures suited the learning needs of most students in the classroom as well as the learning preferences of those students.

The video lectures were recorded using the university's lecture capture software which allowed the lecturer to link the videos to the content management system, Moodle. Using this approach it was possible to monitor how many times the videos were watched. All the videos were less than ten minutes, as the lecturer felt it was more likely that students would watch short videos over long videos. A range of videos were developed and trialed in the classroom. These included; PowerPoint presentation with teacher video in a separate window; PowerPoint presentation with voice over; voice over demonstration and teacher, and voice only. This was done in order to evaluate if students had a clear preference for a style of video, and those that had helped them to understand the topic. Research suggests that active learning increases students recall of information and video lectures allow students to be able to re-watch and rewind in order to better understand concepts. Therefore, the collection management concepts, models and processes that the lecturer felt the students needed to be able to recall and learn effectively were chosen as the topics of the video lectures.

The content of a collection management course includes many process, policy and standards materials. It was felt that a course with these materials embed-

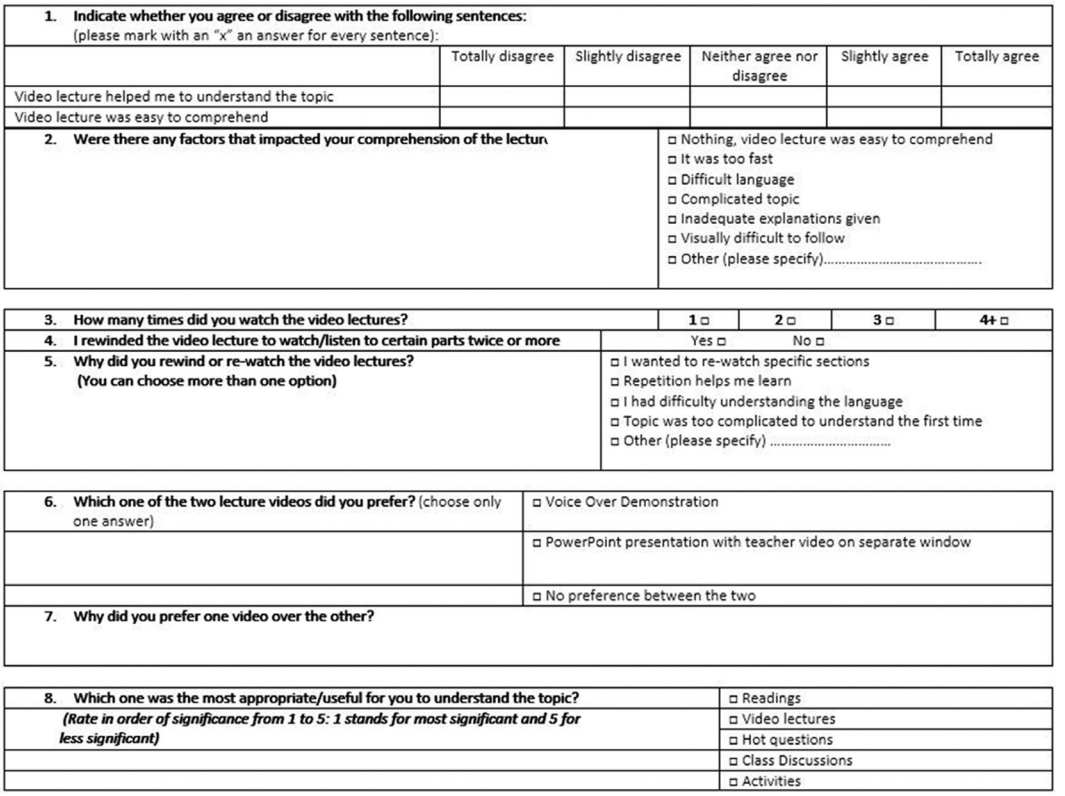
ded provided a good example to trial this teaching method. Video lecturers were recorded about metadata, collection management polices and models, acquisition systems and interlibrary loan systems. A range of interactive activities and materials were developed for the flipped classroom including: in class discussions; online discussions; readings; guest lectures; handouts; PowerPoints; practical group and individual activities; online quizzes and hot questions (asking questions before the class). These activities built on and expanded on the concepts and processes shown in the videos as well as adding additional new content through discussions and activities. Lesson plans were also developed before each class in order to see if the timing of activities and the order of activities were effective. This also helped to effectively organize the flipped classroom before the class. Figure 1 shows an example of a lesson plan.

To evaluate the effectiveness and suitability of the flipped classroom model an evaluation was conducted through a questionnaire at the end of each flipped classroom and then a final evaluation was conducted to assess the students overall experiences of the flipped classroom. Questions in the questionnaire were developed to assess a number of factors surrounding the flipped classroom including: comprehension of video lectures; appropriateness of length; preferences for different video styles and; which elements of the flipped classroom were most effective for understanding the topic. To evaluate the effectiveness of the flipped classroom model, questions were asked about the effectiveness of the video lectures and different activities in helping students understand the content as well as how easy the lectures were to comprehend. Questions were also asked in the final evaluation that were aimed at determining the overall effectiveness of this method of teaching. Specific questions in the individual evaluations and the final evaluation were asked to determine the learning preferences of students, their preference of style of video and which specific elements or activities they preferred, as well as their overall learning preferences for particular styles of teaching.

Figure 2 and Figure 3 shows an example of an evaluation of an individual flipped classroom and the final evaluation.

Lesson	Lecture Casts	Activities in class	Notes
Scholarly Communication, Data Management, Repositories	1. Metadata	Before class – watch Metadata video and read reading. Discussion about metadata based on video and reading – prompted by ten questions about metadata. (20-30min) Reading: Understanding metadata – NISO http://www.niso.org/publications/press/UnderstandingMetadata.pdf **Discussion on** Scholarly Communication, Open access and repositories based on PowerPoint (30min) **Activity – Open Access Options** (30min) Discussion of pro's and con's of open access based on role play with academic or researcher. Resources: • Video - https://www.youtube.com/watch?v=L5rVH1KGBCY • A brief guide to the open access rainbow http://www.sherpa.ac.uk/documents/sherpaplusdocs/Nottingham-colour-guide.pdf • Benefits of Open Access http://sparceurope.org/open-access/benefits-of-open-access/ **Activity: Metrics** (40minutes) Three tasks based on Journal Citation Reports, Science Citation Index and Google Scholar	Lecture Cast Metadata – voice and PowerPoint Length: 7min PowerPoint PowerPoint: Scholarly Communication, Open access and repositories PowerPoint: Metrics

Figure 1. Flipped classroom lesson plan.



1. **Indicate whether you agree or disagree with the following sentences:** (please mark with an "x" an answer for every sentence):					
	Totally disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Totally agree
Video lecture helped me to understand the topic					
Video lecture was easy to comprehend					

2. **Were there any factors that impacted your comprehension of the lectur**	◻ Nothing, video lecture was easy to comprehend ◻ It was too fast ◻ Difficult language ◻ Complicated topic ◻ Inadequate explanations given ◻ Visually difficult to follow ◻ Other (please specify).....

3. **How many times did you watch the video lectures?**	1 ◻	2 ◻	3 ◻	4+ ◻
4. **I rewinded the video lecture to watch/listen to certain parts twice or more**	Yes ◻	No ◻		
5. **Why did you rewind or re-watch the video lectures? (You can choose more than one option)**	◻ I wanted to re-watch specific sections ◻ Repetition helps me learn ◻ I had difficulty understanding the language ◻ Topic was too complicated to understand the first time ◻ Other (please specify)			

6. **Which one of the two lecture videos did you prefer?** (choose only one answer)	◻ Voice Over Demonstration
	◻ PowerPoint presentation with teacher video on separate window
	◻ No preference between the two
7. **Why did you prefer one video over the other?**	

8. **Which one was the most appropriate/useful for you to understand the topic?** ***(Rate in order of significance from 1 to 5: 1 stands for most significant and 5 for less significant)***	◻ Readings
	◻ Video lectures
	◻ Hot questions
	◻ Class Discussions
	◻ Activities

Figure 2. Evaluation of flipped classroom.

Overall five three hour lectures were flipped using the flipped classroom model with four classes being individually evaluated. A final evaluation was conducted at the end of the course. (Some individual lectures were not flipped due to logistics such as introductory lecture explaining the concept, oral presentations and library visits, however overall the collection management course was taught using this teaching method). Ten of the thirteen students (77%) in the class completed the final evaluation of the flipped classroom experience. The number of students filling in the evaluation of individual lectures was dependent on the number of students who were in attendance at each lecture and whether they answered each question. The lecturer also made some observations of the effectiveness of the flipped classroom model and specific elements of the class based on anecdotal feedback given by the students.

Results

Video Lectures

The following tables show the feedback received from the four individual lectures that were evaluated.

Most students watched the video only once, however around half admit to rewinding to watch certain parts of the videos. Students commented that they rewinded or re-watched the video lectures because: repetition helps them learn; to rewatch specific sections and because they were "keeping notes" while watching.

In the final evaluation of which there was a 77% response rate (10 out of thirteen students), 90% of the students totally agreed that the video lectures were easy to comprehend with all students agreeing that the video lectures helped them to better understand the topics presented in the videos. Students commented that it helped

1. Indicate whether you agree or disagree with the following sentences:
(Please mark with an "x" an answer for every sentence):

	Totally disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Totally agree
Video lectures helped me to understand better the topics of this course					
Video lectures were easy to comprehend					
I prefer video lectures to live lectures					
I prefer video lectures to readings					
I prefer interactive in-class activities and discussions to in-person lectures					
Video lectures decreased my studying time					

2. Please rate your preference for the style of video lecture that best helped you to learn about a topic (Please rate 1 as your highest preference with 4 as your least preferred video style)	☐ Demonstration with voice only ☐ Demonstration with teacher face ☐ Video with PowerPoint and voice ☐ Video with PowerPoint and face
For your number 1 preference, why do you prefer that style for the video lecture?	
For the least preferred style (number 4), why did you not prefer this style of video	

3. What do you feel is an appropriate length for a video lecture in order for you to understand a topic? (Please tick 1 option)	☐ Under 5 minutes ☐ 5-10minutes ☐ 10-20minutes ☐ Over 20minutes
Why do you prefer that length for a video lecture or demonstration?	

4. What factors may be responsible for you not watching the video lectures during the semester?	☐ Technical reasons ☐ Didn't have time ☐ I don't like video lectures ☐ Other (please specify)

5. What is your preference when it comes to the use of readings?	☐ Read before class to help understand the topic before coming to class ☐ Reading in class in conjunction with an activity ☐ Reading assigned readings after class to help clarify what I learnt in class ☐ Other (please specify)

6. Please give any further comments here on what you liked or didn't like about the video lectures and accompanying activities or any suggestions you have for future videos and activity

Figure 3. Final evaluation.

them to understand what they were going to learn in the next class; allowed them to pause, look up terms, understand them and then continue on with the lecture without missing information and; helped to summarize the contents of the readings. 80% of the students believed that the appropriate length of video lectures should be between five and ten minutes. Students thought this was an appropriate length because it was: a reasonable time; enough to make the topic interesting; not too long to get bored and an appropriate time not to lose focus. The majority of students (60%) also identified that their studying time was decreased due to having the video lectures.

In terms of video style there was no clear preference between video styles,

although the highest preference was for video with PowerPoint and voice. When students preferred voice only they commented that the teacher's face was a distraction and that voice only helped them to concentrate. When students preferred videos with the teacher's face they commented that: the teacher's face makes the video lecture more alive/natural/interactive; students didn't feel lost looking just at a video; that having just a PowerPoint with voice can read rather than watched; demonstrations with the teacher's face oriented them better than a voice; and it felt more like a classroom environment and not just a disembodied voice on a video. This shows that students have different preferences for learning and one style of video will not necessarily suit every student's preferences. Students also liked the voice over demonstrations as they showed students something practical and a helpful way to find information and allowed them to understand the points more easily by following steps. The following figure shows the students preferences for video styles that best helped them learn about the topic.

Learning Preferences

Students seem not to have a clear preference between video lectures and live lectures with a 50/50 split between their preferences for video or live lectures in the final evaluation of the flipped classroom model. However, they seemed to prefer video lectures to readings with 60% agreeing that they prefer video lectures to readings with 20% neither agreeing or disagreeing and 20% preferring readings to video lectures. In terms of completing readings before, during or after class, 54% of the students identified the benefit of doing readings before the class, with 30% seeing the benefit of doing readings in class in conjunction with an activity. Only 15% saw the benefit of reading assigned readings after class in order to help them clarify what they had learnt in class. In the final evaluation 80% of the students stated that they preferred interactive in class activities and discussions to in person lectures with 20% neither agreeing or disagreeing that this was their preference. These findings are similar to Bishop & Verleger's 2013 study where students also

Table 1. Video Lecture Easy to Comprehend.

	Totally Agree	Slightly Agree
Lecture 1 (11 responses)	73%	27%
Lecture 2 (10 responses)	80%	20%
Lecture 3 (11 responses)	82%	18%
Lecture 4 (11 responses)	90%	10%

Table 2. Video Lecture Helped Me to Understand the Topic.

	Totally Agree	Slightly Agree	Neither Agree nor Disagree
Lecture 1 (11 responses)	82%	18%	
Lecture 2 (9 responses)	67%	22%	11%
Lecture 3 (11 responses)	73%	27%	
Lecture 4 (11 responses)	82%	18%	

Table 3. Watching/re-watching the Videos.

	Watched Once	Watched Twice	Re-winded to Watch Certain Parts
Lecture 1 (11 responses)	55%	45%	55%
Lecture 2 (10 responses)	70%	30%	60%
Lecture 3 (11 responses)	91%	9%	55%
Lecture 4 (11 responses)	91%	9%	37%

preferred video lectures to textbook readings and liked more interactive class time than an in-person lecture.

After each class students were also asked which elements of the flipped classroom were the most appropriate/useful for them to understand the topic. Video lectures and in-class discussions were the most popular/useful elements of the flipped class with online quizzes and pre class questions (hot questions) proving to be the least useful elements. The following figure shows the significance the students placed on each element of the flipped classroom.

A few of the activities proved not to be popular. In-class quizzes to test students understanding were not popular, even though they were not marked. Hot Questions also didn't seem to work as only one student came to class prepared with a question about the video. In response to this, a more informal way of using questions was undertaken in order to assess if students had watched the videos and understood the topic. The questions were asked in an informal class discussion. This approach was received more positively by the students.

Overall the flipped classroom was a success, with mostly positive feedback from the students with students stating that; "The idea of implementing the flipped classroom was helpful", that "It should be applied in other courses" with one student stating that "I liked the idea of watching videos, being told to read something mentioned in the video, coming to class and then doing activities based on the readings". This style of teaching also suited a diverse range of students learning preferences, as a variety of different videos and activities were used in the classroom, meeting the different learning needs of the group. The students' preference for interactive activities such as in class discussions and practical activities shows that students like the more interactive or collaborative elements of the class.

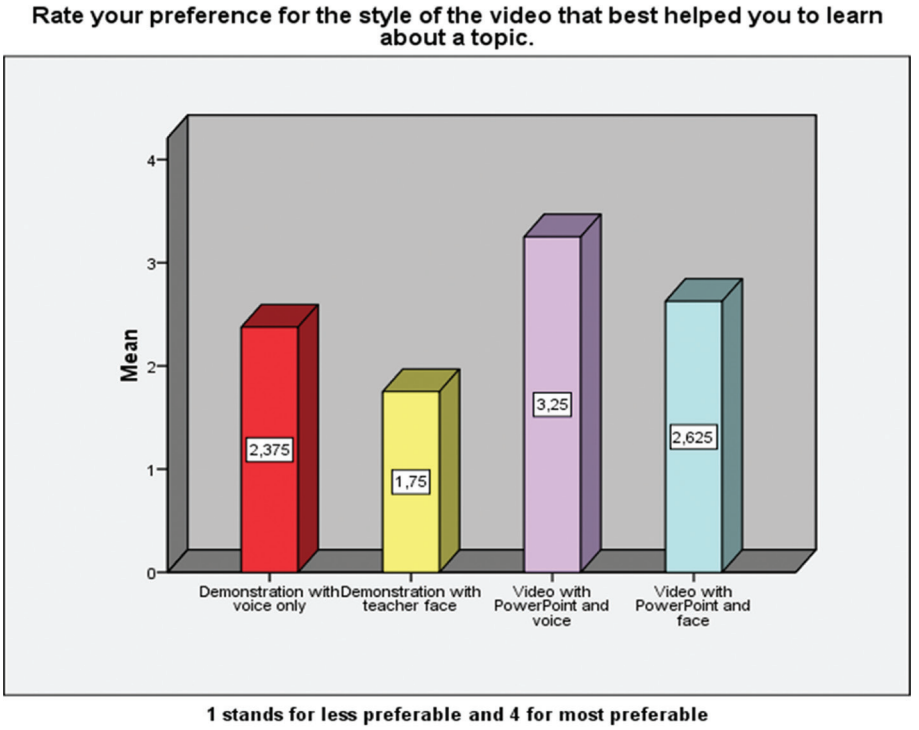


Figure 4. Preferred video style.

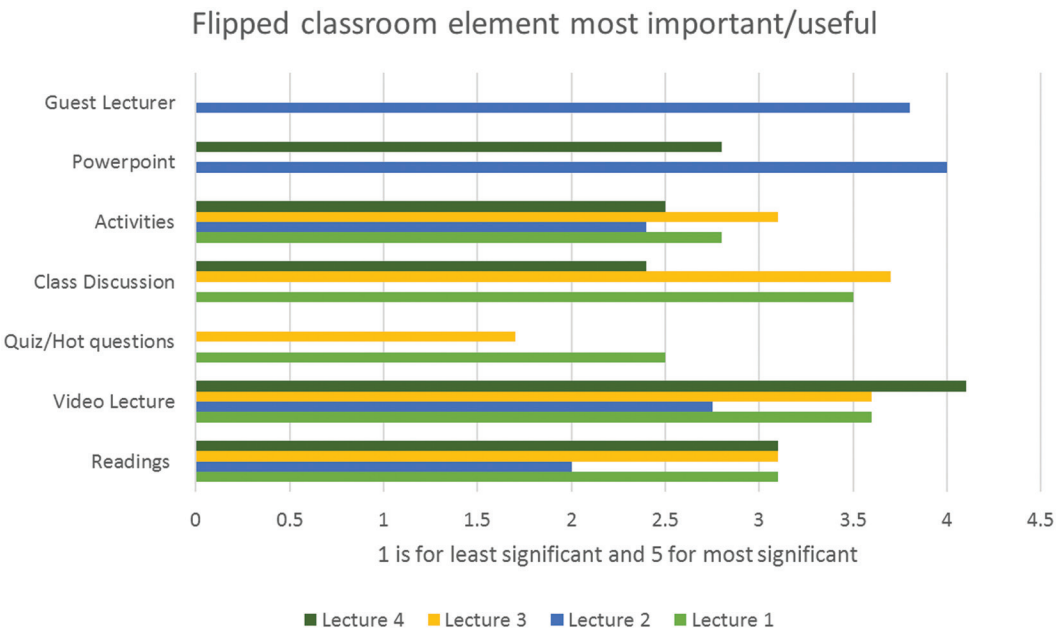


Figure 5. Learning preferences—Flipped classroom.

Discussion

The aim of this project was to investigate if the flipped classroom was an effective model for learning content in the LIS classroom, as well as investigating whether the flipped classroom could meet a number of diverse learning needs. Educause (2012) has noted that lectures that can be viewed more than once may help those students who speak English as a second language and being able to re-watch and re-wind videos puts control of the learning in the students hands. This study found that having video lectures to watch suited the learning needs of the ESL LIS students. This style of teaching suits ESL students as the videos accommodate students who may face challenges understanding or remembering details from lectures and allows them to re-watch as their own pace. This has implications for LIS faculty teaching international students, as this method has proven in this case to be an effective way to teach ESL learners, therefore faculty working with ESL students could employ this as a teaching method. Recording short videos that can be viewed and re-watched at the students own pace, also allowed students to employ a range of learning strategies, such as using repetition to learn and taking notes. As no particular video style was greatly preferred over another, this shows that students have a diverse range of preferences for learning from visual medium. Therefore it's important to note that LIS faculty would need to develop a range of videos in order to meet those diverse learning needs.

One main implication of this study is that the findings support that this model of teaching meets the diverse range of learning needs of students in a LIS classroom. This supports Lage *et al.*'s (2000) theory that the flipped classroom allows for students to use the learning method that is best for them. This is significant as previous LIS and library instruction studies have shown how students effectively learn content, but have not explored how different elements of the flipped classroom suit different types of learners in the LIS classroom. This study not only showed that students felt that the flipped style of teaching helped them to understand the topic, but that different elements of the

flipped classroom suit different students learning styles preferences and also allows them to take control of their learning. If the flipped classroom is used in the LIS classroom, dependent learners can learn through instruction led activities and readings, collaborative learners through group activities, independent learners through watching videos at their own pace, visual learners can learn through watching various video styles and auditory learners can learn through listening to videos and participating in in class discussions. This style of teaching allows LIS faculty to meet the needs of a variety of students learning styles.

This study also showed that faculty need to develop a number of classroom elements to meet the needs of diverse learners and that each flipped classroom should not be developed following an exact formula, but rather developed with different learning styles in mind. Therefore, different activities, styles of videos and discussions should be developed in order to maximize the learning experience for all the students. Development of materials for each individual flipped class should also take into account student feedback and faculty observations from each class, so that different elements of the flipped classroom can be changed accordingly based on this feedback. Developing such a wide range of teaching elements, however presents LIS faculty with challenges such as the time investment needed to create a diverse range of activities and videos. In this project a large time investment was required in terms of recording videos and creating interactive activities that fill a three hour lecture/tutorial. As noted by Phillips & Trainor (2014), a good solution for this is to start small and develop one class and also to record shorter videos. In this project the strategy of developing shorter videos not only worked for the lecturer in terms of time commitment, but was also a good strategy for engaging the students by delivering important content in short to the point videos. To counter any future large time investments, the contents of the videos were recorded as much as possible without reference to specific time periods or events that may require the video to be re-recorded. The idea then is to re-use the videos in future classes.

As Educause (2012) notes, there are some technological challenges involved if a lecturer wants to undertake a flipped classroom. Academics need to not only learn to use the available software at their institution, but also deal with technological problems. In this project, the software platform seemed problematic to some students as they faced some difficulties in accessing videos. This was mostly due to the need to use of a VPN to access the videos on university computer stations. Some students also indicated they had difficulties in understanding new terms and minor sound problems. Another challenge was getting the students to watch the videos. In response to technological challenges and students stating they didn't have time to watch the videos, some video lectures were shown in class and different methods were employed to encourage students to watch the videos, e.g. informal and formal quizzes. As seen from the results, once students did watch the videos they saw the benefits of the videos for learning content, reducing study time and the benefit of having a video that they could re watch or take notes from. Therefore, in order to promote the best learning opportunity for students, academics need to come up with methods to encourage and motivate students to watch the videos. Another challenge often stated in the literature is that students may have problems with the shift of the responsibility of learning from the teacher to the student in a flipped environment. However, students in this LIS Masters course did not seem to have an issue with this, in fact the opposite, as they indicated they preferred interactive activities over teacher led lectures. This implies that the more student led style of teaching works well in Masters or postgraduate environments. As many LIS programs are postgraduate programs,

this would seem to imply that this model would work well in many LIS classrooms. This study has several limitations, including the size of the sample. There are also a lack of results to determine if grades were improved based on using this method, and the project was limited to a specific postgraduate class. However, as there is limited literature or evidence of the effectiveness of this teaching model in delivering LIS content to students with diverse learning needs, this study provide valuable evidence of the flipped teaching models' effectiveness for teaching LIS students and insight into the learning preferences of a specific group of LIS students. It is therefore recommended that other LIS faculty employ the flipped model in their teaching and report on its effectiveness in other LIS class environments.

Conclusion

Delivering a collection management course using the flipped classroom model proved to be a successful teaching and learning project, with LIS students being overwhelming positive about the learning experience. The results have showed that the flipped classroom model was effective in helping LIS students understand content, specifically collection management content in this case, and that they liked this style of teaching due to it's interactive student centred approach. This approach to teaching is an effective and efficient way to teach LIS content, especially in diverse classroom environments where students have a range of learning preferences. It also allows the lecturer to learn and use a range of teaching and learning methods and tools. The flipped classroom works well in a postgraduate environment were students are expected to be more independent and use critical thinking skills and in a teaching environment where there are students who speak English as a second language, as it gave them opportunities to re-watch materials and work at their own pace. This study has shown that the flipped classroom is not only effective in delivering content, but that developing a diverse range of videos and activities for the classroom, can allow lecturers to meet the needs a diverse range of students learning needs. Teaching using this approach comes with many challenges for an LIS educator, including time investment, technical difficulties and motivating students to watch the videos, however the rewards far outweigh these challenges, as students learn content more effectively plus enjoy learning and interacting in this multifaceted learning environment that suits a variety of learning needs. This study is significant to the LIS field as it provides evidence that teaching using the flipped classroom model is an effective model for teaching LIS students with diverse learning styles and needs.

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