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Psychology course redesign: an interactive approach to learning in a micro-flipped classroom

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Abstract

A micro-flipped classroom combines the traditional lecture-based course and the flipped classroom for a blended mixture of the two pedagogical approaches. It allows the instructor time to lecture in class, while promoting more interactive discussions between the students. In this study, we compared the differences between a traditional lecture-based course and a micro-flipped course to see if there were differences in three exam grades and overall course grades. Exam specific analyses revealed that exams delivered in the early and mid-semester (Exams 1 and 2) resulted in slightly higher grades in the micro-flipped class group, and the statistically significant benefits of the micro-flipped course emerged during the third exam. We conclude that all increases in student performance are meaningful, and benefits of the micro-flipped classroom can be realized within the course of one semester.

Keywords: Micro-flipped, Flipped, Lecture-based, College, Classroom, Pedagogy

The flipped classroom is not a new phenomenon; however, it is often utilized in classes such as physical or life sciences, mathematics, or in courses that often have difficult homework assignments. The idea of the flipped classroom came about in 2007 when two high school teachers became concerned about students poor academic performance in a Chemistry course (Albert & Beatty, 2014). According to Albert and Beatty (2014), chemistry instructors Jonathan Bergmann and Aaron Sams posted online lectures for students who were struggling with the lecture material. The technological advancement and ease of posting videos online has made this practice a relatively simple procedure.

The flipped classroom model involves redesigning the traditional lecture-based course to allow more time in class to focus on discussions and understanding the concept(s). According to Albert and Beatty (2014), the traditional lecture design is not an effective model for learning as it does not engage the students to think outside of the box. A traditional lecture-based course involves one person teaching the material while the audience listens. Albert and Beatty (2014) suggest that there are five key components in a flipped classroom. These include:

- The educational process transforms students from passive to active learners
- Technology facilitates the approach
- Class time and traditional homework time are inverted so that homework is done first
- Content is given real world context

- Class activities that engage students in higher order of critical thinking and problem solving, or help them grasp particularly challenging concepts (p. 421).

The flipped classroom incorporates technology into the learning model as students are prompted and required to listen to lecture based material at home and come to class ready to engage and apply the information in the classroom setting.

García-Peñalvo, Fidalgo-Blanco, Sein-Echaluce and Conde (2016) discuss the importance of three components in a flipped classroom including: watching a short 10-min lecture video as homework, an individual activity in class that allows the student to integrate the lecture material and the activity into meaningful information and a group discussion activity, followed by a short lecture. These components allow the student to learn in a variety of ways, which encourage an opportunity to learn, apply and engage in each chapter or section. According to Westermann (2014), the flipped classroom can be applied to any type of course, and could successfully be applied to a face-to-face course or a hybrid course.

The micro-flipped classroom is a relatively new pedagogical model that allows the professor to be able to continue to lecture, while incorporating a variety of interactive models inside of the classroom environment. The model is innovative and has been identified as a way to improve teacher-student interaction (Sen-Eshaluce, Fidalgo-Blanco, & Alves, 2017). The micro-flip can be implemented partially or completely, is not subject-dependent, and is a useful model (Fidalgo-Blanco, Martinez-Nuñez, Borrás-Gene, & Sanchez-Medina, 2017). There have been very few studies conducted on the micro-flipped classroom in general, or in the field of Psychology, despite its large size as an undergraduate major. Most of the flipped-classroom techniques have been applied to mathematics and chemistry courses, and because Psychology is a science, it makes sense to incorporate this approach.

Literature review

The flipped classroom engages students in an active learning environment (Cross et al., 2015). It is common for instructors in flipped classes to post video lectures, as this model requires that the student take responsibility for being prepared in the classroom. Students need to watch video lectures prior to class taking place, as preparedness is essential in order for the student to be able to engage in the classroom discussion. Cross et al. (2015) suggest that the instructor might have the students engaging in homework activities and in-class assignments to encourage continuous engagement. Many instructors use group activities to foster more meaningful and intimate discussions within each group. Cross et al. (2015) conducted a survey study over the flipped classroom with three classes using separate instructors. Students in a flipped classroom were more likely to approach and discuss information with their instructor, and they were more invested in the classroom overall, but this could be due to the high level of individual and group activities present in the flipped classroom (Cross et al., 2015). Student satisfaction levels were slightly higher in the flipped classroom in every category. The average grades, however, did not show a significant difference as the grades in a traditional course were relatively the same in the flipped course (Cross et al., 2015).

Albert and Beatty (2014) compared the course performance between student grades 1 year apart to see if the flipped classroom resulted in an increase in grades. They compared exam scores on three exams over the course life. In exam 1, lecture students scored

significantly lower than students in the flipped classroom. On exam 2 and exam 3, there were no statistically significant differences between the two comparison groups, but on average the exam score means increased by at least two points (Albert & Beatty, 2014).

Westermann (2014) used the flipped model to introduce students to a variety of primary sources. This gave students other perspectives associated with research. Instead of having students watch a lecture video, students were introduced to historical figures through videography and primary research. The students met once a week to have lecture and discuss the primary resource that they were asked to take care of over the previous online course date. According to Westermann (2014), this technique encourages collaboration and an alternative approach to a traditional classroom setting.

Taxonomy

Bloom's Taxonomy is a common term to those in the teaching field. This term was coined by Benjamin Bloom in 1956 (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). Bloom's Taxonomy provides the basic framework for creating a classroom that advances higher order thinking. A classroom based on Bloom's Taxonomy can foster increased retention, comprehension, and enhance critical thinking skills. Bloom's Taxonomy was redesigned and updated during the 1990s, and some of the key concepts involve: remembering, understanding, applying, analyzing, evaluating, and creating. The terms are explained as follows: remembering is simply recall of the information provided by the text or lecture material. Understanding is the explanation of the ideas and concepts related to the material learned. Applying is associated with the student being able to apply the information in a new way. Analyzing is related to the student's ability to understand and distinguish different parts of the information. Evaluating is taking a stand and justifying the information, and creating is the generation of a new point of view (Bloom et al., 1956). According to Fallahi (2008), in the realm of the taxonomy levels, one must master each level prior to being able to successfully move on to the next level.

The purpose of the flipped classroom is to increase the learner's understanding of the material and thus increase their course performance level. Therefore, understanding Bloom's Taxonomy could be a key concept for developing a learning environment that incorporates all levels of advancement within the model. Fallahi (2008) applied the course redesign principle to two Lifespan Development courses, and found that having a model similar to the taxonomy levels provided a basis for course structuring. Fallahi (2008) utilized the 2003 Fink's Taxonomy, which addressed the following concepts: foundational knowledge, application integration, learning how to learn, human dimension, and caring. These concepts were pre- and post-tested in three classes, one of which was the flipped classroom. The results indicated that there were significant differences in the domains of the flipped classroom associated with foundational knowledge, application, and human dimension. The remaining categories were similar to the reports from the traditional lecture-based classroom (Fallahi, 2008).

A partially flipped classroom is a relatively unique perspective, and very little research has been done to investigate the efficacy of the partially flipped classroom as a pedagogical model. Meyers (2016) studied a partially flipped class that incorporated a traditional lecture-based course for the first part of the semester, and a flipped course during the second part of the semester. Meyers (2016) found significant differences in the two

pedagogical approaches such as “learning, interest, and engagement” in an engineering classroom setting (p. 14).

The fully flipped classroom is not for every instructor, so “micro-flipping” is a relatively new phenomenon that allows an instructor to utilize both techniques including half lecture and half of the flipped classroom model. The idea is that students must come prepared to engage in classroom activities, as there are active engagements throughout the lecture that encourage students to participate and be very interactive during the course of the lecture (Brooks, 2014).

The objective of the current research study was to compare the student performance outcomes (grades) in the micro-flipped and traditional classrooms in an undergraduate Psychology course environment. The hypothesis for this research was that application of the micro-flip would result in better student performance compared to the traditional classroom delivery.

Method

This project began under the instruction of the Scholarship of Teaching and Learning (SoTL) program at Tarleton State University. The SoTL program mentors faculty members on how to improve the classroom teaching experience by incorporating research and implementing the design in the classroom environment. This is a free, year-long program that Tarleton State University provides to faculty via a selective application process. The mentored faculty members are selected based upon applications, project ideas and ability to create and implement an engaged scholarship piece. The goal of the program was to implement a research plan that can be utilized in the classroom with the instruction of our Center for Instructional Innovation (CII).

There are very few studies that have addressed the realm of the partially flipped or micro-flipped classroom, so this project aimed to compare differences in two courses with different pedagogical approaches. Psychology in general has very limited research studies that are aimed towards the flipped model. The study compared the differences in grades from a traditional lecture-based course in the fall semester of 2015 to a micro-flipped course in the fall semester of 2016.

Participants

Participants were Tarleton State University students and were all at least 18 years of age. All students were taking part in a freshman level General Psychology face-to-face course. There were 25 students in the traditional lecture-based class (control group) in the Fall 2015 semester, and 25 students in the micro-flipped class (experimental group) in the Fall 2016 semester. Students were told that presentation of the data would be limited to aggregate form in order to protect their identity in this study. There was no data gathered on demographics of each individual student.

The students in the fall 2016 semester were told that they were participating in a micro-flipped classroom and that their consent to participate in the reporting of grades was voluntary, and that they could withdraw consent at any time without penalty. All 25 students gave consent and remained part of the study throughout the reporting time period. The students in the fall 2015 course were contacted through email to be informed that their information was going to be used in aggregate form. These

individuals were told that they had the right to exclude their data if they chose to do so, and none of these individuals contacted the researchers to remove their grades.

Materials

The students were assessed using three examinations in the course. Assessments included hand-picked questions from the Cengage Publisher test bank. The textbook utilized in both of these courses was: *Psychology: Modules for active learning* (13th edition) by Coon & Mitterer (2014). The exams one through three were exactly the same in the 2015 and 2016 semesters, and consisted of 50 questions on each exam.

Procedure

The students in the 2015 semester were enrolled in a traditional lecture-based introductory Psychology course. In preparation for the implementation of the micro-flipped classroom, the researchers participated in a yearlong university-led program that encouraged the scholarship of teaching and learning (SoTL) and course redesign. In the course redesign program, faculty were encouraged to come up with ways to incorporate technology, interactive learning tools and engagement strategies that could be implemented in the classroom. All faculty were given resources that included: *Student engagement techniques: A handbook for college faculty* (Barkley, 2010), and *Engaging in the scholarship of teaching and learning: A guide to the process, and how to develop a project from start to finish* (Bishop-Clark & Dietz-Uhler, 2012). These two texts aided in the process of the implementation of the micro-flipped classroom.

Student assignments

This study implemented interactive classroom teaching methods in the micro-flipped classroom that were based upon the characteristics of a flipped classroom and Bloom's Taxonomy. There were group activities where the students would work on in-class assignments and come up with their own examples of each topic area and present them to the class. This was especially useful in the application of the six concepts of Bloom's Taxonomy, which are: remember, understand, apply, analyze, evaluate, and create. Students had to find a way to comprehend and make sense of difficult concepts on multiple occasions; for example, understanding an area in the brain. Students had to label and identify what the function of this area was, tell the instructor and other students what would happen if this area was damaged, and come up with a personal mnemonic to help them remember this term. We have found that association of damage to that area for example, is a great way to remember the particular section of the brain. Techniques like these are ways that an instructor can apply Bloom's Taxonomy to a difficult concept in class.

Students were assigned a major group paper and presentation that included a thorough discussion of a psychological disorder with at least one required video and links to references that would be useful to students. Each student had to identify and explain a disorder related to Psychology and discuss background information, symptoms, treatment options, and case studies related to the disorder. Instead of simply reading or lecturing over this information, students had to investigate this disorder and delve deep into the primary

literature and diagnostic manual. Implementing the discussion and particular research sections were added to the micro-flipped assignment.

A current event presentation was implemented on a weekly basis to help students apply current event topics to various chapters in the textbook. The instructors noticed that students did not know a lot about the current happenings in the world, and this was a way to implement the real world and critical thinking aspects to the classroom environment while applying it to the textbook information. It was the end goal to have students realize that most things that take place in our world can be applied to Psychology. It was also our goal to help students stay informed about current events in order to increase social awareness and human perspective. The current event project had not been implemented in the traditional lecture-based course.

Weekly online quizzes were required to ensure that the students were reading the textbook and engaging in the material virtually on a weekly basis. In the micro-flipped classroom, there were a total of 12 quizzes that specifically came from the Cengage Publishing Company test bank. These consisted of multiple choice questions that would be similar to the exam-style questions. The implementation of the online quizzes was beneficial to assess areas that students had difficulties with. They were prompted to ask questions over areas that might prove to be difficult so that they would feel more prepared for the examinations. Students in the micro-flipped classroom were more likely to ask questions on a general basis. In the traditional lecture based course, there were four short-answer quizzes that addressed in class information that would promote attendance. It would be difficult to compare grades associated with quizzes in the two pedagogical approaches due to their vast differences.

Exams were given to each student in both courses after the completion of chapters 1–4 (Exam 1), chapters 5–8 (Exam 2), and chapters 9, 11, 12, and 14 (Exam 3). These exams were the same in each course in order to accurately compare the exam scores in the traditional and micro-flipped classroom. In addition to exam scores, the students' overall course grades were assessed, and these included a paper and presentation, quizzes, numerous in-class activities, and homework assignments (see Table 1, pp. 17–18).

The students in the micro-flipped class were very engaged and asked a lot of questions about the material and other areas related to Psychology in general. It is important to note that these courses are taken by all majors and we did not have many students in these two courses that identified as Psychology majors.

Results

A total of 50 students participated in the study, 25 from the traditional lecture-based course (control group) and 25 from the micro-flipped course (experimental group). Grades were compared for three identical examinations over the course of the Fall 2015 and Fall 2016 semesters. An independent samples *t*-test was conducted to compare the traditional lecture-based course grades to the micro-flipped course grades. There were no significant differences on the first examination and the micro-flipped classroom ($M = 90.16$, $SD = 8.20$) and traditional lecture-based course ($M = 89.8$, $SD = 7.45$), $t(48) = .162$, $p = .872$. There were no significant differences on the second examination and micro-flipped classroom ($M = 86.64$, $SD = 8.26$) and traditional lecture-based course ($M = 84.32$, $SD = 7.41$), $t(48) = 1.04$, $p = .301$. In contrast, there was a significant difference in the scores for the third examination in the micro-flipped classroom ($M = 89.36$, $SD = 5.70$) and traditional

Table 1 Course Assignments

Assignment	Differences in the micro-flipped and the lecture-based class	Brief Description
Exam 1	None	Chapters 1–4
Exam 2	None	Chapters 5–8
Exam 3	None	Chapters 9,11,12, 14
*Chapter Quizzes	Implemented online weekly chapter quizzes (12)	Chapter quizzes (4)
*Brain	The micro-flipped class had to associate damage to the area of the brain and come up with a mnemonic and present to class	Label the brain and discuss functions. Present to the class
*Memory	Identify terms, create mnemonics, and present to class	Identify terms. Present to the class
Ear/Eye	None	Label and identify function
Song	None	Find a song that identifies your personality and write a short paragraph about the significance.
*Current Event	This was a completely new event that was added to the micro-flipped class. Find a current event topic and relate it to Psychology; use the textbook as a reference. Present to the class.	Find a current event topic and relate it to Psychology; use the textbook as a reference. Present to the class.
*Learning	Students had to implement the project instead of simply creating the project.	Create a learning project: Behavior modification, classical, or operant conditioning. Present to the class.
Drugs Inc.	None	Watch an episode of Drugs Inc. and answer questions about your knowledge of drugs.
My Plan	None	Take the "My Plan" assessment and relate your personality characteristics to the Myers Briggs. Classroom activity over the letters.
Topics in Psychology	None	Choose a topic in Psychology and discuss its relevance. Discussion group activities
*In class group discussions	Video lectures must be watched prior to class time in order to promote more in depth discussion.	3 discussions at 5 points each. These were over topics that were of key interest. Students chose topic areas to discuss.
*Research paper/Presentation	Show a video in class, present to the class, and relate it to the knowledge one has gained over the course. Group discussions followed.	Psychological Disorders

Note: The asterisks (*) indicate areas that show modifications in the micro-flipped classroom

lecture-based course ($M = 82.76$, $SD = 9.52$), $t(48) = 2.97$, $p = .005$. There were no differences in the overall course grades in the micro-flipped classroom ($M = 87.44$, $SD = 5.67$) and the traditional lecture-based course ($M = 85.40$, $SD = 5.13$), $t(48) = 1.33$, $p = .189$.

Discussion

A comparison of the overall course grades of the micro-flipped and the traditional lecture-based classroom revealed that there were no significant differences, but it is important to note that overall course grades were slightly higher in the micro-flipped classroom. This provided an overall snapshot of the course performance including exam scores and other assignments. The overall course grades did increase by two points, which was consistent with other studies and the flipped classroom results (Albert & Beatty, 2014). This is

important because it shows that the micro-flipped classroom can show similar benefits compared to the fully flipped classroom. Instructors that do not want to give up full lecture time might be able to utilize the micro-flip technique instead, without compromising student performance outcomes.

The hypothesis for this research was that application of the micro-flip would result in better student performance compared to the traditional classroom delivery. While that effect was not captured in overall course grades, this effect did emerge when individual exams were assessed. Exam three scores showed a difference in mean test scores of 6.6 points between groups, which was significant at the alpha .05 significance level.

While the overall course grades were not enough to account for a significant increase over the entire semester, they are still important to report because an increase in two points can potentially move a student to the next grade level. The micro-flipped classroom may not immediately result in significant differences among grades during a short 16-week semester, but because there was a significant difference between groups on the third exam, there is a potential benefit to the long-term effects of a micro-flipped classroom. These benefits to students may not significantly manifest until the end of the semester, but students have learned valuable skills to take on to future classes. These students are better prepared to converse with one another as well as the instructor, and they have learned valuable ways to incorporate the material into meaningful information that can be applied to any subject area.

Conclusion

The micro-flipped classroom has not been researched in the context of Psychology courses. However, introductory psychology courses are often difficult for incoming freshman, so the concept of enhanced understanding that comes with the flipped model is an endeavor that needs to be further investigated. Future research should focus on testing the differences in instructional approaches between the fully flipped, micro-flipped, and a traditional lecture-based classrooms to identify the differences in these three models and compare the course grades. In subsequent studies, it would be beneficial to address student satisfaction levels as well. It would be beneficial to look at a mixed-methods approach in order to address the qualitative and quantitative aspects of the micro-flipped classroom. A student who is satisfied with his or her instructor and the course itself is likely to have a higher attendance rate and is likely to be more engaged in the class, so it would be advantageous for future researchers to assess qualitative properties of the micro-flipped, flipped, and traditional lecture-based courses. It would be beneficial to follow students that have participated in the micro-flipped classroom to see if there are benefits that have carried on throughout their college experience.

The benefits of the micro-flipped classroom delivery can be realized within the course of one semester, and it might be beneficial to follow these students long-term or in sequential courses to assess their progress. In conclusion, the overall course grades improved by approximately two points in the micro-flipped class compared to the traditional lecture-based courses. Students in the micro-flipped classroom increased by 0.36 on exam 1, 2.32 points on exam 2, and 6.6 points on exam 3, so skills appear to develop as a building block methodology.

Limitations

The sample size was limited, and the study was conducted using only two classrooms. It would be beneficial to address multiple classroom environments using a comparison methodology between the flipped, micro-flipped and regular classroom environment. There is a lack of published literature pertaining to the micro-flipped classroom. While that presents a novel research opportunity, it does not allow for a comparison of data or effect size standards. This research can contribute to that gap in the literature. More research about the micro-flipped classroom is paramount.

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Authors' contributions

An 'author' is generally considered to be someone who has made substantive intellectual contributions to a published study. JB carried out the process of the study within the classroom setting. JB and AB participated in the sequence alignment and helped drafted the manuscript. AB and JB participated in the design of the study and performed the statistical analysis. AB and JB conceived of the study, and participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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