Student Involvement in Flipped Classroom Course Design

Whitney Henderson
University of Missouri

Lyndi Plattner
University of Missouri

Bailey Baucum
University of Missouri

Tymeshia Casey
University of Missouri

Allison Grant
University of Missouri

See next page for additional authors

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Abstract

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Keywords

Student involvement, course design, flipped classroom, pedagogy

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Acknowledgements

Authors

Whitney Henderson, Lyndi Plattner, Bailey Baucum, Tymeshia Casey, Allison Grant, and Paige Headlee

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Tymeshia Casey, Allison Grant, and Paige Headlee

University of Missouri

United States

ABSTRACT
The purpose of this mixed-methods study was to examine changes in content knowledge, clinical reasoning, and metacognition with occupational therapy students involved in course design (collaborative participants), with participants engaged in flipped classroom model only (course participants), and to compare results between the collaborative and course participants. Forty-three occupational therapy students participated in this study. Researchers administered three pre- and post-test questionnaires and completed three focus groups. Results demonstrated both groups experienced growth in active learning and clinical reasoning and changed their perception of student involvement. The collaborative participants demonstrated additional benefits of development of relationships, increased accountability, and improved metacognitive learning.

Active student engagement is emerging as an effective educational practice (Gilboy et al., 2015; McLaughlin et al., 2014; Rui et al., 2017). Research indicates when students participate in their own learning, they retain more material and demonstrate higher metacognitive problem solving (Birgbauer, 2016; Bovill et al., 2011; Bovill et al., 2016). Two of these educational practices were included in this study: student involvement in course design and flipped classroom learning format.

Student Participation in Course Design
Health professional education, such as occupational therapy (OT), must use contemporary educational practices grounded by evidence to prepare students to practice effectively in dynamic settings (Hains & Smith, 2012; Henderson et al., 2017). Educational researchers are exploring student participation in course design because of the benefits for both the students and the faculty (Birgbauer, 2016; Hess, 2007). In this

learner-centered approach, faculty collaborate with students to design a course that incorporates necessary curricular content molded by student feedback. Course design teams typically consist of one or two faculty members and a team of two to six students that meet approximately once a week for two to three months brainstorming and discussing various components of course implementation (Birgbauer, 2016; Bovill et al., 2011). Students and faculty have a constant flow of constructive communication (Hains & Smith 2012). Through this approach, students gain a deeper understanding of learning and increased metacognitive skills through engagement in self-directed activities; in turn, faculty learn from students through various forms of feedback. Despite these recognized benefits, faculty rarely consult students about their educational experiences (Bovill et al., 2011).

Faculty in higher education are experts in their field, but often lack formal training in adult pedagogy (Amundsen & Wilson 2012; Bovill et al., 2011; Kreber & Cranton, 2000). Traditionally, faculty develop and teach course content, receive feedback from students via end of semester course evaluations, consider their own observations, and make revisions to improve future courses (Birgbauer, 2016). Although this is a common approach, it is not necessarily the most effective one. When faculty incorporate students into the course design process, they acknowledge the students' expertise about their own learning and have additional insights about course effectiveness (Bovill et al., 2011; Brooman et al., 2015). In addition, when students are engaged in the design process, they retain content and feel more satisfied that faculty can make adjustments to best facilitate understanding and retention of content to achieve desired learning outcomes (Bovill et al., 2011; Halpern & Hakel 2003). Involving students in course design does challenge the common assumption that faculty's expertise ensures complete authority over the learning process. Student involvement does not take the place of the faculty's expertise and faculty still maintain the essential role in promoting learning (Bovill et al., 2011; Hains & Smith 2012).

Students engaged in course design also experience several benefits. First, when faculty afford students the opportunity to provide constructive input into their education, students become more invested and are more motivated to perform well in the course (Hess, 2007). In other words, students begin to take responsibility for their own learning. With this newfound responsibility, students demonstrate increased engagement and enthusiasm for learning (Bovill et al., 2011). Students also develop greater metacognitive skills because they critically think about and consciously analyze how they learn, which can further inform the course design process (Bovill et al., 2011; Bovill et al., 2016). By interacting with faculty, students improve metacognitive awareness about the teaching and learning process (Bovill et al., 2016). Therefore, students that participate in course design engage in deep learning, which leads to increased confidence and performance (Bovill et al., 2011). Lastly, because they are providing frequent feedback to faculty, students improve their ability to communicate effectively with others; an important skill for their professional careers (Galway et al., 2014; van Vliet et al., 2015).

Although student involvement in course design has numerous benefits, faculty and students do experience barriers when implementing this learning approach. Both groups could experience challenges when changing from a traditional lecture format to methods of active learning (Hains & Smith 2012). Scholars suggest faculty may resist changing to active learning methods because of their own experiences as students, their knowledge of how colleagues teach, the time they perceive it will take to change approaches, and their perceptions about what current students expect (e.g., students will not be motivated to be active learners; Bovill et al., 2016; Hugh & Barrie, 2010). Faculty might also resist the additional time it would take to solicit student feedback for course adjustments. Students might also be resistant to this approach as they transition from a passive learner (in which faculty dominate the learning context) to an active learner that has increased responsibility for their own education (Bovill et al., 2011; Hains & Smith, 2012).

Faculty who are willing to try active student involvement might also be concerned about which students would be best suited to collaborate on course design. Education literature provides faculty with insight about the characteristics of students well suited to participate in this process. The most successful student collaborators demonstrate internal motivation, are comfortable sharing input with faculty, express a desire to improve their own education, exhibit maturity to be responsible for and engage in self-directed learning, and understand the time commitment required in addition to the rigor of the course (Birgbauer, 2016; Brooman et al., 2015; Hains & Smith, 2012; Hess, 2007; Spronken-Smith et al., 2007).

Flipped Classroom

Faculty in higher education continue to use traditional lecture-based learning (LBL) despite a lack of evidence supporting this instructional method (Boyce et al., 2017; Galway et al., 2014; LoPresto & Slater 2016; Roehl et al., 2013; Sangestani & Khatiban, 2013). In LBL, faculty deliver new content via lecture while students take notes and ask questions near the end of class as time allows (Sammel et al., 2018; Sangestani & Khatiban, 2013). Faculty assign homework related to the new information for students to complete outside of class (Sammel et al., 2018). Students are passive learners in this didactic method of learning. Evidence suggests students engaged in LBL experience a decline in their attention in the first 10 minutes of class and only retain about 20% of the presented information (Boyce et al., 2017; Gilboy et al., 2015; McLaughlin et al., 2014). Additionally, in the current higher education landscape, students have little tolerance for LBL because they are accustomed to quick access to information using various forms of technology and gravitate toward more social forms of learning (Roehl et al., 2013).

One alternative to LBL is the flipped classroom model. In a flipped classroom, students complete the readings, listen to online lectures, or complete a learning activity (e.g., discussion board) prior to class (Boyce et al., 2017; Critz & Knight, 2013; Galway et al., 2014; Roehl et al., 2013; Sammel et al., 2018). Through these activities, students gain foundational knowledge at their own pace (Roehl et al., 2013). In the subsequent class period, faculty use active learning strategies to facilitate application of the knowledge the students gained prior to class (Boyce et al., 2017; Critz & Knight 2013; Roehl et al.,

2013; Sammel et al., 2018). Examples of active learning strategies in class include role playing, case studies, and collaborative group work (Critz & Knight, 2013; Roehl et al., 2013). By reversing the lecture and outside class material, faculty use class time to think deeply about the material; students are active learners both inside and outside the classroom (Arnold-Garza, 2014).

Students engaged in a flipped classroom model experience numerous benefits. Students gain a deeper understanding of course concepts because they have increased opportunities to be self-directed learners (Boyce et al., 2017; Critz & Knight, 2013; Moraros et al., 2015). They improve self-efficacy and become more aware of and confident in their own learning strategies, which aids in the development of high level critical thinking skills and more effective concept mastery (Boyce et al., 2017; Galway et al., 2014; Moraros et al., 2015; Roehl et al., 2013; Rui et al., 2017; van Vliet et al., 2015). Because they know active participation is required in class, students are also more accountable to the pre-class learning activities (Galway et al., 2014). In addition, students often report improved ability to communicate and learn with peers (Moraros et al., 2015; van Vliet et al., 2015). Similarly, students who are hesitant to ask questions during LBL are more likely to seek assistance from faculty in the flipped classroom model (Critz & Knight, 2013). The development of these metacognitive and communication skills are no doubt useful in other areas of academia and in their future careers (Galway et al., 2014; van Vliet et al., 2015).

In addition to student benefits, faculty that implement a flipped classroom model notice positive transformations in their teaching practices. Because faculty do not lecture in a flipped classroom model, they have more time for one-on-one engagement with the students during class (Arnold-Garza, 2014; Roehl et al., 2013; Rui et al., 2017). Not only does this improve the communication and connection with students, but it also allows faculty to have greater insight into what students are or are not learning. Lastly, this model allows faculty to use a wider range of teaching methods before and during class. The greater variety of methods, in combination with increased communication, allows faculty to reach students with a wider range of learning styles and abilities (Roehl et al., 2013).

Educational literature also recognizes a few limitations of a flipped classroom model. Initially, faculty do have to devote a considerable amount of time to the development of pre-class and in-class learning activities (Boyce et al., 2017; Critz & Knight, 2013; Moraros et al., 2015; Njie-Carr et al., 2017; Roehl et al., 2013). When creating in-class activities, faculty must also plan for a reflective component and provide feedback as these strategies are critical for assessing what the students are learning. In addition, students might not cope well with this radical change or new responsibility and often require time to adjust to the new learning environment. Some students are also uncomfortable with group learning and have a preference for individual work. Lastly, the flipped classroom model might not be applicable to all subjects or content (Roehl et al., 2013).

Student Involvement in Course Design and Flipped Classroom
As discussed above, there are several similarities between student involvement in course design and flipped classroom, such as the development of student-faculty relationships, an active learning component, increased responsibility for their own learning, and improved metacognitive skills. These two learning approaches have potential to improve teaching and learning. Faculty can incorporate students into the course design process when developing learning materials for a flipped classroom.

Therefore, the purpose of this mixed-methods study was to examine changes in content knowledge, clinical reasoning, and metacognition (a) with OT students' involved in course design (collaborative participants), (b) with OT students involved in flipped classroom model, but not course design (course participants), and (c) to compare the results of students involved in course design and students not involved in course design on these outcome measures.

Methods

Research Design
We used an embedded mixed methods design to explore how course design and flipped classroom instructional methods impact OT students' learning. Researchers used a non-experimental exploratory survey design for the quantitative portion of this study. The quantitative strategies allowed researchers to understand how participants acquired content knowledge, metacognition, and clinical reasoning. Researchers collected additional data using a general inductive approach through focus groups for the qualitative portion of this study (Thomas, 2006). Qualitative methods revealed participants' thoughts and attitudes toward learning (DePoy & Gitlin, 2016). The Institutional Review Board at the University of Missouri approved this exempt study. In the quantitative portion, participants gave consent through completion of the questionnaires. In the qualitative portion, participants verbally consented at the start of each focus group.

Participants
Researchers recruited OT students in the second year of a Master's degree program enrolled in a 4-credit hour Adult Practice course. We used a convenience sampling method to recruit participants and sent a recruitment email containing an informational letter about the study. A total of 43 participants (course and collaborative participants) completed the quantitative portion of the study. Of these 43 participants, five volunteered to assist with course design portion of the study and completed a focus group about their experiences following the completion of the course (collaborative participants). The collaborative participants that volunteered for the course design represented diverse backgrounds, educational experiences, and peer groups. The rest of the students comprised the course participant group. For the qualitative portion, another group of five participants not involved in course design volunteered to participate in focus groups before and after the course. Researchers sent an additional recruitment email to the course participants containing an informational letter about focus groups for enrollment in this portion of the study.

Instruments
Researchers collected demographic data to characterize the sample. We collected age, gender, and level of education.

Self-Assessment of Clinical Reflection and Reasoning (SACRR)
The SACRR is an assessment tool with 26 items rated on a 5-point Likert scale from a 1, "strongly disagree", to a 5, "strongly disagree". Researchers used this instrument to assess changes in students' clinical reasoning and reflection prior to and at completion of the course. The psychometric properties of the SACRR show internal consistency scores of 0.87 pre-test and 0.92 for post-test using Chronbach's alpa, and moderate Spearman rank order correlation coefficient for test-retest reliability with a score of 0.60 (Royeen et al., 2001).

Adult Practice Learning Objectives Survey (APLOS)
We developed a survey to determine changes in students' knowledge of course learning objectives prior to and at the completion of the course. The assessment tool consisted of a 4-item questionnaire where students rated their knowledge about each of the course learning objectives on a scale of 1, "no knowledge," to 10 "expert knowledge" (see Figure 1).

	No Knowledge									Expert Knowledge
1. Use theory and evidence to guide intervention planning with adults across various practice settings.	1	2	3	4	5	6	7	8	9	10
2. Summarize the evaluation to intervention planning process.	1	2	3	4	5	6	7	8	9	10
3. Select appropriate devices, technologies, techniques, and strategies to maximize occupational performance.	1	2	3	4	5	6	7	8	9	10
4. Demonstrate appropriate strategies and techniques to enhance safety independence in functional mobility.	1	2	3	4	5	6	7	8	9	10

Figure 1. Adult Practice Learning Objectives Survey (APLOS).

Plattner Metacognition Questionnaire (PMQ)
Researchers developed a questionnaire to determine students' level of metacognitive thinking prior to and at the completion of the course. We completed a thorough review of the educational literature and implemented an iterative, expert review process to develop this questionnaire. We did not pilot the questionnaire with students. The survey

consisted of an 18-item questionnaire rated on a 5-point Likert scale. Scores ranged from a 1, "not at all like me", to a 5, "a lot like me" (see Figure 2). Researchers included a text box at the end of the survey for students to express any additional insights they had about learning.

I learn best when…	Not at all like me	Not like me	Neutral	Like me	A lot like me
I have to show what I know.	○	○	○	○	○
I am in the traditional lecture setting.	○	○	○	○	○
I have concentrated studying just before the test.	○	○	○	○	○
The teacher tells me what I need to know for the reading.	○	○	○	○	○
The material is easy for me to understand.	○	○	○	○	○
I have to prepare material to teach others.	○	○	○	○	○
I study alone.	○	○	○	○	○
I work on a group assignment.	○	○	○	○	○
I focus on my homework on the night just before it's due.	○	○	○	○	○
I have time to pause and think about my learning.	○	○	○	○	○

Figure 2. Segment of Plattner Metacognition Questionnaire (PMQ).

Procedures

The primary researcher asked student volunteers to participate in the course design process the semester prior to the course (collaborative participants). During the summer prior to the course, the researcher/instructor and five collaborative participants met weekly to discuss expectations of OT education, various types of instructional methods and the evidence supporting their use, course readings and assignments, and course syllabus, schedule, and content.

For the quantitative portion of this study, we administered all three questionnaires (SACRR, APLOS, and PMQ) prior to the start of the course (pretest) and all three questionnaires at the completion of the course (posttest). Both course and collaborative participants completed the three questionnaires in person in the classroom setting within approximately 10 minutes. Researchers collected minimal identifying information to maintain anonymity and stored the questionnaires in a secure location. Five course participants (not involved in course design) completed a pre-focus group for the qualitative portion of the study. Researchers recorded and stored the focus group in a secure location.

The primary researcher also served as the course instructor and implemented the course using the materials and suggestions created by the instructor and the five collaborative participants. We presented the course material through a flipped classroom model where students were expected to complete pre-class activities (i.e. readings, reflection, etc.) and actively apply that knowledge learned in the classroom setting. Throughout the implementation of the course, the five collaborative participants continued to meet weekly with the researcher to provide feedback on different aspects of the course (pre-class and in-class activities, readings, instructional methods, etc.), as well as provide additional comments and opinions expressed by fellow peers. At the completion of the course, the course and collaborative participants completed the SACRR, APLOS, and PMQ again as a posttest measure.

For the qualitative portion of this study, researchers completed three focus groups to understand students' learning with the flipped classroom model and how involvement in course design impacted learning. We developed questions based on thorough review of the literature and expert feedback. The first and second focus groups included five course participants; they met prior to and after the course. The third focus group included the five collaborative participants; they met after the course. We did not complete a focus group prior to the course with the collaborative participants because they participated in discussion and reviewed literature in their design role before the start of semester. We felt this would bias their perceptions during a pre-course focus group. An experienced interviewer asked semi-structured open-ended questions throughout the duration of each focus group, with opportunities to add-in additional questions as needed. The live focus groups were approximately 45-minutes in length. Examples of focus group questions are included in Table 1. We recorded and stored the focus groups in a secure location. Researchers reviewed and de-identified each transcribed focus group as needed.

Table 1

Focus Group Example Questions

Questions for Course Participants	Questions for Collaborative Participants
When have you been most engaged in your coursework?	What are your overall thoughts about small group meetings?
When have you been least engaged in your coursework?	How has being a part of course design changed your learning experience?
What activities have facilitated your learning the most?	How has knowing the reason behind why teaching methods were used affected your learning?
When have you felt like you are truly learning the information?	How has being a part of this group changed your level of engagement in coursework?
Why do you prefer certain ways of learning over others?	How has your level of satisfaction with learning changed?
When do you feel the most active and responsible for your own learning?	What skills, if any, would you say you have gained from being a part of this group?

Data Analysis
To determine changes in content knowledge, researchers conducted a repeated measures t-test to analyze pre and post content knowledge assessment (APLOS). We conducted a Multivariate Analysis of Variance Test (MANOVA) to determine differences between course and collaborative participants in clinical reasoning (SACRR) and metacognition (PMQ).

In addition, we compared themes from focus groups using thematic analysis to explore the learning experiences of course participants and collaborative participants as they experienced the flipped classroom model of teaching (Braun & Clarke, 2006). After transcription, the primary researcher reviewed the focus groups and completed initial coding to label the data. A secondary researcher reviewed and offered feedback in a peer debriefing process. Based on this information, the primary researcher revised codes and labels and began determining connections and developing categories. A secondary researcher reviewed this stage and provided feedback an additional time. Lastly, the researchers collaborated to determine relationships and finalize themes (Braun & Clarke, 2006; Thomas, 2006). The primary researcher recorded the themes and focus group comments in a secure document.

To improve the trustworthiness of this study, researchers used methodological triangulation by comparing quantitative and qualitative data. To triangulate the data, we cross checked each set of quantitative and qualitative data. We also directly acknowledged potential for bias due to reflexivity as the primary researcher was an active participant through the research process and the collaborative participants were active participants in the design and implementation of the research (Curtin & Fossey, 2007). We implemented several steps to attempt to reduce this potential bias. For the qualitative portion of the study, an experienced interviewer unaffiliated with the research completed the focus group to control bias, and researchers independently coded data and met 80% agreement to identify themes. In the quantitative portion, a staff member unaffiliated with the study administered the surveys. Researchers also completed an audit trail on a secure online platform to document each step of the qualitative and quantitative portions of the study and an experienced educator provided direct oversight throughout the process.

Results
Researchers administered three quantitative outcome measures (SACRR, PMQ, and APLOS) with 43 participants (course [n= 38] and collaborative [n= 5] participants). Furthermore, we facilitated three focus groups: one pre-course and one post-course focus group with five of the course participants and one post-course focus group with five collaborative participants.

Course Participants Experienced Growth During the Course

Qualitative

After thematic analysis, the five course participants experienced growth in their perceptions of learning and changes in their attitudes toward student involvement in course design. From pre- to post-course focus groups, course participants transformed from passive to active learners, from feeling disadvantaged to recognizing mutual benefits of student collaboration and being grade focused to learning focused.

Theme One: Passive to Active Learners. The course participants transformed from passive learners to active leaners. Prior to the course, participants demonstrated preference for passive learning by reporting "I like to get information before class and then hear it described to me" and "finding some other way of giving us information." Following the course, participants reported more characteristics of active learning, such as "we'll talk about something and I don't know what that is; I'm literally googling and finding videos" or "after we've discussed a topic, I feel like I can formulate questions that will help me learn it and make it more clear for me for real practice."

Theme Two: Feeling Disadvantaged to Recognizing Mutual Benefits. Prior to the course, the course participants felt disadvantaged when compared to their peers that participated in the design process. One participant reported "not that I feel like they are going to do better than us, but it would help me if I sat down with the instructor before the course." Another participant stated, "I think it would give me a better idea of how the course is going to run; understanding the reasoning behind everything we do would be helpful." However, after the course, the participants believed everyone could experience benefits by having a small group of students participate in course design. For example, a participant reported "we shared a lot of grievances and positives so it was nice that there was a group that could go between professor and students like that." In addition, another participant reported "I felt like especially concerns were being addressed a lot sooner and a lot better."

Theme Three: Grade Focused to Learning Focused. At the start of the semester, course participants were more focused on grades versus deep learning of content. Examples of this theme include: (1) "I still feel like I'm competent, even if I did get a B, but at the same time, I'd like to get an A"; (2) "I was very focused on getting as many points"; and (3) I think I've been very grade focused." In the post-course focus group, participants demonstrated less focus on grades and more focus on learning. One participant noted "I think I am more independent in my learning now I would say than before," while another participant believed "I think I thought a lot more deeply about the concepts we were learning as opposed to just trying to think about and understand what was even being taught that day."

Quantitative

We conducted a repeated measures t-test for to determine changes in content knowledge from pre and post-course scores on the APLOS. The findings indicate the course participants (n=38) demonstrated significant growth on the course learning objectives (APLOS) following participation in a course taught via flipped classroom model (see Figure 3). The collaborative participants (n=5) demonstrated significant growth on learning objectives 2, 3, and 4 from pre to post-course (see Table 2). There were no differences between the collaborative and course participants at post-course.
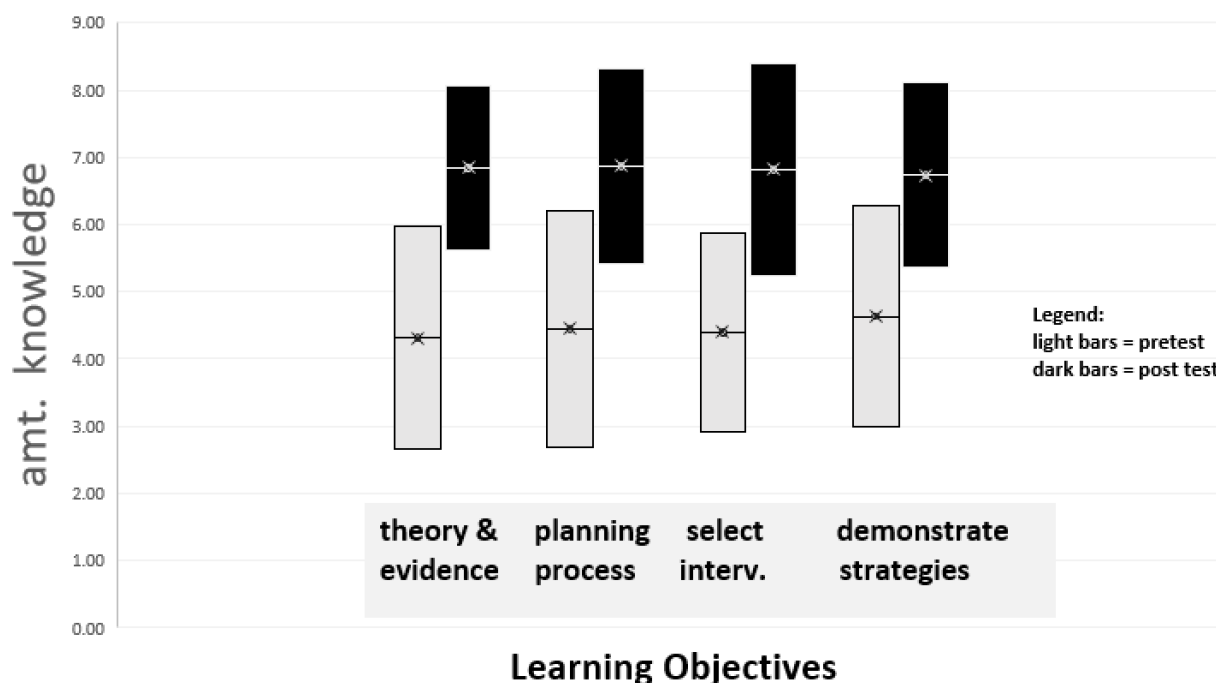

Figure 3. Course participants (n= 38) increased growth on the course learning objectives following engagement in flipped classroom.

Table 2

Results of Paired t-tests on APLOS From Pre to Post-Course

APLOS Learning Objective	Course Participants (n=38)	Collaborative Participants (n=5)
Learning Objective 1 (Using Theory and Evidence)	t = -6.956, p. < 0.001	
Learning Objective 2 (Planning Process)	t = -7.149, p. < 0.001	t = -9.798, p. < 0.0001
Learning Objective 3 (Selecting Interventions)	t = -7.193, p. < 0.001	t = -3.500, p. < 0.025
Learning Objective 4 (Demonstrating strategies)	t = -5.957, p. < 0.001	t = -3.726, p. < 0.020

Collaborators and Course Participants Experienced Similarities Following the Course

Qualitative

When comparing post-course focus groups of course participants and collaborative participants, each group shared the previously discussed perceptions of learning which included becoming active learners, recognizing the mutual benefits, and becoming learning focused (see Table 3).

Table 3

Collaborative and Course Participants Experienced Similarities Following the Course

Course Participant Post-Course Focus Group (n=5)	Similar Theme	Collaborative Participants Post-Course Focus Group (n=5)
"We'll talk about something and I don't know what that is; I'm literally googling and finding videos."	**Active Learners**	"This project has changed my view of engagement in class because I now know how necessary it is."
"We shared a lot of grievances and positives so it was nice that there was a group that could go between professor and students like that."	**Everyone Can Benefit**	"It is satisfying that we helped make this course and we're all learning things from this course."
"I think I am more independent in my learning now I would say than before."	**Learning Focused**	"I understood what I missed and I'm not worried about it because I still feel like I know the information."

Quantitative

Researchers used a MANOVA to compare clinical reasoning (SACRR) scores between the two groups of participants. There were no significant differences (Hotelling's T, $F=1.240$, $p<0.333$) between the collaborative and course participants following course completion. The comparison of post-course data between course participants and collaborative participants demonstrated both groups developed similar clinical reasoning skills (see Figure 4). Figure 4 illustrates selected SACRR items comparing the post-course scores.
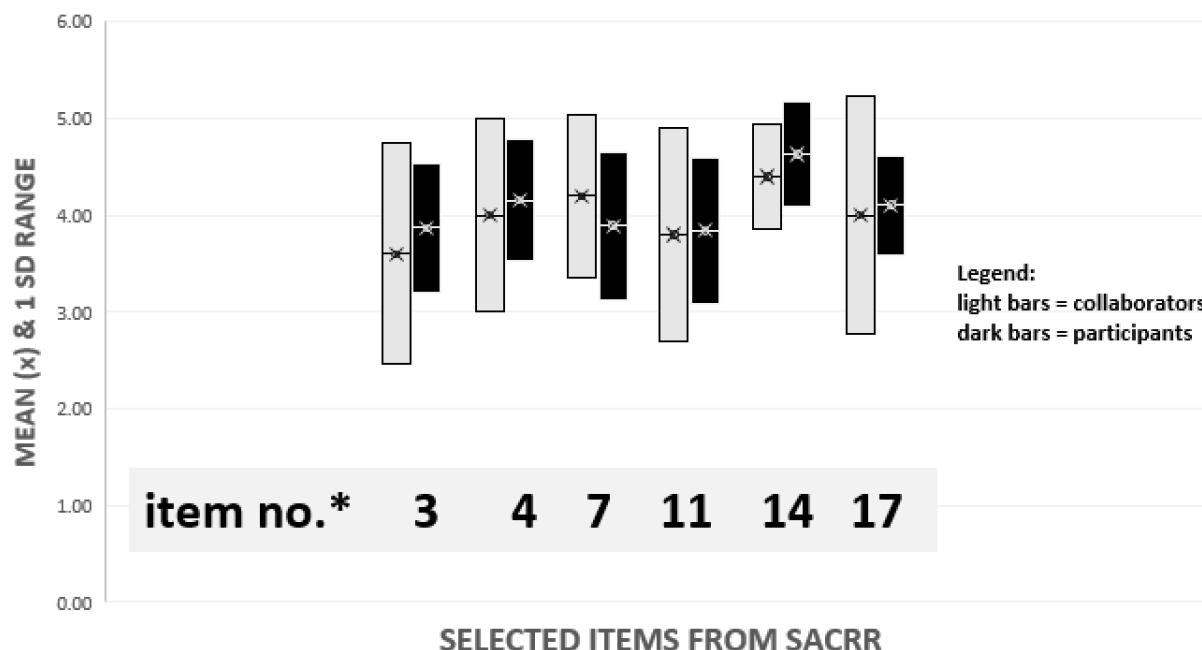

Figure 4. Collaborative and course participants clinical reasoning (SACRR) scores post-course comparison.
* SACRR items available at Royeen et al. (2011).

Collaborative Participants Experienced Additional Benefits

Qualitative

Researchers compared the thematic analysis of the collaborative participants' post-course focus group and course participants' post course focus group. The collaborative participants reported two additional themes: accountability and faculty relationships.

Theme One: Accountability. As a result of engaging in course design, the collaborative participants experienced increased accountability to self, peers, and faculty. One participant reported "I gained more self-discipline from being a part of this group because I knew this process of learning was going to benefit me." Another participant described accountability for peer learning by obtaining feedback to create an assignment; "I talked to some students and asked what they thought about it [assignment]. They thought it sounded interesting and like a good idea."

Theme Two: Faculty Relationships. In the post-course focus group, the collaborative participants discussed gaining a deep relationship with faculty. Examples of this deepened relationship include: (1) "I feel like I could call you at any point if I needed anything, just because of the relationships built through this"; (2) "we want to build skills [responsibility, communication, teamwork] for practice, but I don't think we've ever had a relationship like this from a professor that encouraged or provided that"; and (3) "we were very comfortable and completely honest with her [professor]."

Quantitative

Researchers used a MANOVA to compare the metacognitive (PMQ) scores between the two groups of participants. The collaborative and course participants demonstrated significant differences (Hotelling's T, F=+2.745, p<0.011) on three metacognitive items (out of 18 items). The collaborative participants demonstrated more characteristics of metacognitive learning by reporting less preference for traditional lecture (item 2), the teacher telling them what they need to know (item 4) and doing homework the night before (item 17).

Discussion

The purpose of this mixed-methods study was to examine changes in content knowledge, clinical reasoning, and metacognition with collaborative participants (students involved in course design), course participants (students not involved in course design) who participated in a course delivered via flipped classroom, and to compare the results between the collaborative and course participants. Researchers found that collaborative participants and course participants both experienced growth during this course. However, the collaborative participants experienced deeper learning (metacognition), increased accountability, and developed meaningful relationships with faculty.

Course Participants Experienced Growth During the Course

Our results demonstrated course participants experienced growth in knowledge and transitioned from passive learners focused on grades to active learners focused on learning during the course. We attribute these findings to the implementation of a flipped classroom model because of consistent findings with educational literature. In this model, students take their own notes, work at their own pace, and review learning materials as much as they need prior to class (Rui et al., 2017; Sammel et al., 2018). Therefore, students develop content knowledge and thought provoking questions prior to class and gain deeper understanding of the content when they participate in collaborative and active learning methods during actual class time (Boyce et al., 2017; Galway et al., 2014; Moraros et al., 2015; Roehl et al., 2013; Rui et al., 2017; Sammel et al., 2018; van Vliet et al., 2015). Similarly, Geist et al. (2015) reported nursing students engaged in flipped classroom demonstrated greater gains in knowledge when assessed by tests throughout the course than students in traditional LBL.

Our results that students transform to active learners focused on their learning are consistent with educational literature on the implementation of flipped classroom (Chen et al., 2017; Hew & Lo, 2018; Njie-Carr et al., 2017; Tan et al., 2017). Similar to our

participants, studies report students initially struggle with adjusting to this format because of their experiences as passive learners that sit and get the information from faculty (Betihavas et al., 2016; Hains & Smith 2012). In a flipped classroom, faculty implement a variety of instructional methods that consistently encourage active engagement and appeal to a range of learning styles. Consistent with our findings, studies report students value the active learning experiences after participating in a flipped classroom and would rather complete these learning activities than listen to faculty lecture (Gilboy et al., 2015; McLaughlin et al., 2014; Rui et al., 2017). In addition, the course participants in our study became less grade focused and more learning focused as a result of this method. In their study, Rui et al. (2017) also reported students engaged in this learning format had increased interest in learning. We attribute these findings to the element that students must arrive to class prepared to apply the knowledge. Therefore, they adjust their habits prior to class in order to adequately learn the material for in-class activities (versus a grade) and are motivated to enhance their skills and knowledge of contextual and meaningful course content (Bethihavas et al., 2016; McLaughlin et al., 2014; Rui et al., 2017).

Lastly, the course participants reported changes in their perception of student involvement in course design from feeling disadvantaged to believing everyone in the course benefits. At the beginning the course, the instructor explained the role of the collaborative participants in the course design process. Despite this explanation, the course participants felt the collaborative participants still had an advantage, such as knowledge of "pop" quizzes or test content. Birgbauer (2016) reported faculty do not provide information to students involved in the course design process that cannot be disclosed to students that are not involved. During the semester, the course participants began to understand this notion. In addition, the course participants provided feedback to the collaborative participants and began to view the collaborators as advocates for their learning as the instructor implemented their expressed suggestions during the course (when appropriate). Once the course participants experienced the benefits of having their peers provide feedback to the instructor, their resistance and views positively changed (Bovill et al., 2016). In a study, Birgbauer (2016) noted similar results as nine of 11 students reported strongly positive feelings about student involvement in course design.

Collaborators and Course Participants Experienced Similarities Following the Course

Following the end of the course, the collaborative participants experienced similar beliefs as the course participants about engagement in active learning and that everyone can benefit from having students involved in course design (as previously discussed). When comparing the quantitative data, researchers found that each group also experienced similar growth in clinical reasoning despite different levels of involvement in course design. We expected this finding because each group of participants engaged in a flipped classroom format used a variety of active learning strategies. Educational literature provides a number of well-reasoned explanations for why this format improves students' clinical reasoning and critical thinking skills. First, in a flipped classroom, students have more opportunities to use higher level cognitive

skills (e.g. analytic, problem solving, etc.) for practical application of content (Arnold-Garza, 2014; Betihavas et al., 2016; Dehghanzadeh & Jafaraghaee, 2018; McLaughlin et al., 2014; Moraros et al., 2015; Rui et al., 2017). Several studies suggest faculty facilitate clinical reasoning and critical thinking when they ask students to be active learners and when they teach content in-context (Betihavas et al., 2016; LoPresto & Slater, 2016; Tune et al., 2013). In this study, we incorporated several active learning strategies and clinical scenarios during the course. Students also improve their thinking and reasoning skills when they exchange ideas and experiences with their peers during various learning activities (Dehghanzadeh & Jafaraghaee, 2018). Finally, faculty are able to better recognize and address students' errors and strengths in clinical reasoning in a flipped classroom (Critz & Knight, 2013; Dehghanzadeh & Jafaraghaee, 2018; Morton & Colbert-Getz, 2017). For these reasons, flipped classroom is a reasonable learning approach to promote clinical reasoning and critical thinking in preparation for professional practice (Bossaer et al., 2016; Critz & Knight 2013).

Collaborative Participants Experienced Additional Benefits
When analyzing the qualitative data, the collaborative participants reported two additional themes: the development of relationships with faculty and increased accountability. Experts in student involvement in course design provide support for these findings in educational literature. Students assume faculty have complete authority over and expertise in their learning process (Bovill et al., 2011). However, when working collaboratively to design a course, faculty and students reduce the previous notion that a power differential exists between them (Bovill et al., 2011; Bovill et al., 2016; Butcher & Maunder, 2014; Hess, 2007). This new learning partnership is different than the traditional student-faculty relationship (Bovill et al., 2011; Butcher & Maunder, 2014). On course design teams, faculty view students as peers that have valuable input and give them an active role and voice in their education (Bovill et al., 2011; Bovill et al., 2016; Hess, 2007). When students realize they are valued and taken seriously, the faculty-student relationship is enhanced (Bovill et al., 2011; Bovill et al., 2016). The students begin to gain insight into faculty struggles and exhibit more patience with the teaching-learning process (Bovill et al., 2011). Not only do faculty spend additional time with students engaged in course design, they also often offer emotional and social support (Desai et al., 2008).

We believe the transformed student-faculty relationship is one reason why the participants involved in course design also experienced increased accountability. Bovill et al. (2011) reported when students have opportunity to work closely with faculty to develop a course, they are inspired and experience an increased sense of engagement and motivation. In addition to the relationship, educational literature suggests that students involved in the design process have an emotional connection to the content and feel ownership that the course is their course (Birgbauer, 2016; Hains & Smith, 2012). They also promote the course and share enthusiasm about the course with faculty and their peers (Birgbauer, 2016). The collaborative participants in our study demonstrated these attributes. For these reasons, we believe the participants involved in course design had an increased commitment to and engagement in deeper learning (Brooman et al., 2015).

In our study, the collaborative participants demonstrated more characteristics of metacognitive learning than the course participants. While we believe the previously described ideas of relationships and accountability influenced this finding, educational literature also provides further support that students engaged in course design experience improved metacognition (Birgbauer, 2016; Bovill et al., 2016; Bovill et al., 2016). When students participate in course design, they gain a new perspective on the teaching and learning process. They have an improved understanding of and a different approach to learning (Bovill et al., 2011). We asked the collaborative participants to consider different instructional methods, select topics, locate new and review previous readings, and appraise assignments and assessment methods. These participants were consciously analyzing what enhanced their learning, being exposed to greater depth and breadth of material, and gaining understanding of adult pedagogy. In addition, they were engaging in continuous dialogue with the instructor. They began to recognize the instructor's perspective on the course and any rationales and misconceptions were clarified (Birgbauer, 2016; Bovill et al., 2011). Therefore, the collaborative participants had an improved understanding and awareness of what was happening in the course; which led to deeper metacognitive learning (Birgbauer, 2016; Bovill et al., 2011; Bovill et al., 2016).

Limitations
Researchers recognize a few limitations in this study. First, there is potential the collaborative participants in this study were more motivated learners than course participants because they volunteered for the opportunity to be engaged in course design. However, it is likely that a high number of students enrolled in a professional graduate program are motivated learners; minimizing the potential differences between the two groups of students. In addition, when further reviewing the characteristics of the collaborative participants, there was a diverse representation of educational experiences and peer groups in the course design process.

Additionally, there was no pre-course focus group with collaborative participants; therefore, researchers were unable to perform a pre to post qualitative analysis between the collaborative and course participants. Although researchers did not collect data in the form of a pre-course focus group, the collaborative participants were still able to deeply reflect on their experiences in the post-course focus group. Lastly, we report limitations with the use of the PMQ. We developed this outcome measure for the purpose of this study and although future studies are underway, we have not yet established reliability or validity.

Suggestions for Future Research
Despite the support we found for the use of flipped classroom and student involvement in course design, there remains a need for researchers to explore these two ideas within OT education. Health professional education literature, particularly nursing and pharmacy education, provide ample support for the use of flipped classroom with undergraduate and graduate students (Chen et al., 2017; Hew & Lo, 2018; Njie-Carr et al., 2017; Tan et al., 2017). However, very few studies about the use of flipped classroom with OT students exist. Although OT faculty can draw from current health

professional education literature, we should continue to explore how flipped classroom influences the teaching and learning of our profession's unique ways of thinking and knowing (American Occupational Therapy Association, 2018; Schaber, 2014). By further investigating this learning method, OT faculty can advance understanding of the impact of flipped classroom on student development of the hard and soft skills critical for practice and examine the challenges to and key ingredients of successful implementation.

To our knowledge, scholars have not previously published research on the use of student involvement in course design in OT education. Current higher education literature advocates for faculty to explore strategies which encourage students to be active co-creators of their own learning. Additionally, our profession values the use of meaningful interventions to provide holistic and client-centered services. When OT faculty employ various levels of student involvement in course design, they achieve higher education goals and model values of the profession through the provision student-centered learning. While our qualitative and quantitative analysis initially supports the use of student involvement in course design, much knowledge remains unknown on this innovative method. Faculty can begin investigations by implementing a co-creation strategy with OT students at their local learning environment. When conducting research on OT student involvement in course design, we recommend carefully documenting the process for clear descriptions during dissemination of findings, selecting sound quantitative outcome measures to determine changes in knowledge and skills, and collecting rigorous qualitative data to understand perceptions of faculty and students. In flipped classroom and student involvement in course design studies, OT faculty can inquire about support and funding for education research at their institution or through professional resources.

Implications for Educational Practice
This paper discusses one method faculty can use to include students in the course design process. We acknowledge the collaborative group format implemented in this study requires increased time and effort from students and faculty. While this process was rigorous, researchers encourage the use of students in some form of course design due to the previously discussed results and benefits. Therefore, we provide faculty with numerous ways to involve students in their future teaching practices (see Figure 5). As faculty implement strategies, we recommend employing data collection methods to further advance the Scholarship of Teaching and Learning (SoTL) within OT education and to articulate the time cost and reward value of co-creation in course design.

As previously discussed, research supports the use of flipped classroom in health professional education. Based on this information, researchers encourage OT faculty to use this evidence-based teaching method with their students. Similar to course design, we recommend collecting data to understand the feasibility of flipped classroom with the ethos of OT education.

High involvement	Student liaisons during course that have weekly/bi weekly meetings with faculty
	Focus group prior to, during, and/or after course
	Monthly group meetings with faculty
	Faculty asking for feedback from students at various points through the semester
	Asking students to review an assignment or syllabus or select a reading
Low involvement	Pre-, mid-, and/or post-course surveys

Figure 5. Levels of student involvement in course design.

Conclusion

In conclusion, our results suggest that there are numerous benefits for both faculty and students with the implementation of a flipped classroom and involvement of students in course design. Further research is needed to explore use of the flipped classroom model and student involvement in course design for occupational therapy education.

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