

An Examination of the Flipped Classroom Approach on College Student Academic Involvement

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Colleges and universities remain attentive to developing and supporting ways to foster student academic success. These efforts have taken on more importance as student success, commonly measured by student learning achievement, has failed to meet expectations. For colleges and universities, the flipped classroom represents a student-centered method of fostering academic involvement that is recognized as a positive contributor to student success. This exploratory study examined the flipped classroom's influence on student academic, student peer-to-peer and student-faculty involvement. The study involved 60 undergraduate students (28 male, 32 female) from three flipped classrooms consisting of courses in mathematics and business. Focus group interviews were conducted to gather student feedback regarding their behaviors and classroom engagement. Additionally, a brief survey was administered to collect demographic information as well as quantitative data regarding student perceptions. Findings indicated student academic involvement was present through note taking, viewing video lectures, active in-class learning and collaboration. Students cited peer-to-peer and student-faculty engagement as essential to relationship building, peer learning, and meaningful involvement with faculty.

Introduction

Colleges and universities remain attentive to developing and supporting ways to foster student academic success. These efforts have taken on more importance since the U.S. Department of Education's 2006 report outlining growing evidence of inadequate, and perhaps declining, quality of student learning in U.S. higher education. In response to this evidence, the Department of Education in 2006 issued a call to evaluate student learning through the development of "pedagogies, curricula, and technologies to improve learning" to address these issues (p. 25). Developing effective teaching and learning practices requires educators to design strategies that encourage students to commit time and energy to their educational endeavors (Kuh, Kinzie, Schuh, Whitt, & Associates, 2005) as student involvement is a primary predictor of student learning and development (Astin, 1984, 1999; Pascarella & Terenzini, 2005). Wiggins and McTighe (2006) highlight the importance of involvement in learning. They differentiate the "logic of the content itself" where basic concepts are built upon in a linear fashion to achieve a sense of concept complexity from the "logic of learning content" where content is worked with through sense-making and experimentation. High impact teaching and learning initiatives that emphasize student involvement include first-year experience programs, service learning, study abroad, learning communities and undergraduate research, which have been recognized as key tools for nurturing student learning, development and success (Kuh, Kinzie, Schuh, Whitt, & Associates, 2010; National Survey of Student Engagement, 2008).

Flipping the classroom represents an approach to teaching and learning that focuses on student

involvement. Also known as the inverted classroom (Lage, Platt, & Treglia, 2000), the hallmark of a flipped classroom involves engaging students in knowledge acquisition of course material prior to a class session, typically through assigned readings or lecture videos, leaving class time for the integration of knowledge through application, analysis or synthesis-based activities (Brame, n.d.). By introducing students to course material in advance of a class session, class time is available to explore challenging concepts, address student questions, engage in active learning, and connect to "real life" situations (Stone, 2012). Class time also offers more opportunities for faculty to engage students and encourages students to build rapport with peers and the instructor. Although humanities-based disciplines have been using a basic form of the flipped classroom for many years by assigning text readings in advance of a class in order to conduct further text analysis in class, the flipped classroom of today is credited to two high school chemistry instructors, Jonathan Bergmann and Aaron Sams (Bergmann & Sams, 2012; Brame, n.d.).

Research

Recently, the adoption of the flipped classroom approach is starting to extend from primary and secondary education to the undergraduate level. Interest in the flipped classroom approach has been fueled by early studies that indicate improved student performance outcomes such as tests score gains (McLaughlin et al., 2014; Stone, 2012). These indications of improved student learning beg the question, "How did that happen?" This paper presents exploratory research into the nature of student involvement within a flipped classroom setting and

seeks to identify the ways student involvement maybe fostered within this classroom experience.

Student Involvement Theory

The theory of student involvement serves as a guide to designing more effective learning environments. Defined by Astin (1984, 1999), student involvement represents the amount of physical and psychological energy a student directs toward his or her college academic and social experience. Moreover, involvement operates on a continuum (Astin, 1984, 1999; Nelson, 2010). For example, a student dedicating significant time to preparing for class, studying, participating in extracurricular activities and organizations, and engaging with peers and instructors would represent high student involvement, while a student participating on a limited basis in such activities would reflect low student involvement. The significance of student involvement is its role in fostering student learning.

At the heart of student involvement theory is its focus on “how” students develop. To this end, attention is directed toward the behaviors and processes that support student development, specifically the college environment and a student’s time and energy (Astin, 1984). Although there are many components that make up a traditional college environment (e.g., on-campus residency, membership in student organizations, working on campus), environmental components that foster student involvement have been found to contribute positively to student academic success and persistence, whereas components that impede involvement contribute to students dropping out (Astin, 1975; Bean & Metzner, 1985; Tinto, 1975). Further, student involvement theory recognizes that both student time and energy are limited. As a result, the more a student can direct his or her time and energy toward a developmental goal of learning course material by preparing for class, reading assigned materials, participating in class and engaging faculty and peers, the more the student will learn and in turn achieve his or her goal. In a longitudinal study of 200,000 students regarding 80 different student outcomes, Astin (1993) found higher student academic involvement to be strongly associated with student satisfaction across all aspects of his or her college experience; yet intense academic involvement was related to student isolation and in turn poor development of peer friendships. Astin (1993) also identified a relationship between frequent student-faculty interaction and higher student satisfaction with his or her college experience. Involvement with faculty was reported to be more strongly associated with student satisfaction over all aspects of college life than any other type of involvement (Astin, 1993).

Student academic involvement is particularly potent within the classroom (e.g., Hake, 1998; Laws, Sokoloff, & Thornton, 1999; Prince, 2004; Redish, Saul, & Steinberg, 1997). Two reasons for this are noted by Tinto (1997). First, the class period is a space in time that allows for interaction with others. For many students with busy lives filled with work, family and other commitments, class time represents a valuable opportunity to become involved with peers and faculty. Second, when in class, student involvement in learning, particularly learning with peers, is related to heightened quality of effort, learning, intellectual development and student success (Bowen, 2012; Endo & Harpel, 1982; Tinto, 1997). For these reasons, significant value lies in exploring classroom approaches that encourage academic, peer-to-peer and student-faculty involvement.

Flipping the Classroom

The flipped classroom approach involves engaging students in knowledge acquisition of course material prior to a class session, typically through assigned readings or lecture videos, leaving class time for the integration of knowledge through application, analysis or synthesis-based activities (Bergmann & Sams, 2012; Brame, n.d.). In essence, students are introduced to course concepts prior to class sessions, allowing in-class time to offer students opportunities to work with the concepts while utilizing the support of peers and the instructor. As such, in-class learning is shifted from traditional lecture delivery to class activities such as concept checks, discussions, debates and activities involving application, analysis, problem-solving, experiments and/or evaluation.

Commonly, technology has been integrated into the flipped approach through the use of lecture capture technology (such as enterprise systems like Tegrity, Echo 360, Panopto, or iPad apps like Educreations and Doceri) in concert with lecture slides for delivering course concepts. Technology also offers the ability for faculty to monitor student progress and involvement through a number of methods, such as reviewing student access and time spent with pre-class lectures, in-lecture polling that asks students to respond to questions using clickers or their cell phones (such as Poll Everywhere), and receiving student questions via email. The faculty member can then review the level of student involvement and learning prior to the class session and prepare in-class time to focus on concepts where students may be struggling.

Application of the flipped classroom technique at the college level has received little research attention. Considering the flipped classroom at the community college, Dove (2013) explored student perceptions of a flipped statistics class versus the traditional lecture

approach. Survey data was collected from the 21 students enrolled in the flipped statistics class which had students watching pre-taped lectures prior to class sessions and focused in-class time on discovery-based activities, problem solving and projects. Findings indicated student satisfaction with lecture videos that provided opportunities for concept understanding along with easy access and control over their pace of learning (response mean 3.5/4). In addition, the in-class experience was noted by students as positively influencing their grasp of course material (response mean 3.7/4). Overall, the majority of students were in favor of the flipped classroom and stated a preference for the flipped versus traditional lecture approach (response mean 3.6/4). Similar findings were reported by Toto and Nguyen (2009) in the study of a flipped approach in an industrial engineering course. The study involved 74 junior students who completed three survey items: 1) the Soloman and Felder's Index of Learning Styles Questionnaire, 2) a beginning of the class quiz, and 3) an end of the semester survey. Regarding student learning styles, Toto and Nguyen (2009) found that active learners regarded in-class activities as beneficial to concept understanding, while reflective and sensing-intuitive learners wanted more time at the beginning of class sessions to review video lecture concepts. Visual-verbal learners were more easily distracted when viewing lectures, and visual learners spent more time than others watching the video lectures. Finally, the sequential-global learners reported difficulty following video lectures. Overall, students liked and enjoyed the flipped classroom approach and in particular noted the value of both the in-class activities and the viewing of lectures prior to the class sessions in aiding their understanding of concepts.

Research by Stone (2012) focused on implementing a flipped classroom with video lectures and in-class activities in two biology courses: Genetic Diseases, involving 30 students, and General Biology, involving 400 students. Student exam and assignment scores were compared between the flipped class and its equivalent non-flipped class. In the Genetic Diseases class, exam scores differed significantly between non-flipped and flipped classes with Exam I and II scores increasing from 78.5% and 77.5% to 86.2% and 90.0% respectively. The General Biology course exams and assignments saw significantly different scores with the Exam II class average rising from 70.4% to 74.0% and class average of the assignment scores rising from 71.2% to 82.1%. Improvements in student performance were also reported by McLaughlin, Roth, Glatt, Gharkholonarehe, Davidson, Griffin, Esserman, and Mumper (2014). Using a quasi-experimental design over a three-year period, McLaughlin et al. (2014) investigated student learning outcomes on a standardized final exam for a foundational

pharmaceutics class that was flipped versus traditionally taught via lecture. Student final exam performance improved by 2.5% in the first year of the flipped classroom application and a cumulative 5% over two years. Both studies by Stone (2012) and McLaughlin et al. (2014) found the majority of students agreeing that the flipped approach aided their learning more than the traditional lecture approach (67% and 91% respectively). These studies suggest a pattern of improved student learning and a positive student orientation toward the flipped classroom approach.

There are several benefits to the flipped classroom approach. First, flipping the classroom has been found to produce learning gains evidenced in higher test scores by students engaging in flipped class format versus traditional lecture format (Stone, 2012). Related research considering active learning (Hake, 1998) and peer instruction (Crouch & Mazur, 2001) approaches to in-class learning have also reported significant student learning gains as measured through concept checks and exams. Second, students are provided support and incentives to engage in course material prior to class. From low-tech reading assignments to high-tech lecture videos, students are asked to engage in preparing for class. Embedding feedback mechanisms with the assigned pre-class work, such as quiz question responses or a written summary of a lecture, and attributing course grading to these items provides an incentive for students to engage with the course material (Berrett, 2012; Brame, n.d.). Third, students are provided in-class activities that focus on knowledge integration within a supportive environment (Berrett, 2012; Brame, n.d.). With knowledge and comprehension of concepts taking place prior to a class session, in class time is available for more engaged learning through problem-solving, discussions, experiments and such. In addition, in-class activities provide more opportunities for interaction among peers as well as with the instructor as opposed to traditional lecture.

Challenges do exist for faculty as they take on a flipped classroom approach. Berrett (2012) notes three such hurdles. First, given the dynamic learning environment within the class session, the professor must be skilled at answering questions on the spot. This is particularly challenging when students are still in the process of comprehending the material. Second, flipping the classroom is labor intensive for faculty as they prepare materials and record lectures, review student questions prior to class, and execute the class session. Third, student evaluations of faculty within the flipped classroom tend to be lower than student ratings of professors in traditional lecture classes. Berrett (2012) suggests this may be a result of the increased demands placed on students to participate at a higher level demanded by the flipped classroom approach.

However, in spite of these challenges, initial research findings provide a supportive view of the flipped classroom and make it worthy of additional investigation.

Student Involvement

Existing research findings suggest improved student learning and positive perceptions within the flipped classroom, so considering underlying aspects such as involvement may provide rich insight. In considering how involvement occurs within a flipped classroom environment, we focused on three components of student involvement: academic involvement, involvement with faculty and involvement with peers. These three aspects of involvement are positively associated with learning, academic performance and retention (Astin, 1993), making it relevant to explore involvement in a flipped classroom experience. Academic involvement focuses on the quantity of time and effort a student puts forth toward her or his academic work. Activities such as attending class, completing homework, studying and handing in assignments on time represent behaviors indicative of academic involvement (Astin, 1975, 1993). Student peer-to-peer involvement is found in class-related activities such as discussing class material and working with others on class projects and assignments. Overall, peer interaction was found to be positively related to growth in leadership abilities, academic skills and other aspects of college satisfaction, with the exception of satisfaction with facilities (Astin, 1993). Student-faculty involvement has been primarily defined as the time students spend talking with faculty outside of the classroom. Astin (1984) found frequent interaction to be more strongly associated with student satisfaction with his or her college experience than any other form of involvement, institutional elements, or student characteristics. Given the potency of these three aspects of involvement and the potential for the flipped classroom approach to enhance each of the involvement components, we have focused our study on exploring if and how these elements may operate within the flipped classroom.

Method

With the approach to teaching and learning presented in a flipped classroom, we set out to explore how academic involvement was realized by participating students. As an exploratory study, our primary mode of discovery was focus group interviews. According to Stewart, Shamdasani and Rook (2007), focus group interviews allow for open response format and the opportunity to obtain a rich amount of data in the words of participants. It was important for the data

to be formed by participants because little is known regarding the link between academic involvement and students engaged in a flipped classroom. Alternative methods were considered (e.g., survey, in-depth individual interview, observation), yet focus group interviews were considered most appropriate for this study. The inability to observe students' out of class behavior restricted the use of ethnography while student journaling ran the risk of incomplete or delayed reporting. Individual interviews were also considered; however, group participation was considered important to generate more in-depth discussion. Prior to the focus group interview, participants were asked to complete a brief survey capturing demographic data and overall satisfaction with the flipped classroom aspects.

Population

Study participants consisted of registered students who had completed 15-weeks of a 16-week Spring 2013 undergraduate course. The study consisted of three flipped courses: two mathematics courses and one business management course, M148 Calculus with Precalculus I, M149 Calculus with Precalculus II, and MG335 Organizational Behavior.

Sample and Sample Size

In total, 60 (84%) of the 71 registered students participated in the focus group interviews. Of the participants, 28 (47%) were male, and 32 (53%) were female. Participants represented a number of majors: 31 (52%) were biology majors, 18 (30%) were business majors, 2 (3%) were high school students participating in a post-secondary enrollment option (PSEO), and the remaining 9 respondents were majoring in engineering, music industry, secondary math education, nuclear medicine, environmental biology and undecided. All class levels were represented: 33 (55%) were freshmen, 7 (12%) sophomores, 9 (15%) juniors and 9 (15%) seniors; the remaining two were high school students. Regarding nationality, 46 (77%) were US citizens, and 14 (23%) were foreign nationals including participants from Saudi Arabia (6), South Korea (3), Liberia (1), Mexico (1), Vietnam (1), Bosnia (1), and Russia (1).

Individual classes approached the flipped classroom in a similar manner. The two mathematics courses, M148 Calculus with Precalculus I and M149 Calculus with Precalculus II, together form a two-semester course which covers the content of a standard Calculus I course and includes various precalculus topics as needed. In M148 Calculus with Precalculus I (class size = 25 students; 12 female, 13 male) students were asked to view a lecture recording (ranging from 10 to 20 minutes) which introduced content to prepare the students for the upcoming in-class session.

Occasionally, a question was embedded in the lecture recording that students were asked to respond using Poll Everywhere 15 minutes prior to the in-class session. Students could choose to e-mail their answer if they were not able to use their cell phones to text their answer via Poll Everywhere. The in-class session consisted mainly of students working in small groups on homework problems assigned from the textbook. Occasionally, students worked on teacher-prepared activities which extended the content from one or several days to illustrate connections between topics. In-class sessions involved teacher-student interaction as the teacher facilitated discussions on various homework problems the students found difficult.

In M149 Calculus with Precalculus II (class size = 26 students: 14 female, 12 male) students were asked to view a lecture recording (ranging from 10 to 20 minutes) which introduced content to prepare the students for the upcoming in-class session. The students were asked to respond via email to two comprehension questions regarding the video content before 7:00 am the day of the in-class session. When covering precalculus topics, the in-class session consisted mainly of small groups working on homework problems assigned from the textbook. During the calculus portions, the students rarely worked on textbook problems in class. Instead, the in-class session involved teacher-prepared activities which extended the daily content and illustrated connections between topics.

The Business course, MG335 Organizational Behavior, focused on preparing students for the workplace through understanding individual, team and organization-level constructs (class size = 20 students; 8 female, 12 male). Students were to view a lecture recording (ranging from 20 to 25 minutes in length) introducing chapter material assigned for the upcoming in-class session. Students were asked to prepare written responses to two application questions having to do with the chapter material. The in-class session involved student questions on chapter material, peer sharing of responses to assigned application questions, and chapter-related casework, role play scenarios and activities.

Data Collection

We conducted six focus group interviews and a brief survey. Participating students were asked to discuss their experience with the flipped classroom in which they were currently engaged. Specifically, students were asked to discuss the flipped classroom approach in terms of their perception of its usefulness, impact on their learning and engagement with peers and faculty. A copy of the interview guide is provided in Table 1.

Within each course, students were systematic assigned (by way of numbering students off) to a focus

group composed of 10 to 12 students. This random selection allowed for composition mix of gender and ethnicity. Participants were instructed through an informed consent form and verbally that their participation was optional and that they were free to not participate, to refuse to answer any questions, or to withdraw from the study at any time without penalty or loss of course credit/points. In addition, all data collected and its subsequent use would not make reference to individual students in any way that would divulge identity. A third party conducted the focus groups interviews and transcribed the recorded comments. Faculty access to the collected data was not made available until after semester grades were due. All group interviews lasted approximately 30 minutes.

Data Analysis

A simple descriptive approach was used to review the focus group data. Student responses to each focus group question were presented in a document, noting each class/focus group section. Then four researchers independently identified themes they found emerging from the participant responses to each question. As the researchers analyzed the data, they kept in mind the concepts of academic involvement, peer-to-peer interaction and student-faculty involvement. Due to the broad nature of academic involvement, several questions were asked to explore how students were academically involved in the class (see questions 1, 2, and 3 on Table 1). Student (peer-to-peer) and student-faculty involvement were addressed with direct questions (see questions 5 and 6 on Table 1). Upon completion of independent coding, initial inter-rater reliability was 85%, measured through percent agreement on developed theme categories and sub-components. After discussion involving the review of student responses and rater interpretation of responses, researchers reached 100% agreement on theme coding.

Results & Discussion

Overall, the qualitative data analysis suggests that the flipped classroom approach is seen by students as supporting student academic success. This exploratory study focused on three themes, including academic involvement, student (peer-to-peer) involvement and student-faculty involvement. Table 2 presents each theme along with the subcategories developed from the data analysis.

Academic Involvement

Overall, student comments revealed their connections of academic involvement to the flipped classroom and noted their primary behaviors or

Table 1
Interview Guide for Flipped Classroom Participants

Academic Involvement:

1. How has the flipped classroom approach impacted (helped or not) your learning?
Probe: What tools, skills, or ideas do you have now that you attribute to the nature of this course?
2. How has this flipped classroom format changed the way you approach the class?
Probe: How do you prepare for this class differently than other non-flipped classes?
3. How has the in-class time impacted (helped or not) your learning?
Probe: What did you find most helpful to your learning during the in-class time?
Probe: What did you find least helpful to your learning during the in-class time?

Student (Peer-to-Peer) Involvement:

4. How has the flipped classroom approach differed from other classes as to how you interact with your classmates?

Student-Faculty Involvement:

5. How has the flipped classroom approach differed from other classes as to how you interact with your instructor?

Table 2
Student Feedback on the Flipped Classroom Approach

	Positive Themes	Negative Themes
Academic Involvement	Viewing recorded lectures Access Preparation Control of pace Note taking Easy Organized Thorough In-class experience Easier Engaging Application-oriented learning Help	Self-discipline Responsibility Time and effort
Student (Peer-to-Peer) Involvement	Collaboration Peer learning Relationship building	
Student-Faculty Involvement	Professor awareness of student Knowledge level Approachable Accessibility	

processes of viewing recorded lectures, note taking, in-class experience and collaboration.

Student **viewing of recorded lectures** was utilized through Tegrity, a lecture capture technology. Providing lecture recordings prior to class sessions gave students 24/7 access that allowed preparation for class, quizzes and exams, as well as the ability to control the pace of their learning. Students noted:

When it comes to exams... I could go back to the Tegrity session and just watch the good 20 minute session and be completely refreshed on what I'm about to study for.

I tend to zone out in class sometimes so it's just nice to have it at home and you're just paying attention to your course and doing something.

For me, especially in my dorm, a bunch of my buddies are in this class too and so we listen to the recording all together and then if we had questions we'd ask each other and kind of work in a group outside of the classroom as well.

You kind of learn at your own pace....you don't just stop the class so you can learn what is going on but if you are just watching Tegrity sessions

then you can always stop it and go back and re-learn it.

There was broad agreement regarding the impact of the flipped approach upon student **note taking**. Ease of note taking, thoroughness of notes, and organization of notes were highlighted. Feedback included:

Since you have to watch the Tegrity (recorded lectures) because it goes for part of your grade, my notes were really organized... It's easy to go back and review and know how to do the steps based on the Tegrity notes.

Normally in math courses it's really hard to keep your notes sometimes because there is the difference between like writing down the definitions you need to know, the basic equations, and then how to use them. But, with the Tegrity videos, it's easier to keep things organized because you have the examples in different sections.

On Tegrity you can pause it and take a note. In the classroom sometimes when she's lecturing, you miss some things....this time you can stop it and go at your own pace.

Student academic involvement outside the classroom in the form of viewing recorded lectures and note taking was an asset to the in-class experience. In turn, students said they felt more prepared for class, which made the **in-class experience** seem easier:

I think you are always coming in with questions. It's not like you're coming in like "Oh my gosh, what am I going to learn?" It's like you already know, and you're already okay and get the general concept, how are we going to expand on that kind of thing, and you all have that same background.

I feel like it's just easier because of the plain concept being introduced to you in the video. I feel like it's just easier to understand what is being taught in class, instead of it all being done in class, and you come with background knowledge and stuff.

Further students commented that their level of engagement **in class** was heightened through their preparedness and the in-class activity-focused experience:

Here you actually have to do something to fully participate. I feel like I'm not fully prepared to

participate in class compared to another course where you can still participate fully without prepping, I guess. It kind of makes you prep if you are going to participate.

I guess it gets students to think about the material before they just come to class. Because if it's a lecture class, I go and then I put my notes in my folder, and I don't look at them again until the next class and lecture and that same thing. This makes you continue to think about the material between classes and get ready for class.

I think this learning in-class just engages you more; I don't sit there and space out. Being interactive and doing activities kind of makes you more active during the class time.

It's definitely a wake-up call. Before we have a lecture and we don't do anything and then you get in there and its activities so you are walking around and getting more involved.

An engaging **in-class experience** was connected to the application orientation of the class sessions:

I think it's helped because you get more examples in class and then it helps you. You are working on your homework in class then when you study for the test, you know that your examples are right. This way, you know that they are right, and you know you're doing it right.

I feel like the activities help a lot more. ...we are doing activities every class period, so it does help reinforce the concepts that were learned in the chapter.

I think what we've all touched on is it (in class activities) helps us embed examples in our brain and make it more relatable to everyday life or a situation that might arise in our working environment.

You remember that activity so then on a test when that word pops up....you have to think about what the activity meant still, but it's kind of a trigger.

I liked applying what we took from Tegrity actually into the classroom. I found that a little more useful than a normal classroom where you just sit there and the teacher lectures for an hour and five minutes or whatever it is. I mean, applying it, I felt a little more confident when the test came around because I was able to look at a question and say "Okay, well we did this example in class and it

can relate to this question in that way,” and then kind of just go off there.

Students also noted their appreciation for being able to receive help and feedback **in class**.

We’re constantly working with other people and getting feedback from peers and what problems they are having and then base it off of what problems you’re having and know that it’s not only you so it helps keep your resolve up. The guy I’m with, we’re always confirming hand-set answers and if we get a different answer, then we go back over the method.

Sometimes, the teacher or professor isn’t always able to explain it the way you are thinking about it, and your partner may be able to explain it a different way.

I think it’s easier to ask questions when they arise because you have the opportunity to ask the people around you, you can ask the professor. At the beginning of class, that is how she always starts, is questions we had from the video the previous day or from homework problems from the last class period and there is a lot of opportunity to raise questions that you may have that could help with learning.

Just being able to do problems while the professor is around you so you can ask questions right away instead of having to do the problem wrong because you don’t know, you’re just kind of guessing and going along with what you think is right, even if it’s not right; the professor is there to answer your question right away.

Yeah, one of the most discouraging things about doing math homework is that when you get stumped, you kind of want to be like, “I don’t want to do this anymore,” but when you’re doing it in class with a teacher, you can ask her right there or you can ask classmates that you are with.

Many students made mention of the opportunity to interact and **collaborate** with their peers during the class session. Students noted the following:

Yeah, it’s also nice working with other people and if the majority of the class seems to come in with the same question, it’s often like an alert to the teacher that the concept needs to be better explained.

There’s just a lot of situations where, outside of class, you kind of talk to people mostly on a project but in this you are put in different groups and whatever and given more of a chance to get to know people one-on-one more.

If we didn’t have so much activity, I wouldn’t be able to know her (the instructor) so well. Otherwise, I would just be staring at the board and taking notes.

There is more bonding. For example, we did a sugar cube game where we had to stack these sugar cubes. You don’t get that when you have a bunch of lecture classes. I mean, we actually enjoyed it because you were trying to compete with other people and you’re not thinking about it, but you are actually learning about some of the terms.

It was nice when we got some of the time to work in groups, and then we could ask each other questions, and it would help us actually understand it.

This focus group data indicates that the flipped approach fosters academic involvement. Students identified having 24/7 access to lectures, being prepared for in-class sessions, and having control of the pace with which they learn as being positive characteristics of the flipped classroom pedagogy. Similarly, students mentioned note taking was easier, and their notes were more organized and thorough. These elements of student involvement speak to student time and energy being spent on the academic aspect of the class. In addition, students found the in-class experience to be of significant value, citing the class experience as more engaging and the learning more accessible. Further, the classroom activity-oriented learning, the ability to receive help from peers and faculty, and the opportunity to collaborate with others made the in-class experience enjoyable and increased their involvement. These indicators of academic involvement both before and during the flipped class sessions speak to the essence of involvement theory whereby students’ physical and psychological energy is directed toward his or her academic work (Astin, 1993). Studies by Deslauriers, Schelew, and Wieman (2011) and Hake (1998) support the value of active-learning classroom environments resulting in enhanced student involvement. Specifically, Deslauriers et al. (2011) compared two large sections of undergraduate introductory-level physics classes and found that active learning in class increased attendance, led to higher engagement, and improved learning as evidenced through exam scores versus traditional lecture. In a study of over 6,000 undergraduate introductory-level physics students, Hake (1998) found that students who participated in an interactive-engagement class showed higher post-test learning and enhanced problem-solving abilities than students in traditional lecture classes.

However, student perspectives on academic involvement were not all positive. Some students

struggled with the self-discipline and responsibility required of students in a flipped classroom. Specifically, students recognized they needed to exercise self-discipline in order to view taped lectures prior to the class session. This tied into comments regarding student responsibility to put in the time and effort required to fully engage in the flipped classroom approach. Student comments included:

I probably was more lackadaisical with this class and always put it off, as in, I'll get to it later. When I had the time, I did it. If that time never came around, or if there is something else I would rather do, I would put this class as a lesser priority compared to my other classes.

I guess if you have to be a certain place and time, you are going to sit there and pay attention, more where if I'm watching the computer screen in my bedroom or back at my dorm, I'm going to be way more distracted.

I feel it's a little time consuming because the way I study, I watch the Tegrity so it's like double the amount. For international business, I just have to watch a limited amount of Tegrity but for her class, there is twice as much. It takes a long time for me to finish all of the Tegrity. I had to pull a couple of all-nighters for this class.

I think it also makes you more responsible because doing the homework it's completely your option; like she said, you don't need to turn it in so it's your choice as to whether you actually want to do the practice problems or whatnot to help you when it comes to tests and quizzes.

This focus group data reveals some challenges faced by students when they engaged in a flipped class. Self-discipline was at the center of student concerns. Students found the flipped classroom approach to be demanding in terms of requiring them to spend time and effort to prepare for class sessions by viewing lectures and completing assignments. Further investigation into the mindset of the students and expectations of their time and effort for a course may provide insight into how a faculty member, academic department or institution could utilize the flipped classroom approach to generate student interest as well as to set in-coming student expectations.

Student (Peer-to-Peer) Involvement

In regard to student involvement, peer-to-peer involvement within the classroom environment

encompasses the discussion of course materials and working with others on class projects. Such peer learning, along with relationship building, were the two subcategories of peer-to-peer involvement shared by students. Comments on **peer learning** included:

(Through peer interaction) you can kind of see other people's views on how they learn it in their own mind, so it's not just your ideas and your teacher's ideas. It's like multiple people "Okay, this is how I go about it." It's like reinforcement from other people.

In my group at least, everyone always participates in any way. Some people may not know some part, but another person will and be able to pick it up from there. In other classrooms I don't pay attention to my peers as much and pay more attention to the teacher, where in this one it's more paying attention to the bright minds around us that makes a difference with my peers.

I watch the Tegrity with one other person in our class. It actually is (beneficial) because we'll stop it, and I'll ask her questions, and then she can explain it to me. If people did it together, I actually think that would be really beneficial.

We were able to do the problems in a group. It helps a lot more, it helps us with understanding the material more, and then if we need help or if none of us get it, we can also just ask her (instructor).

As for **relationship building**, students shared the following:

In lectures, we're not really allowed to talk to the people next to us, but in the flipped classroom, we can ask them questions and stuff. It's helpful.

I think my math class is one of the only classes where I actually know a majority of the names of the people in my class and at least know who is in my class. A lot of the time in lectures, I will just go in, listen, and leave again.

You are just kind of thrown into the situation and forced to meet new people to get your work done, just like a lab. That's what I pictured it as.

... [W]hen we are going to get out in the work force, we're most likely going to be working with people around our age, so it's kind of preparatory for what you're about to learn once we are done with school. Being able to interact with each other in groups and

get each other to talk because if we all want to be managers one day, that's what we are going to try to have to learn is how to get people to talk and to get them going and get them involved and it relates to the class as well.

It's extremely different from other classes because I've taken other courses and not known my fellow classmates names by the end of the course and this course, I know everyone's name, and I guess I've built somewhat of a relationship with everyone. It's nice to have those connections.

I definitely feel more comfortable in class because I have a class I take and I know maybe three people and so I don't talk, but in this one I got to know everyone, so now we all say hi and I talk more.

You definitely develop more rapport. I've had classes where I know one or two people so you don't really want to talk up because you think all these people that don't know me might judge me. Here, you don't know them that well, but you know them enough that you almost want them to agree with you, so then maybe you do talk.

Similar to the student feedback on academic involvement, student (peer-to-peer) involvement within a flipped class received strong positive comments from students. Interviews indicated a great appreciation for the in-class environment that allowed peer relationships to be built and for peer knowledge to be shared. Studies have found significant benefits to peer learning, including developing planning and organizing skills, improving conceptual reasoning and heightening quantitative problem solving (e.g., Boud, Cohen, & Sampson, 2001; Crouch & Mazur, 2001; Hwang & Hu, 2012; Menzies & Nelson, 2012).

Student-Faculty Involvement

Although time spent interacting with a faculty member outside of the classroom has served as a primary measure of student-faculty involvement, students in focus group interviews were questioned on how the flipped classroom fosters student-faculty interaction. Student responses indicated a sense that the professor had a better indication of a student's knowledge level. In addition, students reported viewing the faculty member as more approachable and more accessible for help. Student responses regarding the **faculty's insight into their knowledge level** included:

It seems like our professor in our flipped class gets to know us better personally because she goes around, and she actually helps us. But in lecture,

they are just talking at us and we take notes, so they don't really get to know us as students and how we work.

I think other courses, they kind of know where you are at when it comes to test time or some do quizzes, and that's how they keep up with you. Here it's more like she can just kind of tell if you're engaged in discussion or not.

I feel like when I come to class and I don't talk, she (instructor) knows I'm falling behind on the material...she can just kind of tell based on how the class is.

I think she has a better chance at looking at our level like with our other problems we have and where should she focus on and re-explain things so she had an idea so when she writes out the test it will be reasonable for our skills.

I would say more just because we are physically interacting with her compared to hiding our face in our notebook and taking notes and seeming like we understand and just nodding because you can't really just nod in her class because she be like, "Okay but why?" You need to have a reason as to why you do understand or why you don't understand.

Students viewed faculty as more **approachable** in the flipped classroom environment. Comments included:

I feel more like a friendly level to her than my other professors; it seems like my lab professors, with more interaction based classrooms, I feel like I'm on a more friendly level basis. Then I don't feel so much less superior, it's easier to talk to them as a person and not just as your professor. And that way it's easier to approach them in class or outside of class too.

I think, especially for this class, it's made me more comfortable going up to her office and asking a questions or if I didn't understand something in class or my question wasn't really answered in class or I didn't understand something if I watched the Tegrity assignment and I wanted to figure out before class, it made me a little more comfortable going up to her office and saying "Hey, I have a question about this, can you explain it a little bit more?"

I know in one of my other courses, it's not the flipped, during the lecture, he'll ask us questions and nobody answers but in here, with it flipped and

we're doing group work and we actually need help, we'll actually say something, not just sit there and smile or not do anything. So she is more approachable that way.

Students also highlighted **accessibility** as they considered their involvement with the flipped classroom faculty. They mentioned:

I think the instructor has more time to help you since she's not focusing and giving a lecture to the whole class, she is walking around and you can ask questions and she will actually sit down and help you. Whereas, the traditional classroom, you don't have time for that.

I think it is much easier to call for her individual attention in this flipped classroom because otherwise she would be up doing lecture, I suppose. I don't think she would have the time or opportunity to speak with people individually the way she is able to in this classroom.

The flipped classroom approach was also connected with positive aspects of student-faculty involvement. Interview feedback indicated student agreement that the flipped approach allowed the faculty to get to know the student and her or his knowledge level better than in a traditional lecture course. Several reasons for this enhanced connection between student and faculty centered on the in-class structure, which allowed for more one-on-one time with faculty and their availability to answer questions. In addition, students felt more comfortable in contacting the faculty member outside of class time largely due to the connections made within class time. Both student involvement and student-faculty involvement are recognized as two of the Seven Principles for Good Practice in Undergraduate Education (Chickering & Gamson, 1989). Further, cooperation among students, active learning and time on task represent three additional Good Practices that were present in our findings related to academic involvement.

Overall Satisfaction

In addition to the qualitative data, quantitative data was collected to gain a sense of overall satisfaction with components of the flipped classroom experience. Of the 60 students surveyed (those who participated in the focus group interviews), 51 (85%) agreed (30% somewhat agreed, 30% agreed, 25% strongly agreed) that the flipped classroom approach helped their learning. Further, 36 students (60%) said given the choice between a traditional classroom or a flipped

classroom, they would choose the flipped classroom setting.

Conclusion

Approaches to teaching and learning such as the flipped classroom offer opportunities for addressing student academic success. Research studies indicate that student time and energy focused on educational learning activities predict learning and personal development, so investigating ways to foster student involvement is of significant value (Kuh et al., 2010). Moreover, as colleges and universities continue to work on improving student academic success levels, raising student involvement levels can serve as an important tool in this work (Astin, 1975, 1993; Tinto, 1975, 1993).

Previous research on the flipped classroom approach has been limited to only a few studies (Crouch & Mazur, 2001; Deslauriers, Schelew, & Wieman, 2011; Dove, 2013; Hake, 1998; McLaughlin et al., 2014; Stone, 2012; Toto & Nguyen, 2009). The findings of these studies offer support for the flipped classroom approach as a means to improve student learning and participation. Yet these studies are limited in number and focus on student outcomes and perceptions. Adding to this body of research, our study offers the unique contribution of exploring how students become involved across three dimensions: academic, peer-to-peer and student to faculty. By considering potential underlying factors in student learning and perceptions, a deeper understanding of the mechanisms driving performance outcomes may be gained. In turn these insights may assist in addressing specific techniques and enhancing the effectiveness of the flipped classroom approach.

Implications

For colleges and universities struggling with retention and graduation rates, understanding the value of teaching and learning approaches such as a flipped classroom may offer opportunities to positively address such challenges. The findings suggest that the flipped classroom approach offers a means to address student involvement and, in turn, student learning. Several interesting possibilities arise from this finding.

First, colleges and universities may be well served by educating and encouraging faculty regarding the value of raising student involvement through various techniques, such as the flipped classroom approach. The work by Astin (Astin, 1975, 1993, 1999) on student involvement speaks to the link between the time and effort students put toward their academic activities and student learning.

Our findings suggest the flipped classroom approach encourages student academic involvement (dedication of time and effort) through class preparation (note taking, viewing recorded lectures online) and in-class active learning.

Second, the findings suggest that students are concerned about the increased self-discipline required for participating in a flipped classroom. To address this concern, colleges and universities may consider ways to promote flipped courses to students. Specifically, promoting the value of active learning in the classroom that ties to application experience and preparation for the workplace would appeal to the job-minded student of today. Further, promotion of the flexibility afforded students with recorded lectures and the frequent assessment that often accompanies flipped class sessions would also appeal to today's students. Getting students interested in the flipped classroom approach would allow for easier integration of flipped courses and more immediate student involvement returns by institutions. Such promotion may offset the negative student perception of flipped courses requiring more of their time and effort.

Third, in a recent article on teaching Generation Y college students, Eisner (2011) notes the unique characteristics of persons born between the early 1980s and 2000, known as Gen Y or the Millennial generation. This technology savvy, independent minded, and risk averse population enjoys team work and being connected via "fun" versus details. Training through video simulations and coaching versus lecture methods have been found effective. As faculty struggle with the seemingly restless and disinterested Gen Y college student, the interactive orientation to learning present in the flipped classroom approach offers a way to connect on a more meaningful platform with the current college student. Encouraging a more motivated and engaged student body may also have returns for faculty, who may find the interaction with such a student group more inspiring and intellectually stimulating.

Limitations and Future Research

Two primary limitations existed within our study. First, this study was exploratory in nature, focusing on how academic, peer-to-peer and student-faculty involvement may be present in a flipped classroom. Based on student perceptions, the findings suggest all three aspects of student involvement to be present. These preliminary findings offer many opportunities for further research, including the addition of more extensive interviews as well as survey questions regarding time spent and effort level. Tracking class performance behaviors and learning outcomes through observation and comparison studies between flipped

and non-flipped courses would allow for a fuller view of student involvement. In addition, a large body of research examining motivational aspects of self-regulation, self-directed behavior and attribution theory may also be integrated to determine the negative theme of self-discipline and taking responsibility for one's learning (e.g., Deci, Koestner, & Ryan, 1999; Deci & Ryan, 2012; Dweck & Leggett, 1988). Further, this line of inquiry could give insight into underlying student motivations and ways in which the flipped classroom approach could be augmented to tap into student motivation and heighten student learning.

Second, the generalizability of our findings is limited. Although generalizability is often seen as disconnected from qualitative research (Denzin, 1983; Guba & Lincoln, 1981), understanding the relevance and applicability of study findings is of value (Miles & Huberman, 1994). The reasons for our lack of generalizability include the data collection process, which was limited to three undergraduate courses at the same institution. Moreover, although participating students were in different flipped classrooms, the class sizes were relatively small and involved only one semester of students. Ideally, the integration of data from multiple comparison groups would serve to identify specific conditions that support the findings as well as serve to broaden themes and sub-categories (Glaser & Strauss, 1967). Direction from this exploratory study offers guidance to develop survey items to be used in further data collection. Extending the findings from this exploratory study to develop a survey tool would allow for external validity concerns to be addressed.

In summary, today's challenging higher education environment asks colleges and universities to prove the value of their education; as a result, high impact initiatives in teaching and learning have become imperative. Kuh, Kinzie, Schuh, Whitt and Associates (2010) highlight academic practices that have shown potency with raising student academic success. These initiatives include active and collaborative learning, student-faculty interaction, enriching educational experiences and challenging programs. The flipped classroom is an approach that embraces these well studied academic components. With little research conducted on the flipped classroom approach, there seems to be significant value in examining this approach further.

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