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Sage or guide? Student perceptions of the role of the instructor in a flipped classroom

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Abstract

Higher education has begun to shift from a teacher-centred instructional approach to a student-centred learning approach; many instructors have embraced this change by developing flipped classrooms. In the flipped classroom, students complete pre-work prior to attending class; this pre-work is often in the form of a video recording, lecture recording or reading. Class time is then repurposed to focus on knowledge application and synthesis rather than delivery. As such, it is suggested that instructors become less sage- and more guide-like in their teaching approach. The impact of the flipped classroom has been mostly positive in research; however, it is unclear whether students actually note and/or value the change in the role of the instructor in the flipped classroom. This study sought to evaluate the perception of the ideal instructor according to students following their experience in a flipped classroom course. Data were collected on students' perceptions of the instructor prior to, during, and following a flipped classroom experience. Overall, students valued the instructor's role as a moderator rather than information-deliverer; however, the most important aspect of the flipped classroom, according to the students in this study, was the ability of the flipped classroom to foster greater interaction and learning between students.

Keywords

active learning, flipped classroom, guide, instructor, peer interaction

An overview of the flipped classroom

The concepts of flipped classrooms and blended learning have overtaken higher education. The flipped classroom is where the emphasis of in-class instruction changes. In traditional classrooms, class time often uses a lecture format and is more focused on imparting knowledge. The flipped

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classroom may provide more opportunities to focus on knowledge application, analysis and evaluation, higher orders of thinking according to the updated Bloom's Taxonomy (Bishop and Verleger, 2013; Krathwohl, 2002; Tucker, 2014). A blended classroom is one in which face-to-face teaching is integrated with an asynchronous online learning experience; the purposeful integration of both components is essential (Garrison and Kanuka, 2004). The flipped classroom does not require blended learning, but many flipped classrooms use a blended approach because offering pre-activities online makes them more accessible. In the flipped classroom, the student spends their time outside of class learning the base knowledge (e.g. through assigned readings, videos or online modules) and in-class time on collaborative and problem-based learning (Bergmann and Sams, 2012; Bull et al., 2012; Chen et al., 2014; Hamdan et al., 2013; Jamaludin and Osman, 2014; Kurtz et al., 2014; Milman, 2012; Roehl et al., 2013; Strayer, 2012; Westerman, 2014). While it is true that in both the flipped and non-flipped versions of instruction there is 'lecture time' and 'homework/application time', students benefit from a repurposing of class time (Horn, 2013). The flipped classroom is rooted in the constructivist theory of learning; students are not passive vessels for receiving information, rather, they must construct and reconstruct knowledge by rectifying it with what they already know (Gilboy et al., 2015). In the flipped classroom, teaching strategies during class time, such as group work, are used to support students' learning.

One could argue that the flipped classroom creates the students' learning environment by focusing on relationships (between students, between students and teachers) and the interplay between teaching and learning (Abualrub et al., 2013). As a student-centred approach, the focus in the classroom should be on monitoring student perceptions and activity, rather than on the teacher's instructional methods (Prosser and Trigwell, 2014). However, students in higher education do not see a teacher-centred and student-centred approach being at odds with one another, but rather, view the environment as a transaction in which teachers and students are jointly responsible for learning (Elen et al., 2007). Indeed, the flipped classroom requires students to actively participate by completing the 'lecture' component outside of scheduled class time. Many implementations of the flipped classroom, use a blended approach, with the 'lecture' component delivered via video recordings created by the instructor (see review by O'Flaherty and Phillips, 2015). The student experience in any environment is contingent on a number of factors, including their deep versus surface approach to learning as well as, when it comes to blended learning, their engagement with the technology and the perceived workload of the course (Ellis, 2016). A student's approach to learning is further dependent on a number of factors, including the context of the course (such as class/group characteristics), assessments and student factors such as personality and coping strategies (Baeten et al., 2010). Work from Heijstra and Sigurðardóttir (2018) showed that students in a blended environment vary greatly in their pre-work habits, with some students not viewing the recordings at all, and others viewing the recordings multiple times. The pre-work had benefits as students who viewed the recordings had higher grades in the course than those who did not (Heijstra and Sigurðardóttir, 2018).

While pre-work is important, the focus of the flipped classroom is to allocate more time during the class for activities such as debate, discussion, case studies and problem solving. The flipped classroom model has been widely studied in terms of assessing students' performance. The impact of the flipped classroom on student performance has varied in the literature and primarily addresses millennial learners. Millennials, comprising the majority of students in higher education at the time of the study presented in this article, are defined by being born between 1980 and 1994 (Twenge, 2017) and having some common characteristics such as being digital natives, being confident and being team-oriented in the workplace (Monaco and Martin, 2007). The ability of millennial students to consistently use technology appropriately for education, however, is not supported by evidence (Bullen et al., 2011).

Some studies show that the flipped classroom model increases students' academic performance (Pierce and Fox, 2012; Tune et al., 2013), others show it does not impact student performance (Arnott and Planey, 2017), while still other studies suggest that the flipped classroom approach benefits students' ability to solve novel problems but not their ability to recall knowledge (White et al., 2017). Obviously, different implementations and interpretations of this pedagogical method can have direct effects on its efficacy. The flipped classroom has generally been associated with gains in student performance, but this can be context-dependent. A study by Folnes (2016) evaluated the implementation of a flipped classroom in two different circumstances: one in which students progressed through the flipped course at their own pace and the other in which students organized cooperative learning activities. Folnes (2016) found that only students in the cooperative learning group had any academic performance gains (marks on a final examination), suggesting that peer interaction is a key component of an effective flipped classroom. While most studies focus on student grades (performance) rather than on their learning, the flipped classroom has been shown to support learning (McLean et al., 2016). Although the range of learning gains varies with the flipped classroom, the majority of students view this approach in a positive light (O'Flaherty and Phillips, 2015). Evidence of student preference for the flipped classroom is fairly consistent across disciplines (Butt, 2014; Elliott, 2014; McLaughlin et al., 2014; Phillips and Trainor, 2014). However, research by Ebbeler (2013) described an experience of encountering student 'disorientation' in response to the flipped classroom and suggested that for a flipped classroom to be successful, one has to provide significant structure. However, simply providing structure may also be insufficient. In an article from Burke and Fedorek (2017), three sections of the same course were taught using three different approaches: a traditional lecture-based approach, a fully online version and a flipped classroom. The authors found that students enrolled in the flipped version reported *lower* levels of student engagement and satisfaction; this is in contrast to the majority of the flipped classroom literature. While the flipped classroom model is touted as being superior to other learning styles for millennial learners (O'Flaherty and Phillips, 2015), one must be purposeful when designing flipped classroom courses and keep in mind the needs of the students.

As such, there has been a movement to transition the role of the instructor in higher education from 'the sage on the stage' to the 'guide on the side', and to encourage faculty to embrace techniques in their teaching that are underpinned by the constructivist view of knowledge and therefore reflected in the design of activities used (King, 1993). The flipped classroom promotes social interaction and cooperation so students can negotiate their knowledge and understanding with their peers – they can constantly monitor their learning and challenge misconceptions as they arise (Gibbs, 1994).

Some concerns from faculty include the amount of time and effort required to engage learners in this way in the classroom, student resistance and a lack of recognition for using innovative teaching methods (Michael, 2007; Miller and Metz, 2014). Simonson (2017) created a decision matrix to guide instructors who are considering a flipped approach. A mixed-methods study from Kim et al. (2014) illustrated that students appreciate the student-centred approach in a flipped classroom, but still place a great deal of importance on teaching presence. Research has not yet addressed how a change in the instructor's role is perceived by students in the flipped classroom. Work by Bati et al. (2013) in health education found that the majority of their students were comfortable with a lecture style of instruction, but felt that overcrowding in lecture halls hindered their learning. It is obvious that some questions remain unanswered with flipped classroom research. Do students want to engage in activities that are more associated with those used in the flipped classroom or do they prefer the style of teaching more commonly associated with the lecture? How important is the opportunity to interact with peers in the flipped classroom? Do students view the instructor as their most important partner in learning, or do students prefer to learn from peers?

There is a need to find out whether students perceive a change in the role of the instructor in a flipped classroom, compared to a traditional lecture-style class, and whether this affects learner preferences and student engagement.

Based on the current popularity of the flipped classroom, it is tempting to suggest that all faculty adopt the approach. However, there is a need to uncover the student perspective on the role of the instructor/lecturer in a course, and whether this aligns with what is reported in the flipped classroom. The study described here was designed to answer the following questions:

1. Do students perceive a change in the role of the instructor/lecturer in the flipped classroom compared to their traditional lecture-style courses?
2. If there is a change in the students' perceived role of the instructor/lecturer in the flipped classroom, how does it affect the learning environment of in-class sessions?

Materials and methods

Course design

Medical Sciences 4200 is a blended and flipped elective course for non-thesis honours medical sciences undergraduate students at a large, research-intensive university in Canada (McLean et al., 2016). Prior to attending face-to-face classes, students complete interactive, self-paced online learning modules that are available on the learning management system (LMS). These modules were created by the instructor using Adobe Captivate software (Adobe Systems, San Jose, USA) and are approximately 50 slides in length with a play time of 1 hour. In preparation for class, students complete formative pre-quizzes, then an online summative quiz, both of which are available on the LMS prior to class.

The Medical Sciences 4200 classes take place once weekly for 2 hours. Each class section is small (fewer than 40 students). In-class time is focused on discussion of online learning modules, analysis of case studies, literature critiques and debates. Students work in groups or pairs for the majority of the learning activities in the classroom. No new information is presented during the class sessions; rather, these sessions serve to apply the online learning module content. Students are assessed through a variety of means in this course, including a capstone project, independent written assignments, examinations, quizzes and oral presentations (Figure 1).

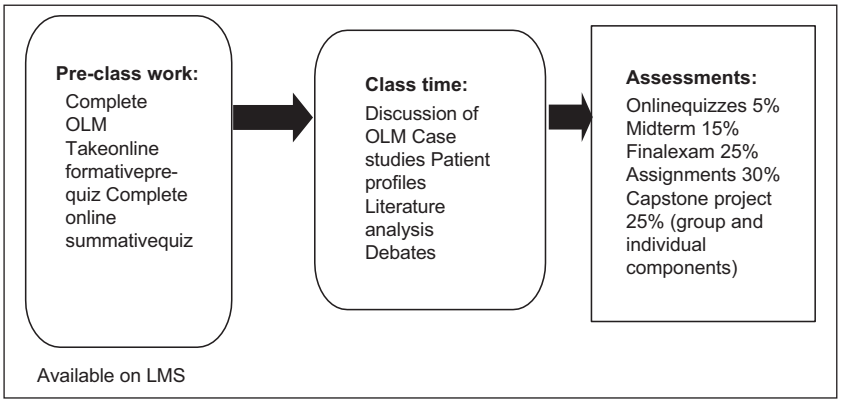

Figure 1. Course design and assessments in Medical Sciences 4200.
OLM, online module; LMS, learning management system.

Study design

This research was approved by the Office of Research Ethics at Western University, London, Ontario, Canada (HSREB#104196). Participants were students enrolled in Medical Sciences 4200 during the fall or winter terms of 2013–2014 who provided written consent.

Students were informed on the first day of class (via a letter of information) that they would have the option to provide feedback to the instructor on this new course design by completing surveys throughout the term. Participants completed three paper surveys regarding their perception of the instructor's role in the class; one survey on the first day of class, one survey before the mid-term and one survey on the final day of class. The surveys collected both qualitative (open-ended student comments) and quantitative data (Likert-style questions). The question prompts for the qualitative data can be seen in Table 1.

Table 1. Questions from surveys for short answer responses.

Survey	Question
First day of class	Students were first prompted to reflect on their favourite lecture-based class that was completed in the previous academic year, and then were given the following question to answer: 'Reflecting on your lecture-based course, briefly describe your perception of the role of the instructor in a course. (point-form is okay)'.
Midterm survey	'Having experienced a number of in-class sessions, do you think that Dr McLean's role in class is that of a moderator or a provider of information. Why?'
	'Do you think the role of the instructor in this course differs compared to the role of the instructor in a lecture-based course?'
Final day of class	'Given your experiences in Medical Sciences 4200 and in your lecture courses, what do you think is ideally the role of the instructor in a class?'
	'What is your favourite aspect of this course?'

All sections of the course were subjected to the same study. On the final day of class, students were debriefed and informed that the surveys would be used in a study on the flipped classroom. At this time, students were offered a new letter of information that fully debriefed the study and gave the option to consent to the study. All the students in the course consented to participate in the study, comprising a total of 54 participants (24 men and 30 women). De-identified surveys were analysed only following the submission of the final course grades.

Data analysis

The qualitative student responses from the three surveys were analysed using coding followed by thematic analysis. Short-answer questions were analysed using an inductive coding process consistent with content analysis. Coding is a systematic approach to analysing textual data in qualitative studies and can be used as a means of quantifying qualitative data. Codes are tags that are used to ascribe meaning to textual data such as words, paragraphs or sentences (Basit, 2003). Student responses were coded focusing on the semantic meaning of the responses (Braun and Clarke, 2006). Codes were applied using Atlas TI version 7.0 software (ATLAS.ti Scientific Software Development GmbH Berlin, Germany). SM assigned codes to various aspects of the text responses in the survey and created a codebook. Attribute codes (Saldaña, 2016) were used to denote simple dichotomous answers (e.g. yes or no codes). Descriptive codes (Saldaña, 2016) summarized the basic topic of a passage, such as a short phrase (example code: helping).

Similar to the approach by Billings-Gagliardi and Mazor (2007), if one student's response included multiple themes, each was counted. One of the authors was the primary coder and the other used the codebook to independently apply codes to the text. Interrater reliability was assessed through the calculation of Fleiss' (1981) kappa using the Coding Analysis Toolkit (Lu and Shulman, 2008). The overall Fleiss' kappa score for all codes was 0.84, suggesting strong agreement between the researchers and a reliable codebook. Individual codes with Fleiss' kappa values under 0.8 were excluded as findings. The multiple-choice questions were simply tallied and reported in graph format.

Results

First day of class survey: ideal role and interaction with instructor

The codes and themes from the first day survey can be seen in Table 2.

Table 2. What is the ideal role of the instructor? First day versus final day.

Theme	Code	First day n	First day %	Final day n	Final day %
Role of instructor	Give information – if student mentions instructor giving course content, explaining concepts, lecturing or providing material	24	36	18	29
	Provide help – if student mentions instructor answering questions or providing guidance or clarification	14	21	16	26
	Provide and mark assessments – if student mentions that the role of the instructor is to mark students timely and/or make fair assessments or promote students 'doing well in the course'	6	9	4	7
Qualities of instructor	Organized – a quality of the instructor – if the student mentions that the instructor should have well-organized objectives and/or clearly explain expectations for the course	11	16	4	7
	Discourages interaction – a quality of the instructor – if the student mentions that the instructor is disengaged and/or unavailable	4	6	0	0
	Encourages interaction – a quality of the instructor – if the student mentions that the instructor is approachable and/or promotes discussion or active learning	0	0	15	24
	Engaging a quality of the instructor – if student mentions that instructor should be passionate, knowledgeable, engaging, etc.	8	12	4	7
Total		67	100	61	100

Participants had not been exposed previously to a flipped classroom. Students' responses on the first day of class focused on characteristics and behaviours of the instructor. For example, the most common response for the role of the instructor was to give information. This code was applied if the student mentioned the instructor giving course content, explaining concepts, lecturing or providing material. For example, one student stated that the role of the instructor is to 'present the information in a way that was as entertaining as possible'. The next most common

role of the instructor was 'providing help'. This code was applied if the student mentioned the instructor answering questions or providing guidance or clarification. Without prompting, some students commented negatively about the role of the instructor in a lecture-based course. For example, one student commented, 'the instructor is typically a presenter of information; information that is not up for debate'. The majority of these negative comments were directed towards an instructor's perceived unwillingness to engage with students; as such, when coding data, the negative code 'discourages interaction' was created to capture the sentiments of these students.

On the first day survey, students were also asked to reflect on their favourite lecture-based course and recall how much interaction they had with the instructor (Figure 2(a)). Nearly one third of students (31%) indicated that they had no interaction with their instructor, whereas nearly half of students (48%) responded that they had 'little' interaction with their instructor (Figure 2(a)) such that they asked the instructor a question or two following class. Finally, approximately 20% of students stated that they had 'some' or 'lots' of interaction with the instructor (Figure 2(a)), meaning that they asked questions in the classroom or visited the instructor during office hours. Students were finally asked to indicate how much interaction they would ideally like to have with an instructor by completing a multiple-choice question on their preference for having 'none, some, or lots' of interaction with instructor. Only one student replied that they were happy to learn on their own and would be happy with no interaction from their instructor (Figure 2(b)). Conversely, the majority of students (65%) responsed that they would like to have lots of interaction with their instructor and would like the instructor to 'help guide my learning, be available for questions, and be more involved in the class' (Figure 2(b)).

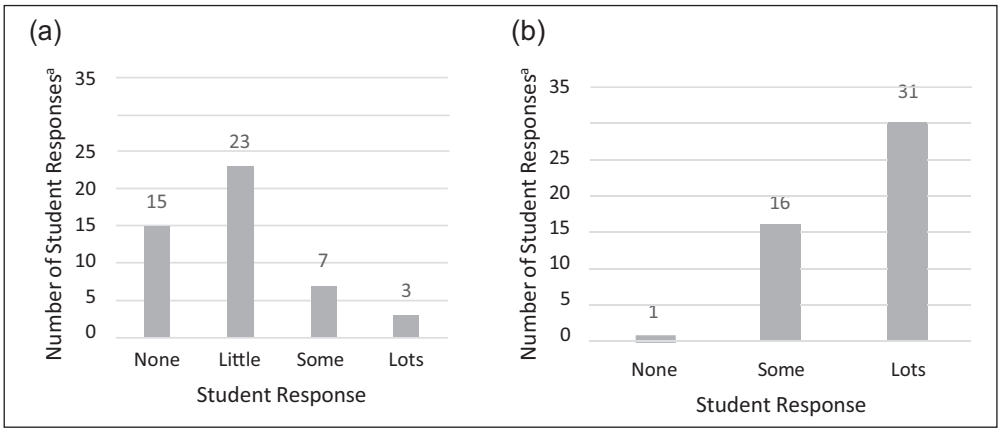

Figure 2. Students were asked to reflect on (a) how much time they spent interacting with the instructor in their favourite lecture-based course and (b) how much time they would ideally like to spend with an instructor.

For (a), students were asked, 'Reflecting on your lecture-based course, how much interaction did you typically have with the instructor?' Possible choices were none – I never spoke with the instructor; little – I asked the instructor a question (or two) following class; some – I asked the instructor questions during and after class; lots – I asked the instructor questions during class and also visited the instructor during office hours.

For (b), students were asked, 'Given the opportunity how much interaction would you ideally like to have with a course instructor?' Possible choices were none – I am happy to learn on my own; some – I would like the opportunity to ask the instructor questions and ask for clarification; lots – I would like the opportunity to have the instructor help guide my learning, be available for questions and be more involved in the class.

[a]n = 54.

Midterm survey: the role of the instructor changes in a flipped classroom

Having experienced six in-class sessions by the midterm, students were asked to reflect on role of the instructor in Medical Sciences 4200 compared to lecture-based courses on the midterm survey. Specifically, they were asked whether the instructor's role in 4200 differed from that of an instructor in a lecture-based course.

Many students agreed that the role differs and stated that the two greatest roles of the instructor in Medical Sciences 4200 were to encourage application and encourage interaction (Table 3). When asked whether the instructor's role differs in 4200, one student stated, 'Yes. The instructor's goal here is more of a guided coach. Teaching us the basics and then making us expand on that and broadening what we've learned'.

Table 3. Student responses to whether the role of the instructor differs.

Theme	Code	n	%
Role differs?	Yes – student writes 'yes' or agrees with the statement (yeah …)	36	37
	No – student disagrees, writes no or gives a 'soft' no (i.e. 'not really')	7	7
Contributions of students	Student independent learning – if the student mentions that students need to be prepared, work more independently and/or put in more 'effort'	6	7
Role of instructor	Instructor more work – if the student mentions that the instructor has to prepare more or do more work for this style of class	9	9
	Encourages application – if the student mentions that the instructor focuses more on application of knowledge, critical thinking or problem solving	16	16
	Encourages interaction – if the student mentions that the instructor is approachable and/or promotes discussion/interaction or active learning	23	24
Total		97	100

Unprompted, some students commented on the contributions of students to the course. Their responses indicated they felt that students were responsible for more independent learning in 4200 (Table 3). Some students also suggested that there was more work for the instructor in 4200, compared to a lecture-based course. As noted by one student, 'The instructor has to be more engaged, more energetic and prepare more for classes (which she does!), than a lecturer'.

Students were then prompted to expand on this idea, by describing whether they thought the instructor's role was more of a moderator or provider of information. Many more students (31% vs 3%), thought that the role of the instructor in this course was as a moderator rather than a provider of information (Table 4).

Table 4. Is the instructor/teacher more of a moderator or provider of information?

Theme	Code	n	%
Role of instructor	Provider of information – if student mentions that instructor is a provider of information	2	3
	Moderator – if student mentions that instructor is a moderator	21	31
	Both provider and moderator – if student thinks that instructor has both roles but does not distinguish between online and in-class environment	13	20
Contributions of students	Peer discussion – if student mentions the role the student(s) play in the class in discussing, collaborating, participating, being prepared, etc.	21	31
	Deep learning – if student mentions that the instructor facilitates application, making connections, applying content, some metacognition	10	15
Total		67	100

Other students commented that the instructor in this course incorporated both roles, and distinguished between the role of the instructor in the online environment (provider of information) and the role of the instructor in-class (moderator) (Table 4). Unprompted, many students also commented on the increased importance placed upon the students in this course format. Thirty-one percent of responses noted the role of peer discussion in the class, and many students also suggested that students contribute to deep learning in the class through participation (Table 4). As noted by one student, 'Although she is both, I would say largely a moderator since she asks questions to spark our own thoughts and asks leading questions to concepts. Triggers us to think deeper with other classmates'.

Final day of class survey: the ideal instructor incorporates peer interaction and a variety of assessments

Students' responses of the 'ideal instructor' changed after their involvement with Medical Sciences 4200. At the beginning of the course, students focused on instructor characteristics such as 'being organized' and 'being engaging' (Table 2). Following their experience with 4200, many students (24%) indicated that the ideal instructor encourages interaction, whereas on the first day of class, no students indicated encouraging interaction as an ideal role of the instructor (Table 2). Furthermore, a slightly higher percentage of students reported that the ideal role of the instructor was to 'provide help' on the final day survey (26%) versus on the first day survey (21%).

Finally, students were asked to comment on their favourite aspect of the course. Two common themes emerged: the assignments in the course and the ability for peer engagement (Table 5). Thirty-five percent of students indicated that the case studies that were completed in-class were their favourite part of the course. This was closely followed by elements of peer engagement: 26% reported that they liked the opportunity for discussion and 22% of responses highlighted the opportunity for peer interaction (Table 4).

Table 5. Favourite aspect of the course.

Theme	Code	n	%
Peer engagement	Discussion – student states that they enjoy the in-class discussions	6	26
	Peer interaction – student states that they enjoy working/talking with their peers or the small class dynamic	5	22
Assignments	Case studies – student states that they enjoy the case studies the most	8	35
	Variety – if student mentions that they enjoy the variety of assessments or topics	4	17
Total		23	100

For example, one student explained,

> The role of the instructor should not be just to provide information to the students. I really liked that with class discussion points it was up to the class to help teach (same with capstone, mythbusters, etc.) and I really got to think about how certain pathways and such were involved.

Some students suggested that this approach may not always be feasible and that class size can play a limiting role:

> Because this class is so small, the instructor should be more involved and be able to interact with students on an individual level; this is not always realistic since most classes are larger and lecture-only.

Overall, students noted a change in the role of the instructor. Importantly, concomitant with this change in the role of the instructor, students highlighted their enjoyment in interacting with their peers.

Discussion

'From the sage on the stage to the guide on the side' is a cliched expression used to describe the shift in higher education to a more learner-centred teaching approach (Morrison, 2014). However, research in flipped classroom pedagogy has yet to capture the student perspective of the role of the instructor in the flipped classroom which is helpful if faculty are to consider using it. This study has identified three key changes in students' perceptions:

1. While students see instructors in the flipped classroom as taking on more of a moderator role, they still like to have instructors to guide the conversation and be approachable and available for help.
2. In lecture-based courses, most students would like to have more interaction with their instructor than they are currently able to achieve.
3. Peer interaction and discussion are some of the most valued aspects of the flipped classroom experience.

To address the first finding, students do perceive a change in the role of the instructor in the flipped classroom. The data show that while students focus initially on personal qualities of the instructor, such as organization and knowledge, following their flipped classroom experience, students valued instructors who could play more of a moderator role. These data support the principle of flipped classroom pedagogy, in that class time should be focused on student-centred activities that require interaction of some sort (Bishop and Verleger, 2013). While the instructor's role changes from sage to guide in any classroom where, say, work in groups is taking place, so too does the role of the student, from recipient to participant. Unprompted, in this study, many students commented on the increased role of the student in the classroom. This work suggests that instructors interested in implementing a flipped model, or any other, should actively take time at the beginning of the course to address expectations with students in terms of the role of the instructor and the role of the student.

While the roles of the student and instructor are fairly prescribed in classes, regardless of the classroom setting, students still desire more interaction with their instructor. This flipped classroom study examined a small class of fewer than 40 students and as noted by some of the student responses, smaller class size can make interaction much more feasible. Larger classes are more frequently taught in a lecture style, which can often mean less student involvement in terms of activities such as group work. This makes for a challenging situation: how does an instructor lecturing to 600 students engage personally with each student? While it is not possible for an instructor to interact directly with each student in a large class (nor would all students want direct interaction), there are ways to increase interaction (Prosser and Trigwell, 2014) even in a large-size lecture-based format. Bowen (2014) suggests that decreasing the amount of technology in the classroom may also be able to increase student engagement. This suggestion has implications for flipped classroom teaching, as many practitioners of the flipped classroom use technology to deliver their pre-classroom work. Perhaps to most effectively engage our students, the *in-class* portion of the flipped classroom should be less technology-heavy, as suggested (Bowen, 2014).

One of the most striking results of this work is how students viewed the opportunity to interact with their peers. Many students expressed that the discussion and interaction with peers was the most valuable aspects of the flipped classroom. Our work contributes to this narrative by suggesting that students perceive one of the greatest benefits of the flipped classroom approach as enhancing peer collaboration.

This finding is in line with Jensen et al. (2015) who state that it is learning via activities which involve collaboration, and not the flipping of the classroom, that is most important for student gains. Instructors should therefore find opportunities for students to engage in dialogue with one another during class time, whether in a simple breakout discussion or a more organized collaborative activity.

This research study is not without its limitations. This study examined one flipped classroom course, in a classroom with small numbers, in one discipline, from one university and in only one cultural context. This work is a case study of the perception of the role of the instructor in a flipped classroom course to develop a better understanding of the ways in which students in this course viewed the role of the instructor. Thus, the ability to extrapolate the results from this study to all flipped classrooms will be limited, particularly since the success of a flipped classroom can depend on many factors including (but not limited to), the instructor, student motivation, technology use and assessments. Future work could evaluate student perceptions of the flipped classroom across multiple institutions, years of study and settings in order to see whether the findings presented here are similar elsewhere. In particular, it is of interest to assess the perception of the instructor in a flipped first- or second-year undergraduate-level course, as many courses at this level are taught in a large class format.

With a shift in education from a teaching-centred to a learning-centred approach, one question on all educators' minds should be, 'What are the students getting out of this?'. Our work has added to this narrative by showing that in our implementation of the flipped classroom, one of the greatest benefits perceived by the students was an ability to interact with and collaborate with their peers. Students' embraced a change in the instructor's role from directing to moderating. The flipped classroom may be an ideal way to support this change in learner role, as it can be easier to promote peer interaction in a non-lecture-based classroom format. Our work shows that the organization of the in-class portion of the flipped classroom is most essential for the change in the role of the instructor, and the implementation of cooperative learning activities should be the focus of the flipped classroom, rather than simply a focus on the 'flip' itself. We suggest that a change in instructor and learner role does not need to be done solely in the context of a flipped classroom – rather, it should be a starting point for instruction of all types of learning environments.

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