It All Adds Up: Impact of the Flipped Classroom Approach related to Achievement, Student Satisfaction, Self-Efficacy, Anxiety, and Optimism in a Retail Math Course

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Purpose of the Study: Experiential approaches to marketing education such as flipped instruction have been found to be effective in building analytical skills in marketing and retailing students, which are demanded by today's employers. Interest in student-focused techniques has been further intensified by the ongoing COVID-19 crisis. Recent studies have called for more research on student participation and motivation in flipped marketing-related math classes. The purpose of the current study is two-fold: 1) investigate the effectiveness of a flipped classroom approach in a retail mathematics course with regards to student achievement, satisfaction, self-efficacy, anxiety, and optimism, and 2) use these results to recommended best practices for teaching marketing and merchandising courses involving retail mathematics using a flipped classroom and/or remote instruction method.

Method/Design and Sample: A merchandising mathematics course was redesigned with two flipped units and two lecture-based units. Forty-six students completed all units. A mixed methods approach utilizing both quantitative (survey instrument) and qualitative methods (focus groups) was used to investigate the hypotheses and research question.

Results: Students opposed the flipped method and desired classroom interaction where exchanges with the professor and peers during lectures were vital to learning. Quiz scores indicated students performed better in the lecture-based units. Results suggest students are more successful and satisfied by a retail math course that features immediate interaction with instructors and instant feedback regarding mathematical calculations.

Value to Marketing Educators: The present study provides more granularity to marketing educators regarding the efficacy of flipped class approaches, particularly for retail math-related courses.

Keywords: Flipped instruction, undergraduate, retail mathematics

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Traditional methods of business school instruction involve techniques such as lectures, where teachers compartmentalize content in a linear fashion and students are viewed as a passive audience soaking up knowledge (Barr & Tagg, 1995; Bhakti et al., 2019; Cao & Swada, 2020; Kumar, Mukherjee, & McGinnis, 2015). Critics of traditional lecture methods point out that students possess variable cognitive abilities (Mann & Enderson, 2017), display a large range of out-of-class initiative (Bormann, 2014; Cevikbas & Kaiser, 2020), mentally disconnect from classroom lectures after 15-minutes (Bonwell & Eison, 1991), and only retain 20-40% of content (Crittenden, Biel, & Lovely, 2019). This traditional dynamic is outlined in Bloom's Taxonomy for Learning (1956), which delineates in-class activities as "remembering, understanding […] and applying" (Bormann, 2014, p. 7); students are solely responsible for abstract, higher-order activities of "analyzing, evaluating, and creating" outside of class (p.7). For these reasons, conventional instructional formats may lead to student dissatisfaction and disengagement (Abedi, Keshmirshekan, & Namaziandost, 2019; Bonwell, 1996).

Instructor-focused learning techniques are giving way to student-focused "flipped" approaches, where the instructor acts as a director and not a dictator of knowledge (Bhakti et al., 2019; Marcketti, 2011). Flipped learning occurs when students collaborate towards a common goal to solve problems (Cevikbas & Kaiser, 2020; Kolb, 1984; Kumar et al., 2015). In this active learning scenario, students achieve a much higher level of meta-cognition, develop a more robust understanding of principles, and participate with enthusiasm (Marcketti, 2011; Yurniwati & Utomo, 2020; Yen, 2020). This is achieved through a dynamic mixture of in-class approaches and external activities (Bonwell & Eisen, 1991; Bowen, 2012; Cevikbas & Kaiser, 2020), such as a combination of pre-recorded and self-guided materials for students to explore on their own, while synchronous class time is spent on active learning via

discussions, projects, and audiovisual materials (Cevikbas & Kaiser, 2020).

Active learning approaches are gaining wide attention and a combination of technological and pedagogical approaches are being employed as a tool for reaching 21st century marketing students (Crittenden et al., 2019; Yen, 2020; Yurniwati & Utomo, 2020). Interest in student-focused techniques has been further intensified by the ongoing COVID-19 crisis (Carolan et al., 2020; Yen, 2020; Yurniwati & Utomo, 2020). Schlegelmilch (2020) outlined this approach as an "incremental albeit necessary" (p. 103) component in the evolution of business school education.

Research has outlined the need for an evolution in marketing and retailing instruction (Mann & Enderson, 2017) to produce job candidates with analytical skills (Grewal, Motyka, & Levy, 2018; Mann & Enderson, 2017) due to an increased demand for those in the areas of "merchandising/buying, inventory management, store management" (Chatterjee & Kumar, 2017, p. 1). However, studies have found marketing students sometimes fail to understand the key role of mathematics and analytics in the marketing and retailing field (Cappuccitti, Gunn, & Lee, 2020; Hartley, Routon, & Torres, 2019) and are often underprepared upon entering retail careers (Mann & Enderson, 2017). Some students may be drawn to completing a marketing degree due to a perception of it being a non-quantitative discipline (Flight, 2021). To combat this, experiential approaches to marketing education such as flipped instruction have been found to be effective in building analytical skills in marketing and retailing students (Kumar et al., 2015) with techniques that allow students to think more deeply about the purpose of analytical procedures (Lo, Hew, & Chen, 2017; Mann & Enderson, 2017).

It is essential to understand the efficacy of "flipped" approaches in comparison to traditional teaching methods as institutions strive to meet marketing students' educational needs (Cevikbas & Kaiser, 2020). Researchers have advocated the use of the flipped classroom design for marketing and retailing-related courses to foster student engagement (Green, 2015; Wang, Wang, & Luo, 2019) and collaboration (Salas-Rueda, 2021), and to reduce student anxiety (Petrochuk, 2020). However, there is scant literature covering the impact of this technique with courses concerning retail math (Flight, 2021; Mann & Enderson, 2017; Salas-Rueda, 2021) and recently, Salas-Rueda (2021) called for more research on student participation and motivation in the flipped classroom. Therefore, the purpose of the current study is two-fold: 1) investigate the effectiveness of a flipped classroom approach in a retail mathematics course with regards to student achievement, satisfaction, self-efficacy, anxiety, and optimism, and 2) use these results to recommended best practices for teaching marketing and merchandising courses involving retail mathematics using a flipped classroom and/or remote instruction method.

REVIEW OF LITERATURE

Active Learning: The Flipped Classroom

Although Bloom et al.'s (1971) Taxonomy serves as a system to build proper balance in curriculum development and assessment, Krathwohl's (2002) update of the *Taxonomy* modifies the "knowledge dimension" to include "metacognitive knowledge" (p. 214), thus ensuring a student's awareness of not just the subject matter, but *how* they think. In Bonwell's Learning Paradigm, course content should include "enhanced lectures" (Bonwell, 1996, p. 31) (incorporating breaks, discussion, writing exercises, and non-graded quizzes), audio/visual methods (Abedi et al., 2019), in-class group projects, and industry collaboration (Bowen, 2012, Kozar & Marcketti, 2008), which adds substantial depth to class composition and encourages students to develop a more abstract level of problem-solving skills. This approach generates a deeper level of knowledge and the ability to think abstractly about concepts, along with building students' skillset in working in diverse and interdisciplinary settings.

The Learning Paradigm manifests within the flipped classroom, which is a pedagogical approach that reverses traditional lectures and homework assignments by pre-recording lecture content and devoting class time to active discussion and activities (Cevikbas & Kaiser, 2020; Lo et al., 2017; Yurniwati & Utomo, 2020; Yen, 2020). Flipped classroom approaches re-situate "direct [teacher] instruction" (Lo et al., 2017, p. 53) from the physical group classroom setting to the individual student's home setting (Abedi et al., 2019). Abedi et al. (2019) point to Khan Academy as an early innovator of this type of instruction; short videos are provided for home viewing, giving students flexibility and accounting for differing learning styles. In-class time is then devoted to active scenarios where the instructor merely guides students through exercises and activities that apply knowledge learned prior to class (Cevikbas & Kaiser, 2020; Lo et al., 2017; Yurniwati & Utomo, 2020; Yen, 2020).

Student Outcomes in Flipped Approaches: Grades and Satisfaction

Grades. Ichinose and Clinkenbeard's (2016) study compared students' engagement levels and achievement in college algebra using flipped and traditional instruction. The researchers found that flipped students performed better on individual testing instruments, attaining a 7% higher overall class grade, and a 9% higher pass rate over the group instructed using traditional techniques. Peterson (2016) also found that students in a flipped section of a statistics course performed better on exams by a full letter grade than those in a lecture-based section. Cilli-Turner (2015) found that grades improved significantly for flipped versus traditional undergraduate statistics students, but students were less satisfied. Still, several of these analyses do not consider mathematics instruction that applies to retailing and marketing.

Satisfaction. Student satisfaction is defined as a student's perception of the college experience and the value of education (Bollinger & Martindale, 2004). Recently, Salinas-Rueda (2021) studied Mexican college marketing students studying interest rates, value, and discount calculations in a financials class. Supplemental bilingual materials were provided, such as language videos, on-line exams, lab work, and a shared Google Sheet that students could contribute to. These materials had positive effects on students' perceptions of their math skills, but the inquiry did not compare flipped and lecture-based approaches and was not retailing-specific. Cappuccitti et al. (2020) designed a retail lab experiential course where students assumed industry roles and collaborated as a store team. This flipped approach was effective, as students discovered mathematics and analysis as key to running a retail establishment.

Van Alten et al.'s (2019) meta-analysis found a small effect of flipped classrooms on learning outcomes (tests, quizzes), but no effect on satisfaction, although the studies were not math, retail, or marketing specific. A meta-analysis of flipped mathematics courses by Lo et al. (2017) including calculus, statistics, algebra, and others, indicated a significant positive effect on student achievement in flipped over traditional classroom methods. Researchers also found that students in a flipped statistics course were more satisfied than those in a lecture-based section (Peterson, 2016). Byun et al.'s (2012) flipped classroom study found that students' attitudes and social/cognitive learning outcomes were positively impacted by implementation of the approach. Despite the lack of research on flipped approaches in the retail math sector of the marketing field, research from related fields, such as statistics (Cilli-Turner, 2015; Peterson, 2016; Phillips & Phillips, 2016), education (Dove and Dove, 2015; González-Gómez, Jeong, & Cañada-Cañada, 2019; Pajares & Graham, 1999), and algebra (Ichinose and Clinkenbeard 2016; Yurniwati & Utomo, 2020), leads to the following hypotheses:

H1: Mean grades for flipped units will be greater than for lecture-based units.

H2: Mean satisfaction for flipped units will be greater than for lecture-based units.

The Role of Self-Efficacy

Perceptions of self-efficacy are defined as a "belief in capabilities to produce given attainments" (Bandura, 2006, p. 307). Flipped classroom approaches have been found to foster self-efficacy and independent learning (González-Gómez et al., 2019). Bandura (1977) indicated that expectations of efficacy are integral to the relationship between behaviors and outcomes and sources of self-efficacy included "performance accomplishments, vicarious experience, verbal persuasion, and physiological states" (p. 191). Self-motivation can be reinforced by sustained effort to overcome periodic failure; over time, high levels of expertise can be obtained by maintained effort (Bandura, 1977). "Verbal persuasion" (p. 198) may influence pursuit of subject mastery, such as teachers framing content as "can do," rather than "will do" (Bandura, 2006, p. 308). Social cognitive theory posits that self-regulation is key to "human functioning" (Bandura, 1986, p. 443) and may lead to concept mastery (Usher & Pajares, 2008). Individuals who believe that they can manage their own learning and carry it out effectively possess "self-efficacy for self-regulated learning" (p. 444), which has been linked to achievement in mathematics and science subjects (González-Gómez et al., 2019; Usher & Pajares, 2008).

Self-efficacy for self-regulated learning may be linked to students' self-concept in terms of an optimistic outlook (Usher & Pajares, 2008) in mathematics-related classes (Pajares & Graham, 1999). Usher and Parajes (2008) found self-efficacy for self-regulated learning impacted student achievement across subject areas and Alghamdi et al. (2020) found this relationship to hold true for both face-to-face and online instruction. Research has indicated that female students illustrate higher levels of self-efficacy for self-regulated learning (Alghamdi et al., 2020) in terms of superior organizational skills and self-monitoring (Pajares, 2002), and given the greater proportion of women than men in marketing (54%), retailing (85%), and merchandising (93%) degrees (Business Degree Central, 2019), the following is proposed:

H3a: Self-efficacy for self-regulated learning will positively impact student performance for the flipped classroom units.

Math Content and Anxiety

Marketing and retailing demand keen analytical abilities and it is imperative that educators craft pedagogy with this in mind (Chatterjee & Kumar, 2017; Flight, 2021; Grewal, Motyka, & Levy, 2018). Flight (2021) stated: "Where do marketers fit if they lack focus in a specific subfield, abhor math, and do not fully realize the key role they play in creating value for the firm?" (p. 13). Students view marketing majors as "math light" (Flight, 2021, p. 12), and research has shown that marketing students suffer anxiety when confronted with quantitative content (Bhowmick, Young, Clark, & Bhowmick, 2017; Tarasi, Wilson, Puri, & Divine, 2013).

Math anxiety involves negative feelings that interfere with manipulation of numbers and quantitative calculations in a wide variety of contexts (Bhowmick et al., 2017). Anxiety around quantitative concepts can lead to lower self-confidence and lower motivation in math courses (Tapia, 2004). Tarasi et al. (2021) focused on undergraduate marketing students' math anxiety and found that marketing students had significantly less quantitative abilities than students in other business majors. In a study of marketing students, Bhowmick et al. (2017) found that higher levels of math anxiety have been found to be significantly related to lower performance on mathematical calculations. Dove and Dove (2015) found no impact of math anxiety on student performance in a flipped mathematics course. However, research has also indicated gender differences in quantitative orientation (Tarasi et al., 2013) and math anxiety (Bhowmick et al., 2017) making it important to further explore the impact of math anxiety in sub-disciplinary areas of marketing that are heavily

populated by female students, such as retailing (Business Degree Central, 2019). Hence, the following hypothesis:

H3b: Math anxiety will negatively impact student performance for the flipped classroom units.

Optimism

Optimism is a "general predisposition to expecting positive outcomes" (Nonis & Wright, 2003, p. 332). Those who possess an optimistic attitude have been found to be inclined towards success (González-Gómez et al., 2019; Holmes et al., 2017) and have higher grades in business-related courses (Nonis & Wright, 2003). Research indicates flipped classroom methods can positively impact student self-esteem and increase optimism in subject matters (González-Gómez et al., 2019; Mulawarman, Susilawati, Syifa, & Rifani, 2020). Chao and Yu (2019) studied adoption of online learning systems by business students and found optimism to play a significant role. Still, there is a dearth of literature regarding student optimism specific to flipped learning outcomes in the retailing discipline, which guides the following hypothesis:

H3c: Optimism will positively impact student performance for the flipped classroom units.

Student Perceptions of Instructional Approaches

It is important that students have a positive attitude towards the type of instructional architecture that faculty provide to them (Nouri, 2016). Flipped classroom techniques have been found to resonate positively with students and this approach reaches those of all aptitudes, including low-achieving individuals (Abedi et al., 2019; Nouri, 2016). A number of studies indicate that the flexible nature of flipped learning is more attractive to students than traditional methods (Abedi et al., 2019; Nouri, 2016). Flipped students have also been more likely to continue on with the subject matter due to their positive perceptions of the learning environment (Byun et al., 2012). An exploratory-sequential approach has been found to yield more nuanced data on student experiences with instructional techniques (Chao & Yu, 2019). Thus, a qualitative method will be employed to answer the following research question:

RQ1: What are students' perceptions of and experiences in flipped and lecture formats?

METHOD

Upon Institutional Review Board approval, a mixed methods approach utilizing both quantitative (survey instrument) and qualitative methods (focus groups) was used to investigate the hypotheses and research question. In mixed methods designs, qualitative analysis can provide richer understanding of a phenomenon under study by developing "explanation, context, and enhancement" on quantitative results (Clark & Badiee, 2010, p. 289) and can mitigate the limitations of each approach (Creswell, 2014).

Course Design

A four-unit course on merchandise planning and retail math was redesigned to include two units of flipped instruction and two lecture-based units. For the flipped units, short 10-15 minute video lectures that covered course concepts and demonstrated basic sample retail calculations were created. The videos were uploaded to YouTube for viewing outside of class time. Activities for in-class instruction during the flipped units included worksheets, case studies, and discussion questions involving application problems and more challenging retail-math calculations. Conversely, the lecture-based units included in-class lectures on course concepts and demonstration of basic calculations; whereas, out-of-class homework assignments involved advanced calculation and application exercises. Both the flipped and lecture-based units included multiple choice online quizzes and in-class exams.

Instrument

The pre-course survey instrument was comprised of previously validated items tapping student characteristics: self-efficacy for self-regulated learning (Usher & Pajares, 2008), math anxiety (Betz, 1978), and optimism (Scheier et al., 1994). The instrument used after each unit included a single-item measurement of satisfaction on a five-point Likert-type scale ranging from very satisfied (1) to very dissatisfied (5) with the final survey including a question assessing preference for the lecture or flipped format. For the focus groups, research assistants guided the participants in an open discussion on their perceptions of the two classroom approaches with questions such as, "what are your thoughts on the two teaching methods employed in [course name]?" and "what was it like to learn in each format?".

Procedure

Students completed all four units of the course, including the two flipped and two lecture-based units. The flipped units were randomly assigned resulting in the second and third units of the course being conducted in a flipped format.

Quantitative. Students completed online quizzes and in-class exams for all units, along with online surveys before the course and after each unit. Students earned extra credit points (less than 0.5% of total grade) for completing the surveys. Grades on quizzes and exams were recorded and matched to students' survey responses.

Qualitative. Two research assistants were trained in group interview techniques (Morgan, 1997) and qualitative data were collected via focus groups. After obtaining informed consent, the research assistants conducted three focus group sessions during the last two weeks of the semester, with a total of seventeen students who were each compensated with $5 dollar gift cards. Each focus group discussion lasted for approximately 45-60 minutes before data saturation was reached. Data collection for both the quantitative

survey and the qualitative focus groups was completed prior to the COVID-19 outbreak.

Data analyses

Quantitative analyses including analysis of variance (ANOVA) and regression were employed to investigate hypotheses one through three. For the first two hypotheses, a blocked design was employed to control for the variability in individual student achievement in each of the flipped and lecture course units. The teaching method (flipped or lecture) served as the independent variable, student as the blocking factor, and student quiz grades, exam grades, and satisfaction were included as the dependent variables in the ANOVAs. For hypothesis 3, regression was used with the independent variables of self-efficacy for self-regulated learning, math anxiety, and optimism and the dependent variable of average grade on the flipped units. Variable composites were used in all analyses. Data were checked for reliability and violations of the assumptions of ANOVA and regression.

An explanatory-sequential mixed method design was used to gain further clarification on quantitative findings (Clark & Badiee, 2010). Focus group data were transcribed and coded by two researchers. Analysis was achieved by a constant comparative method and emergent themes were developed through an iterative process (Creswell, 2014). Reliability was estimated by calculating the rate of coding agreement between the two researchers (Creswell, 2014).

RESULTS

Forty-six students completed all flipped and lecture-based units and online surveys. The quantitative sample was majority female (96%) with a mean age of 20 (SD = 1.33). The ethnicity of the students was white (86%), Black (2%) and Asian (11%). The sample included juniors (67%) with some sophomore (15%), senior (13%), and graduate (4%) students. The average grade-point average was 3.21 (SD = 0.37) and 72% were working part-time jobs an average of 15 hours per week. The qualitative sample was a subset of the quantitative sample, including seventeen sophomore (7%), junior (22%), and senior (9%) students who were majority female (88%) and white (88%) with a mean GPA of 3.19 (SD = 0.82).

Data Quality

Quantitative data were checked for reliability and all multi-item measures achieved acceptable reliability with Cronbach's alpha statistics above 0.8. Residual plots and the Durbin-Watson test did not indicate assumption violations for the ANOVA and regression models, in terms of normality, homoscedasticity, or autocorrelation of residuals. Coding of the qualitative data achieved an acceptable inter-coder reliability of 85% (Creswell, 2014).

Quantitative Results

In testing hypothesis 1, two blocked ANOVAs were conducted to look at differences in exam and quiz grades for the flipped and lecture-based units. There were no significant differences in students' exam scores (out of 100) for the flipped (M = 81.26, SD = 15.39) versus lecture-based units (M = 80.08, SD = 15.84) ($F_{1,137}$ = 0.43, p > .05) (Table 1). Students' quiz scores were significantly higher for the lecture units (M = 95.00, SD = 11.72) than for the flipped units (M = 89.78, SD = 17.66) ($F_{1,137}$ = 5.63, p < .05) (Table 1). These findings reject hypothesis 1 that suggested higher grades in the flipped units than the lecture-based units.

Hypothesis 2 proposed that student satisfaction would be higher for the flipped units than the lecture-based units. Students gave a mean satisfaction rating of 1.92 (SD = 0.77) for the lecture-based units, where 1 equaled "very satisfied", which was significantly better than their rating of the flipped units (M = 2.59, SD = 0.97) in rejection of hypothesis 2 ($F_{1,137}$ = 35.64, p < .000) (Table 1). At the end of the course, 14% of the students reported a preference for the flipped format over the lecture format.

Regression analyses indicated that self-efficacy for self-regulated learning (b = 0.62, t = 0.30, p > .05) and math anxiety (b = 0.33, t = 0.32, p > .05) were insignificant predictors of average student grades for the flipped units and were omitted from further analyses. These results rejected hypotheses 3a and 3b. Optimism (b = 2.62, t = 3.24, p < .01) was a significant predictor of student grades for the flipped units and explained 19% of the variance in student scores in support of H3c.

Qualitative Results

Five major themes emerged regarding student perceptions of the course formats: 1) expectations, 2) interactions with others, 3) time commitment, 4) engagement, and 5) availability of teaching materials. This addressed research question one by providing greater detail into students' perceptions of and experiences in flipped and lecture formats and further clarified quantitative findings of students' lower satisfaction and exam performance in the flipped units.

Expectations. This theme involved student beliefs about where teaching and learning happen and what tuition pays for. Students expressed expectations that teaching only happens in the classroom. Students felt that despite being conducted by faculty, online lectures involved self-teaching. One participant stated, "Why are we paying somebody to teach us when the idea of the flipped classroom is to teach ourselves?" Another student explained, "my parents are paying for my school, but I don't expect them to pay for my school and then have me have to teach myself. That's not what they want, they want someone else to teach me."

Interactions with others. Findings further suggested that what students perceived as "learning on their own" in the flipped classroom was due to a lack of interaction with others in the online environment. 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. One student indicated, “[The lecture is] helpful because we work together in class all the time so even if the professor's not helping us, at least we're helping each other out and I didn't have that in my apartment, by myself.” Others stated, “for me, just having that personal contact, just being in the classroom was way more helpful” and “watching the videos, if I had a question, no one is right there to answer it.” When asked how they felt the in-class and online lectures differed, students explained, “the only difference would be, during class if someone didn't understand something, she would try to explain it in a different way” and “in class, we have classmates, so maybe [we] can ask our neighbors something instead of just doing it ourselves.”

Time commitment. Students felt the time commitment was greater for the flipped units than the lecture units. As one student explained, “I watched the videos very thoroughly and I paused them and wrote down every single note that she said […] and then I go through the PowerPoint and make sure I have everything and then I'd do the practice problems in the book. I spent hours and hours every week on this.” Another student stated, “I didn't really liked the flipped unit personally just because there was a lot of work outside of class.”

Engagement. Students also felt that the flipped units were less engaging than the lecture units, and they were unmotivated to watch the lecture videos outside of class. As one student expressed, “we were all more engaged [in the lecture] I think than just sitting watching it on my own” and another explained, “I also feel like I pay more attention when I go to class and am listening to [the instructor] talk rather than playing a video, I'll get distracted thinking about something else or on my phone and I'm not really paying attention to what [the instructor] is saying.” Other students stated that they skipped through the videos or did not watch them at all saying, “I found it hard to actually want to watch every single video,” “I would usually just skip through it,” and “I literally just let them play and never watched them.”

Availability of teaching materials. By contrast, other students expressed an interest in the availability of teaching materials without the flipped format. As one student indicated, “I didn't like the flipped format, but I liked the videos, if I was struggling I could go back and watch those so those were really helpful to have, but I didn't like having to do it outside of class.” Another student stated, “I have to say that, actually, I did like the videos. The fact that she worked out the examples so you could follow and rewind if you had to.” Students also expressed that on average, they would like an additional 1.3 hours of class time per week, so that both the lecture and the in-class activities from the flipped units could occur during class time.

DISCUSSION AND CONCLUSIONS

It is paramount that instructors prepare industry-ready retailing professionals and this involves careful course construction (Grewal, Motyka, & Levy, 2018). Although flipped techniques meet the needs of today’s students in many content areas, this may not be effective for every classroom. Flipped advocates see lecture approaches as one-sided; however, results of the current study suggest otherwise. Students in the current study opposed the flipped class method, instead desiring an interactive classroom where exchanges with their professor and peers during lectures were vital to learning. Quiz scores indicate students performed better in the lecture-based units, suggesting that lecture-based formats may be necessary when teaching retail math. The current study indicates students were more successful and satisfied by a retail math course that featured immediate interaction with instructors and instant feedback regarding mathematical calculations. A best practice approach for retail math instructors may be a synchronous course offering allowing students real-time interactions and immediate feedback. Instructors could provide real-time practice during class, create study-groups of 3-8 students) to foster student learning, assign practice problems to groups and meet (virtually) at regular intervals throughout the semester to discuss the formulas and answers.

Although hypothesis 1 was rejected, these findings are in line with Cilli-Turner (2015) who found student satisfaction to be lower in flipped sections, but conflicts with other research (Ichinose and Clinkenbeard 2016; Peterson, 2016) that found higher grades via flipped approaches. Results of hypothesis 2 also conflict with studies that indicated either no impact (Van Alten et al., 2019) or higher results for flipped students (Byun et al., 2012; Cappuccitti et al., 2020; Lo et al., 2017; Peterson, 2016). Qualitative comments such as, “[I] have to teach myself” indicate expectations were not met regarding instructor face time, leading students to “never watch[ing] videos.” This connects with Peterson’s (2016) observation that students perceive on-line class to be more work, leading to lower satisfaction. The qualitative portion of the present study illustrated low touch approaches lead to less conceptual learning, which in turn leads to lower grades and satisfaction; this is in line with Mann and Enderson’s (2017) findings. Also, females have been found to have less inclination and confidence in math (Flight, 2021). The present sample might have done better with a high-touch conceptual approach with synchronous and asynchronous attendance options (Mann & Enderson, 2017). Flexible assignments, such as a multiple-choice test or short-format paper, might have also improved performance.

Hypothesis 3a and 3b were also not supported, which may be partially explained by students needing “verbal persuasion” (p. 198) reinforcing a can-do attitude (Bandura, 2006). Comments such as, “the idea of the flipped classroom is to teach ourselves” indicate students felt unsupported in the flipped modality. This

aligns with research that found that students may have lower self-efficacy based on unrealistic expectations of success (Usher & Pajares, 2009), which was reflected in comments such as "I spent hours every week on this." While female students have higher self-efficacy for self-regulated learning, this may be mitigated by the need for adoption of online learning technologies. This is in line with research indicating female merchandising students vary in their technology efficacy (McKinney et al., 2017). This is also supported by Hypothesis 3c as optimism led to higher performance in the flipped units, in line with previous research (Chao & Yu, 2019; González-Gómez et al., 2019; Holmes et al., 2017; Nonis & Wright, 2003) and qualitative feedback regarding lack of interaction and engagement and availability of teaching materials. Students higher in optimism may have been more likely to engage with the online videos, quizzes, and message board, as in Chao and Yu (2019), leading to higher grades as students indicated that video content was helpful as they "could go back and watch" for explanation, as observed in Salas-Rueda's (2021) study. Retail math instructors might encourage students lower in optimism to engage with online learning technologies through the use of Kahoot, Google Jamboard, or interactive white boards and by imbedding quiz questions within live or recorded lecture videos. This would encourage active participation with the content outside of the classroom, and may lead to higher grades. Though only one hypothesis was supported, the current study is noteworthy. Flipped approaches appear to work in other subjects, however the current study found the opposite for retail math. Marketing educators might adjust their teaching modality to enhance student learning and engagement in this subject.

LIMITATIONS AND FUTURE RESEARCH

The current study has limitations that provide opportunities for future research. This study recruited apparel students from a retail math class at one Midwestern University limiting the representativeness and generalizability of results. Future research could investigate a wider variety of courses across multiple universities, as there are no standard techniques to flipping a class. Although data for the current study were collected prior to COVID-19, the findings still fully support the notion that students need more engagement with the subject matter of retail math than flipped class modality provides. Future research could investigate the effectiveness of further teaching techniques and delivery methods delivered during the pandemic with a focus on students' self-efficacy, satisfaction, anxiety, and optimism in retail math-related courses.

REFERENCES

Abedi, P., Keshmirshekan, M. H., & Namaziandost, E. (2019). The comparative effect of flipped classroom instruction versus traditional instruction on Iranian intermediate EFL learners' English composition writing. *Journal of Applied Linguistics and Language Research*, *6*(4), 43-56.

Alghamdi, A., Karpinski, A. C., Lepp, A., & Barkley, J. (2020). Online and face-to-face classroom multitasking and academic performance: Moderated mediation with self-efficacy for self-regulated learning and gender. *Computers in Human Behavior, 102*, 214-222.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology*, *4*(3), 359-373.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 307-337). Charlotte, NC: Information Age.

Barr, R. B., & Tagg, J. (1995). From teaching to learning: A new paradigm for undergraduate education. *Change: The magazine of higher learning*, *27*(6), 12-26.

Betz, N. E. (1978). Prevalence, distribution, and correlates of math anxiety in college students. *Journal of Counseling Psychology, 25*(5), 441-448.

Bhakti, Y. B., Astuti, I. A. D., Sumarni, R. A., Sulisworo, D., & Toifur, M. (2019). Flipped classroom as a millennial teaching model. *Indonesian Review of Physics*, *2*(1), 22-27.

Bhowmick, S., Young, J. A., Clark, P. W., & Bhowmick, N. (2017). Marketing students' mathematics performance: The mediating role of math anxiety on math self-concept and math self-efficacy. *Journal of Higher Education Theory and Practice*, *17*(9), 104-117.

Bloom, B. S., Hastings, J. T., Madaus, G. F., & Baldwin, T. S. (1971). *Handbook on formative and summative evaluation of student learning.* New York, NY: McGraw-Hill.

Bollinger, D. U., & Martindale, T. (2004). Key factors for determining student satisfaction in online courses. *International Journal on E-Learning*, *3*(1), 61-67.

Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom.* 1991 ASHE-ERIC Higher Education Reports. Washington, DC: ERIC

Bonwell, C. C. (1996). Enhancing the lecture: Revitalizing a traditional format. *New Directions for Teaching and Learning*, *1996*(67), 31-44.

Bormann, J. (2014). *Affordances of flipped learning and its effects on student engagement and achievement* [Master's thesis, University of Northern Iowa].

Bowen, J. A. (2012). *Teaching naked: How moving technology out of your college classroom will improve student learning*. Hoboken, NJ: John Wiley & Sons.

Business Degree Central (2019). *Business majors and programs.* Retrieved from https://businessdegreecentral.com /

Byun, S. E., Kim, H., & Duffey, M. (2012). A multicourse collaborative project within a global context multidimensional learning outcomes for merchandising and interior design majors. *Clothing and Textiles Research Journal, 30*(3), 200-216.

Cao, L., & Swada, J. (2020). Effects of implementing flipped classroom elements and in-class discussion on student performance. *Journal of Food Science Education*, *3*(1), 1-9.

Cappuccitti, A., Gunn, F., & Lee, S. H. M. (2019). Establishing Knowledge and Cultivating Talent via Experiential Learning: The Case of the Fashion Retail Lab. *Journal for Advancement of Marketing Education*, *27*(2), 1-9.

Carolan, C., Davies, C. L., Crookes, P., McGhee, S., & Roxburgh, M. (2020). COVID 19: Disruptive impacts and transformative opportunities in undergraduate nurse education. *Nurse Education in Practice*, *46.*

Cevikbas, M., & Kaiser, G. (2020). Flipped classroom as a reform-oriented approach to teaching mathematics. *ZDM Mathematics Education*, *52*(7), 1291-1305.

Chao, C.-M., &. Yu, T.-K. (2019). The moderating effect of technology optimism: How it affects students' weblog learning. *Online Information Review, 43*(1), 161-180.

Chatterjee, P., & Kumar, A. (2017). Innovating the Retail Curriculum for Future Careers in Retail. *Journal for Advancement of Marketing Education, 25*, 1-2.

Cilli-Turner, E. (2015). Measuring learning outcomes and attitudes in a flipped introductory statistics course. *Primus*, *25*(9-10), 833-846.

Clark, V. L. P., & Badiee, M. (2010). Research questions in mixed methods research. *Handbook of mixed methods in social & behavioral research*, 275-304, Los Angeles, CA: Sage.

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Los Angeles, CA: Sage.

Crittenden, W. F., Biel, I. K., & Lovely III, W. A. (2019). Embracing digitalization: Student learning and new technologies. *Journal of Marketing Education*, *41*(1), 5-14.

Dove, A., & Dove, E. (2015). Examining the influence of a flipped mathematics course on preservice elementary teachers' mathematics anxiety and achievement. *Electronic Journal of Mathematics & Technology, 9*(2), 166-179.

Flight, R. (2021). Linking Practitioner Dilemmas and Research Metrics Across an Integrated Marketing Curriculum. *Journal of Marketing Education*, 02734753211017173.

González-Gómez, D., Jeong, J. S., & Cañada-Cañada, F. (2019). Enhancing science self-efficacy and attitudes of Pre-Service Teachers (PST) through a flipped classroom learning environment. *Interactive Learning Environments*, 1-12.

Green, T. (2015). Flipped classrooms: An agenda for innovative marketing education in the digital era. *Marketing Education Review*, *25*(3), 179-191.

Grewal, D., Motyka, S., & Levy, M. (2018). The evolution and future of retailing and retailing education. *Journal of Marketing Education*, *40*(1), 85-93.

Hartley, P., Routon, P. W., & Torres, L. (2019). The skills marketing majors believe they acquire: Evidence from a national survey. *Journal of Marketing Education*, *41*, 202-214.

Holmes, Y. M., Collins, J., & Rutherford, J. (2017). Active learning and Generation Next perceptions of engagement and motivation: An Attribution Theory approach. *Journal of Higher Education Theory and Practice*, *17*(7).

Ichinose, C., & Clinkenbeard, J. (2016). Flipping college algebra: Effects on student engagement and achievement. *Learning Assistance Review*, *21*(1), 115-129.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

Kozar, J. M., & Marcketti, S. B. (2008). Utilizing field-based instruction as an effective teaching strategy. *College Student Journal*, 42(2), 305.

Krathwohl, D. R. (2002). A revision of Bloom's taxonomy: An overview. *Theory into Practice*, *41*(4), 212-218.

Kumar, A., Mukherjee, A., & McGinnis, J. (2015). Who wants to be an etailpreneur? Experiences from an electronic retailing course. *Marketing Education Review, 25*(2), 117-128.

Lo, C. K., Hew, K. F., & Chen, G. (2017). Toward a set of design principles for mathematics flipped classrooms: A synthesis of research in mathematics education. *Educational Research Review*, *22*, 50-73.

Mann, M., & Enderson, M. C. (2017). Give me a formula not the concept! Student preference to mathematical problem solving. *Journal for Advancement of Marketing Education*, *25.*

Marcketti, S. B. (2011). Effective learning strategies in the history of dress. *The History Teacher*, *44*(4), 547-568.

McKinney, E., Baytar, F., Stanley, E. E., & Karpova, E. (2017, January). Are they tech-savvy?: Understanding technology self-efficacy of apparel female freshmen. In *International Textile and Apparel Association Annual Conference Proceedings* (Vol. 74, No. 1). Iowa State University Digital Press.

Morgan, D. L. (1997). *Focus groups as qualitative research.* Los Angeles, CA: Sage.

Mulawarman, M., Susilawati, S., Syifa, L., & Rifani, E. (2020). Classroom guidance strategy with flipped method in guidance and counseling services at Indonesia Schools in the digital era. *Islamic Guidance and Counseling Journal*, *3*(2), 61-74.

Nonis, S. A., & Wright, D. (2003). Moderating effects of achievement striving and situational optimism on the relationship between ability and performance outcomes of college students. *Research in Higher Education, 44*(3), 327-347.

Nouri, J. (2016). The flipped classroom: For active, effective and increased learning–especially for low achievers. *International Journal of Educational Technology in Higher Education*, *13*(1), 33.

Pajares, F. (2002). Gender and perceived self-efficacy in self-regulated learning. *Theory Into Practice, 41*, 116-125.

Pajares, F., & Graham, L. (1999). Self-efficacy, motivation constructs, and mathematics performance of entering middle school students. *Contemporary Educational Psychology*, *24*(2), 124-139.

Peterson, D. J. (2016). The flipped classroom improves student achievement and course satisfaction in a statistics course. *Teaching of Psychology, 43*(1), 10–15.

Petrochuck, M. (2020). Turnin' it upside down: Using the flipped classroom to advance student knowledge and application in a marketing capstone course. In *Atlantic Marketing Association Conference Proceedings*, Asheville, NC.

Phillips, L., & Phillips, M. (2016). Improved student outcomes in a flipped statistics course. *Administrative Issues Journal, 6*(1), 88e98.

Salas-Rueda, R. A. (2021). Use of flipped classroom in the marketing career during the educational process on financial mathematics. *Education and Information Technologies*, 1-24.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, *67*(6), 1063.

Schlegelmilch, B. B. (2020). Why business schools need radical innovations: Drivers and development trajectories. *Journal of Marketing Education*, *42*(2), 93-107.

Tapia, M. (2004). The relationship of math anxiety and gender. *Academic Exchange Quarterly, 8*(2).

Tarasi, C. O., Wilson, J. H., Puri, C., & Divine, R. L. (2013). Affinity for quantitative tools: Undergraduate marketing students moving beyond quantitative anxiety. *Journal of Marketing Education*, *35*(1), 41-53.

Usher, E. L., & Pajares, F. (2008). Self-efficacy for self-regulated learning. *Educational and Psychological Measurement, 68*, 443-463.

van Alten, D. C. D, Phielix, C., Janssen, J., & Kester, L. (2019). Effects of flipping the classroom on learning outcomes and satisfaction: A meta-analysis. *Educational Research Review, 28*(100281), 1-18. https://doi.org/10.1016/j.edurev.2019.05.003

Wang, W., Wang, Q., & Luo, X. (2019, October). Evaluation of the effect of flipping classroom in the teaching of marketing. In *2019 International Conference on Advanced Education, Management and Humanities (AEMH 2019)* (pp. 61-68). Atlantis Press.

Yen, T. F. T. (2020). The performance of online teaching for flipped classroom based on COVID-19 aspect. *Asian Journal of Education and Social Studies*, 57-64.

Yurniwati, Y., & Utomo, E. (2020). Problem-based learning flipped classroom design for developing higher-order thinking skills during the COVID-19 pandemic in geometry domain. *Journal of Physics: Conference Series*, *1663*(1), p. 012057.