



It All Adds Up: Flipped Classroom Approaches in Retail Math Instruction

Amy Dorie and Jessica Hurst, Iowa State University, USA
David Loranger, Philadelphia University, USA

Keywords: Flipped classroom, active learning, Constructivism, retail math

A shift has begun from instructor-focused learning techniques and philosophies to those that are more student-focused, where the instructor acts as a “guide” and not a dictator of knowledge (Marcketti, 2011, p. 548). A portion of this shift is due to Constructivist thinking (Hein, 1991), the idea that learning occurs collaboratively when students work together towards a common goal to solve problems (Kimmons & Spruiell, 2005). In this active learning scenario, students achieve a much higher level of meta-cognition, a more robust understanding of principles, and participate with enthusiasm (Marcketti, 2011). An active learning approach gaining wide attention as a tool for reaching 21st century students is that of the flipped classroom. In the flipped classroom, students watch video lectures online, then in-class hours are dedicated to activities designed to promote active learning. Researchers suggest that flipped classrooms lead to better student engagement and overall learning (Bormann, 2014). However, critics note that this technique is grounded in what is possibly a flawed pedagogy: the lecture (Ash, 2012). Roehl, Reddy, and Shannon (2013) advocated the use of the flipped classroom design for apparel, merchandising, and design courses; however, there is scant literature concerning the impact of this technique in the field. Therefore, the purpose of the current study is to investigate the effectiveness of a flipped classroom approach in an apparel merchandising course.

Research questions. The study was guided by the following research questions: 1) Do students perform better in a flipped or lecture-based classroom? 2) Which method do students prefer? 3) Do student characteristics influence student performance in a flipped classroom?

Method. A mixed methods approach was used to address the research questions. A course on merchandise planning and retail math was redesigned to include two flipped units and two lecture-based units (students completed all units). Short 10-15 minute video lectures, in-class worksheets, and case studies were created for the flipped units. All units included exams and quizzes. Students ($n = 46$) completed online surveys after each unit, 16 students participated in focus groups (conducted by research assistants), and grades were recorded and matched to survey responses. The survey instrument was comprised of previously validated items tapping student characteristics: academic self-efficacy, math anxiety, and optimism. Quantitative analyses included analysis of variance (ANOVA) and hierarchical regression. Data were checked for violations of the assumptions of regression and composites of the variables were used in the analysis. Qualitative analyses included techniques such as the constant comparative method. Focus group data were coded by two researchers resulting in an acceptable inter-coder reliability of 85% (Creswell, 2014).

Results. There were no significant differences in students' exam scores (out of 100) for the flipped ($M = 81.26$) versus lecture-based units ($M = 80.06$) ($F_{1,45} = 0.37, p > .05$). Students' quiz scores however, were significantly higher for the lecture units ($M = 94.13$) than for the

flipped units ($M = 88.70$) ($F_{1,45} = 5.34, p < .05$). Students gave an overall satisfaction rating of 1.92 (on a scale of 1 to 5) for the lecture-based units, which was significantly higher than their rating of the flipped units ($M = 2.58$) ($F_{1,45} = 26.84, p < .000$). At the end of the course, 14% of the students reported a preference for the flipped format over the lecture format. Finally, hierarchical regression indicated that the only significant predictor of students' grades in the flipped class was optimism ($b = 2.62, t = 3.24, p < .01$). All remaining student characteristics were non-significant. Results of the focus groups suggested that students preferred the social aspect of learning in the lecture-based classroom over what they perceived as "learning on their own" in the flipped classroom. The students desired immediate feedback from professors and peers in order to ask questions, clarify concepts, and confirm math calculations and felt that the online message boards available during the flipped units were not adequate for this purpose. The students also felt that the flipped units were more time consuming than the lecture units, and they were unmotivated to watch the lecture videos outside of class. By contrast, students expressed an interest in having on average, an additional 1.3 hours of class time per week, so that both the lecture and the in-class practice from the flipped units could occur during class time.

Conclusion. It is paramount that instructors develop efforts with the end-goal of preparing industry-ready apparel and textile professionals, and this involves the careful planning of course format and materials (Sanders, Zhang, McKinney, Lee, & Bennett, 2014). However, this must be balanced with an understanding of the learning preferences of students and the effectiveness of various methods. Many academics advocate for use of the flipped classroom, but this method may not be effective for every classroom or every student. In the current study, a majority of apparel merchandising students opposed the method and quiz scores suggested students actually performed better in the lecture-based units, contrary to prior research (see Bormann, 2014). Flipped class advocates see the lecture-based classroom as one-sided; however, students in the current study saw the classroom as an interactive environment where immediate exchanges with their professor and peers during the lectures were vital to their learning; suggesting that lecture-based formats may be integral when teaching retail math. As there are no standard techniques to flipping a class, future research could investigate the key practices of the flipped classroom that lead to increased student learning in a wide variety of courses.

References. Ash, K. (2012, August). Educators evaluate 'flipped classrooms.' Retrieved from <http://www.edweek.org>

Bormann (2014). Affordances of flipped learning and its effects on student engagement and achievement [Master's thesis]. Retrieved from <https://pdfs.semanticscholar.org>

Hein, G. (1991). Constructivist learning theory. Institute for Inquiry. Retrieved from <http://www.exploratorium.edu>

Kimmons, J. V., & Spruiell, P. R. (2005). Using problem-based learning in a multidisciplinary setting. *Clothing and Textiles Research Journal*, 23(4), 385-395.

Marcketti, S. B. (2011). Effective learning strategies in the history of dress. *The History Teacher*, 547-568.

Roehl, A., Reddy, S., & Shannon, G. (2013). The flipped classroom: an opportunity to engage millennial students through active learning strategies. *Journal of Family and Consumer Sciences*, 2, 44-49.

Sanders, E. A., Zhang, P., McKinney, E., Lee, Y. A., & Bennett, S. (2014). Insights from an Industry Advisory Board about Online Education for Practitioners. Paper presented at ITAA Conference: Charlotte, NC.