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FLIPPED UNIVERSITY CLASS: A STUDY OF MOTIVATION AND LEARNING

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ABSTRACT

Aim/Purpose	This study aims to explore the relationship between motivation and students' perspectives, learning performance, and use of online course materials in flipped classrooms.
Background	The flipped classroom model is an innovative instruction method that has limited research to date exploring its impact on motivation. It remains unknown if the same motivation patterns exist in flipped classrooms as in purely face-to-face or online learning environments.
Methodology	Fifty-nine undergraduate students' expectancy beliefs (control beliefs about learning, self-efficacy) and value beliefs (task value, intrinsic motivation, extrinsic motivation) were measured by subscales adapted from Motivated Strategies for Learning Questionnaire. Students' final grade percentage represented their learning performance. Regression analysis was used to explore the ability of motivational characteristics to evaluate how well the five motivational subscales predicted participants' perspectives of a flipped class.
Contribution	The results of this study suggest that students have similar motivation patterns regarding their learning performance in flipped classrooms as in traditional or online classrooms. Overall, students reported positive motivational beliefs towards a flipped classroom.
Findings	Results indicated that students in a flipped classroom also show a positive correlation with motivation regarding their learning performance as in traditional or online classrooms. Self-efficacy is a significant predictor of both students' academic achievement and perceptions of the flipped classroom.

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	Overall, students had positive attitudes towards the flipped model but indicated neutral attitudes when asked if they wished to take another class taught in a flipped format.
Recommendations for Practitioners	The findings suggested that instructors should set up pre-class activities related to credits that account for the course grade to reinforce students' effort spent on course preparation. The results of this study suggest that students' previous experiences of flipped classrooms and online learning may not always affect their motivational beliefs, learning performance, and perceptions of the course format in a flipped classroom. However, a large number of online materials may cause fatigue and make students unwilling to use all the online materials.
Recommendations for Researchers	The flipped classroom model is a valuable teaching strategy that can be applied at any educational level to maximize learning time, but continuing research is needed in the field to improve the effectiveness of this approach and facilitate learning among all students, including those with low self-efficacy beliefs or overall motivation.
Impact on Society	While the flipped learning model challenges instructors to shift emphasis from providing content to designing active learning experiences, this role remains vitally important for facilitating in-class activities, scaffolding out-of-class preparation, and effectively implementing the flipped design.
Future Research	This research did not use control experiments to eliminate other confounding variables. This study explored relationships between motivation and flipped learning but did not prove cause and effect. Whether students in a non-flipped learning classroom have a higher or lower motivation is still unknown and more empirical studies are still needed in the field for assisting instructors who want to adopt this teaching style with better practices.
Keywords	motivation, learning outcome, flipped classroom, undergraduate course

INTRODUCTION

Recognition of the importance of active learning has drawn educators' attention to the flipped classroom, which takes advantage of flexible asynchronous learning. High school chemistry teachers Jonathan Bergmann and Aaron Sams (2012) first tried this instructional approach in 2008, later instructors, teacher trainers, and institutions adopted it across the world. The flipped classroom approach allows students to use "technology to access the lecture and other instructional resources outside the classroom to engage them in active learning during the in-class time" (Giannakos, Krogstie, & Chrisochoides, 2014, p. 23). Flipped learning introduces students to content materials before class and leaves class time for learning activities. This fosters in-depth and active learning by having direct instruction before the class meets, which in turn, maximizes the in-class time with student-centered learning activities (Hamdan, McKnight, McKnight, & Arfstrom, 2013).

As the prevalence of practice increased, there has been a corresponding increase in publications examining the flipped classroom (Bishop & Verleger, 2013; Lin & Hwang, 2019). Recent research on flipped learning has expanded to incorporate immersive technology (Lin & Hwang, 2019) including augmented reality (Chang & Hwang, 2018), mobile learning (Louhab et al., 2019), and gamification (Huang, Hew, & Lo, 2019). Researchers have also explored the effectiveness of the flipped design in different subjects, such as language learning (Hsieh, Wu, & Marek, 2017), mathematics (Lai & Hwang, 2016), engineering (Karabulut-Ilgu, Cherrez, & Jahren, 2018), and medical education (El-

Miedany, El-Gaafary, El-Aroussy, & Youssef, 2019). Comparatively little work, however, has focused on the relationship between the flipped learning environment and students' motivation.

Motivation is one personal variable that may help explain who engages and who does not in a flipped environment. Educators believe that motivation provides reasons underlying the process and behavior "whereby goal-directed activity is instigated and sustained" (Schunk, Meece, & Pintrich, 2013, p. 4). Students' motivation influences their willingness to participate in classroom activities, which in turn, could affect the efficiency and success of the flipped classroom model (Yilmaz, 2017). To examine the effectiveness, it is important to know how motivation influences students' learning in a flipped learning environment.

In a video-based flipped classroom, research illustrated limited and mixed findings regarding students' motivation. Shih and Tsai (2017) discovered that the flipped classroom might enhance students' learning motivation. However, Awidi and Paynter (2019) found that the flipped classroom design only motivated a minority of respondents to engage in learning activities. Tse, Choi, and Tang (2019) stated that a video-based flipped classroom posed limited capability to strengthen secondary students' subject reading motivation comparing with the traditional classroom. These studies focused on general motivation to learn or on motivation specific to the subject, without a detailed investigation into motivational characteristics. The current study examines students' motivation by measuring task value, intrinsic motivation, extrinsic motivation, control beliefs about learning, and self-efficacy (Wigfield & Eccles, 2000).

THEORETICAL BACKGROUND

Investigation on students' motivation can help understand students' willingness, subjective experiences, and the reasons behind their performance, which connected to their actions and effort that engaged in learning activities (Brophy, 2013). This study discusses motivational beliefs that directly influence students' achievement choices, based on the expectancy-value model (Eccles, 1983; Eccles & Wigfield, 2002). Expectancy-value theory (Wigfield & Eccles, 2000) proposes that individuals' expectancy-related and task-value beliefs are assumed to be directly related to performance, persistence, and task choice.

Expectancy–value theory aims to explain the reasons behind individual achievement performance and choices from the aspect of expectancy and subjective values. Expectancy relates to individuals' expectations about their success on a task and to what extent they believe they can perform an activity within their abilities. Individuals may be capable of doing an activity but are not willing to do it. On the other hand, subjective task values consider the beliefs and reasons that influence individuals' choices about engaging in an activity. Subjective task values include individual beliefs such as intrinsic value, extrinsic value, and other values that activity may bring and the cost of doing it.

Expectancy–value theory addresses the way students' beliefs affect how well they do different tasks and how much they value the tasks as related to their learning choice, persistence, and performance. Eccles and Wigfield (2002) assumed that expectancy-related and task-value beliefs have a direct influence on achievement choices and performance. Eccles first proposed the modern expectancy–value model of achievement motivation in 1983, and since then the model has been continuously studied and developed. The model centers on achievement-related choices with a broad scope that covers different social cognitive constructs. Those constructs have a direct or indirect influence on students' achievement-related choices, such as learning goals, previous related experience, or value beliefs (Wigfield & Eccles, 2000). The expectancy–value model links people's behaviors, choices, and persistence most directly to individuals' expectancy and value beliefs, such as self-efficacy, control of learning, intrinsic motivation, extrinsic motivation, and task value. Wigfield and Eccles (2000) argued that these constructs are the most immediate predictors of people's performance, which are themselves influenced by a variety of internal and external factors (e.g., Eccles & Wigfield, 1995).

The components of expectancy and value constructs represent students' perspectives about their beliefs of ability, reasons for participation, and feelings about the activity. In the expectancy-value theory, both expectancy and value components are defined in rich ways and are connected with other broader psychological, social, and cultural determinants. The expectancy component covers students' expectancies for purposeful initiated action, competence and efficacy about their abilities, and a sense of control over outcomes (Eccles & Wigfield, 2002). On another note, the subjective value relates to students' beliefs about the reasons to perform a task (Eccles & Wigfield, 2002).

Based on the theoretical framework of expectancy-value theories (Eccles, 1983), Pintrich, Smith, Garcia, and McKeachie (1991) developed the Motivated Strategies for Learning Questionnaire (MSLQ) to measure undergraduates' dynamic motivation and self-regulated learning in a college course. Pintrich and De Groot (1990) referred to task values components of the model (Eccles, 1983) while researching how positive self-efficacy and task value beliefs promote students' self-regulated behaviors. This research selected the motivational subscales of the MSLQ to evaluate the motivational and cognitive effects of the flipped course design. The first 31 items in MSLQ constitute six motivational belief subscales, which are (1) task value, (2) intrinsic motivation, (3) extrinsic motivation, (4) control beliefs about learning, (5) self-efficacy, and (6) test anxiety. Eccles and Wigfield (2002) did not mention test anxiety as a direct influence on students' achievement choices. Therefore, this research did not use test anxiety subscale.

LITERATURE REVIEW

FLIPPED CLASSROOM

Although there is not a fixed model for a flipped classroom, the core idea is to flip the traditional face-to-face teaching approach and integrate before class instructional materials and in-class learning activities into the overall approach (Tucker, 2012). It requires students to independently learn materials and gain background knowledge before coming to class and allows instructors to arrange interactive activities to further emphasize learning concepts and clear up misunderstandings during class meeting time. Examples of active in-class activities include collaborative learning, peer tutoring, and problem-based or inquiry-oriented case studies. Rogers (1969) conceived that when students can use what they learn to perform a task, the learning will be more active. Active learning emphasizes students' taking an active role in the knowledge internalization process, relating new knowledge to prior knowledge, rather than passively receiving information, such as when listening to a lecture and taking notes (Prince, 2004). Flipped classroom learning is active learning that is "done with the expectation of using the material" learned outside of class (e.g., from video) for in-class activities (Benware & Deci, 1984).

The results of early studies have shown that the majority of students have positive perceptions of the flipped classroom (Love, Hodge, Grandgenett, & Swift, 2014; Pierce & Fox, 2012; Roach, 2014; Smith, 2013), and their learning performance as measured by course grades was improved for the flipped instructional design compared to traditional classroom (Pierce & Fox, 2012; Tune, Sturek, & Basile, 2013). In a flipped classroom, students are able to review the pre-class content materials at their own pace, which may lead to mastering the learning content effectively (Roach, 2014). Roach (2014) also observed that students who favored the flipped learning design and watched the pre-course materials had a high achievement score. Overall, most students show positive attitudes to flipped learning with better academic achievement and higher course satisfaction compared to the traditional classroom (Zhonggen & Wang, 2016).

Even though most flipped learning studies indicate that the majority of participants have positive attitudes toward flipped learning, studies have shown there is still a group of students who are less satisfied with the flipped classroom method than the traditional lecture method (e.g., Johnson, 2013; Missildine, Fountain, Summers, & Gosselin, 2013; Schultz, Duffield, Rasmussen, & Wageman, 2014;

Tune et al., 2013). Some students perceived flipped learning as being very time consuming, overloaded with extra work, and requiring students to teach themselves (Smith, 2013; Tune et al., 2013; Zusho, Pintrich, & Coppola, 2003; Xiu, Moore, Thompson, & French, 2019). Missildine et al. (2013) argued that flipped learning blended with various teaching techniques with relevant in-class activities did not necessarily improve students' course satisfaction. Pierce and Fox (2012) used flipped learning in a topic module and surveyed their students' views of the flipped learning activities. Thirty-eight percent of the students expressed that they disagree or strongly disagree with the statement that "I wish more instructors used the 'flipped classroom' model." The reason behind this negative attitude among the 38% is unclear. Some students also reported that they felt less motivated compared to traditional classrooms (Johnson, 2013).

Motivation in Flipped Classroom

Results of early studies have shown that students' motivational beliefs and adoption of learning strategies have a deep relationship with their academic performance and learning skills (e.g., Schunk et al., 2013). Moreover, existing empirical research has also shown that individuals' expectancy and value beliefs can influence and predict students' academic achievement outcomes in different ways depending on various learning contexts (e.g., Steinmayr & Spinath, 2009; Wang & Liou, 2017). In a study grounded in Expectancy-Value Theory, motivational beliefs of self-concept, intrinsic value, and utility value were measured, and each motivational belief was found to have a positive predictive effect on students' science performance (Wang & Liou, 2017). Pintrich and De Groot (1990) also discovered that self-efficacy positively related to cognitive engagement, and intrinsic motivation had a strong relationship with self-regulation and cognitive strategies but did not show a direct influence on achievement scores, after controlling for the prior achievement. Within online settings, learners' motivation is associated with successful learning, as in traditional environments. Research has shown that motivation was positively associated with students' academic achievement and course satisfaction in online learning environments (Artino, La Rochelle, & Durning, 2010; Artino & McCoach, 2008). The flipped designed courses invert the traditional classroom settings and have different learning activity arrangements compared to both traditional face-to-face and purely online classes.

Researchers have investigated motivation in different flipped classrooms and found a positive impact. In the AR-based flipped learning system, fifth graders' learning achievements, learning motivation, critical thinking tendency, and group self-efficacy were significantly improved (Chang & Hwang, 2018). Hsieh et al. (2017) revealed that the flipped instruction using online interaction strategies enhanced the undergraduate students' motivation and successfully achieved the instructional goals in an English language course. A flipped classroom instructional format using a student-response system demonstrated a substantial increase in students' engagement, motivation and cognition compared to traditional lecture classrooms for a third-year engineering course (Lucke, Dunn, & Christie, 2017). Liu, Raker, and Lewis (2018) suggested that students in a flipped classroom and peer-led team learning environment were significantly motivated toward chemistry at the end of the semester while controlling for the motivation pre-test scores. It is important to note that the examined studies that applied advanced technologies (e.g., augmented reality, etc.) to support the flipped design may not reflect the relationship between motivation and the flipped classroom in the more common video-based implementations of this instructional model.

Published literature on video-based flipped classroom design has shown mixed results regarding students' learning motivation. Zainuddin and Perera (2019) stated that the flipped classroom environment had a positive influence on students' intrinsic motivation. Yough, Merzdorf, Fedesco, and Cho (2017), however, concluded that preservice teachers did not have increased motivation in flipped classrooms compared to those in traditional sections of the course. Shih and Tsai (2017) also reported neutral agreement results indicates a flipped classroom approach might enhance students' learning motivation. Students reported that the flipped design of pre-recorded lectures only motivated a minority of respondents to engage in learning activities or additional reading (Awidi &

Paynter, 2019). Similarly, Tse, Choi, and Tang (2019) found that a video-based flipped classroom increased academic satisfaction and teaching effectiveness but posed lower motivation for academic subject reading compared to the traditional classroom.

Moreover, most research focused on students learning motivation in general, with fewer studies exploring specific motivation constructs such as intrinsic motivation, extrinsic motivation, or self-regulation (Yough et al., 2017; Zainuddin & Perera, 2019). While these publications provide some understanding of how the flipped design affected student's motivation, they do not address the question of how students' expectancy and value motivational beliefs affect students' academic choices in a flipped classroom.

In summary, the literature on motivation in the flipped classroom indicates that the emphasis of educators has been on how different flipped classroom instructions influence students' learning motivation. Because there is no one model for flipping a classroom, instructors might have different implementations, which could lead to different effects on students' course performance, completion assigned course materials, time spent for study, and the sense of classroom community (Eddy & Hogan, 2014). Studies exploring flipped classroom implementations with advanced technology (e.g., Chang & Hwang, 2018; Liu et al., 2018; Lucke et al., 2017) do not necessarily reflect student motivation in the more commonly used video-based implementations of flipped learning. Studies focusing on students' general motivation to learn or subject-specific motivation, while valuable, do not address questions of how the flipped classroom affects specific motivational constructs. This study explores how motivational characteristics, including task value, intrinsic motivation, extrinsic motivation, control beliefs about learning, and self-efficacy, related to students' perspectives, performance, and use of course materials in flipped learning. The research questions were as follows:

1. To what extent do students' motivational characteristics relate to learning performance in a flipped undergraduate class?
2. To what extent do students' motivational characteristics relate to their use of course materials in a flipped undergraduate class?
3. To what extent do students' motivational characteristics relate to their perspectives on a flipped undergraduate class?
4. To what extent do differences in flipped classroom strategies influence how students respond to a flipped learning classroom, in terms of students' motivational characteristics, learning performance, use of course materials, and perspectives on a flipped undergraduate class?

METHOD

The research was conducted in the context of two undergraduate college classes offered by a Midwestern public university with a Carnegie classification of "very high research activity." The researcher pursued this study in two flipped courses in Fall 2017 semester, a hospitality management (HM) course and a leisure services (LS) course. Students reported data through in-class self-report surveys. Data was also obtained from the Brightspace learning management system recorded log of student activity. The two courses are described in detail below.

EDUCATIONAL CONTEXT

Leisure Services course

This course aimed to introduce evaluation methods, techniques, and applications related to different functions of leisure service. After completing the course, students were expected to be able to design, implement and analyze a formal assessment project for a leisure service (e.g., a public park, etc.). At the beginning of the semester, the instructor talked about the flipped design of the course to prepare the students. Before coming to class each week, the students were required to read the textbook with

guidance from a PowerPoint posted on the university learning management system, Brightspace. During class time, the instructor did interactive learning activities, such as group presentations or discussions with questions or prompts based on the learning materials. Throughout the semester, there were 12 in-class workdays, in which students worked in a randomly assigned group to prepare their evaluation project. On some of those days, students were asked to submit their drafts before class so they could receive feedback during class time. Other days, students worked in class with their teammates and submitted the draft by the end of class. Four unit quizzes, seven drafts, and one evaluation project were graded throughout the semester. The unit quizzes were not comprehensive and were delivered online in weeks 3, 6, 9, and 13. The evaluation project was a team project with 27 students divided into eight groups. The project required students to evaluate an actual recreation or relevant program with a local agency.

Hospitality Management course

This course focused on management principles, functions, methods, and other skills in hospitality industry. Before coming to class, students were required to read assigned materials, watch narrated PowerPoint lectures and complete a quiz on Brightspace. The narrated PowerPoint lectures were usually less than 40 minutes in total. In most of the weeks, students also need to answer several questions and submit a reflection report. During the class time, students would do different in-class exercises, such as mini-quizzes, in-class small group discussions, and short case studies, which would count as class participation toward 10% to 20% of the overall grade for the course. Additionally, the instructor explained misunderstandings and difficult concepts based on the quiz results and reflection answers submitted before class. There was a group presentation, a midterm exam, and a final exam throughout the semester as well. The exams reflected both in-class materials and the assigned supplemental materials posted on Brightspace. However, the students could choose not to take the final exam if they obtained 90% or more of the total points after completing the last assignment in week 16.

Both courses were three-credit upper-division level courses that meet two to three times per week for a total of 150-min periods. Both were mandatory courses for major students and were perceived as challenging courses according to the instructors. According to the instructors, students were expected to take an active role in their learning progress. Neither course had mandatory final exams that made up large portions of the overall grade. Students' performance was evaluated by their cumulative learning activity participation and performance, such as project presentations, reflections, and case studies. The dynamic nature of the courses required students to integrate knowledge, use higher-order thinking and problem-solving skills, and engage in group discussions to understand the concepts. This type of course naturally lends itself to a flipped format where students learn the materials, which include pre-recorded video or audio lectures and assigned readings from the textbook, posted on Brightspace before class and having class time devoted to interactive activities. Brightspace, a learning management system supported by the university, has the feature of tracking students' visit times and duration for each embedded pre-recorded video lecture. This function could facilitate the collection of more accurate objective and factual data and help instructors to understand students' learning habits and behavior (Smith, 2013). Through Brightspace, students were able to view the materials on their device (PC/Mac/tablet/phone of their choice) and control the pace of their learning. They could rewind or change the speed of videos, as they preferred. They were also encouraged to store the material links or files for future review purposes. Besides, students were required to submit all the assignments online for instructors to keep records and grades.

Study Participants

This study took place at a Midwestern public university with a Carnegie classification of "high research activity." Of the 65 questionnaires submitted, only 59 records were valid for analysis.

Table 1 reported the descriptive and inferential statistics of 59 participants, including 13 males and 46 females. The mean age was 21.55 years (range 19-30). Twenty-seven participants that majored in Recreation Therapy and Management were in LS group and the other 32 participants that were in HM group. Participants included 11.9% sophomores, 35.6% juniors, and 50.8% seniors. The self-reported breakdown of approximate grade point average (GPA) before the semester of data collection was 10.2% reporting a 4.0 average, 28.8% with 3.5-3.99 points, 35.6% with 3.0-3.49 points, 17% with 2.5-2.99 points, 3.4% with 2.0-2.49 points, and 1.7% with less than 2.0 points. The researcher assigned the middle value of the GPA range to the record, such as the records of "3.5-3.99" were replaced with a value of "3.75", the students who choose "4.0" were assigned with value "4". In this way, the researcher calculated an approximate GPA mean of 3.31 (range 1.0 - 4.0) with a standard deviation of 0.56.

To assess how well the sample reflected the general student population in the college, demographic data from the sample were compared with enrollment statistics available from the university registrar. This comparison indicated that the sample, which was 22% male and 78% female, reflected the demographics of the education college in which the study took place.

The questionnaire asked participants to report their reasons for enrolling in the course, and their previous experience with flipped learning and with courses with large online components. Results showed that 98.3% of the participants selected that the course as required by the program or major, 10.17% of the students took the course because they were interested in the content, while only 6.78% (four students) indicated that they took the course because they wanted to improve their academic skills. Regarding students' previous experience with flipped learning, 72.9% of them indicated that this was their very first flipped designed course, 16.9% had taken one flipped class before, and only 10.2% had taken more than two flipped classes. However, 59.3% of students had taken more than two courses that had large online components, while only 16.9% of students did not have much experience with courses with large online learning components. Table 1 shows the Descriptive Statistics of the Sample as discussed above.

Table 1: Descriptive Statistics of the Sample (N = 59)

	LS	HM	TOTAL
Group	N = 27	N = 32	45.76% LS 54.24% HM
Gender	25.9% Male 74.1% Female	18.8% Male 81.3% Female	22% Male 78% Female
Agea	22.07 (2.42)	21.1 (1.99)	21.55 (2.23)
Self-reported GPAa	3.38 (0.45)	3.25 (0.64)	3.31 (0.56)
Flipped Classroom Experience	85.2% First timer 11.1% Second timer 3.7% Third timer or more	62.5% First timer 21.9% Second timer 15.6% Third timer or more	72.9% First timer 16.9% Second timer 10.2% Third timer or more
Online Learning Experience	11.1% First timer 14.8% Second timer 74.1% Third timer or more	21.9% First timer 31.3% Second timer 46.9% Third timer or more	16.9% First timer 23.7% Second timer 59.3% Third timer or more

Note. LS = students in Evaluation of Leisure Services course; HM = students in Hospitality Management and Organizations course.

[a]data was presented in the form of "mean (standard deviation)"

PROCEDURE AND INSTRUMENT

Students completed a questionnaire consisting of three parts toward the semester's end: flipped classroom perceptions, motivation, and demographic information.

The questionnaire scales are adapted from existing published studies, which have been shown to have acceptable reliability and validity in previous studies. The flipped classroom perceptions questionnaire was adapted from a study that had a similar purpose to examine students' perceptions of learning materials and activities in a flipped classroom (Pierce & Fox, 2012). The instrument had 10 statements on a five-point Likert-type scale, ranging from strongly agree to strongly disagree. The first five scale items addressed the pre-class learning materials and the second five items focused on students' overall perceptions of a flipped classroom (Pierce & Fox, 2012). Pierce and Fox (2012) found a Cronbach alpha measure of reliability equal to 0.82 for the first subscale and 0.83 for the second subscale. After obtaining the developer's consent, the researchers modified the instrument to match the course context. For example, "I am confident about my ability to address these topics on the final exam" was converted to "I am confident about my ability to address the topics in the projects." The second part of the instrument was the motivation questionnaire.

This research included five motivational subscales of 26 items to evaluate the motivational and cognitive effects of the flipped course design, which were adopted from the motivational subscales of the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991). MSLQ is a valid and highly reliable instrument based on the premise that students' motivation is dynamic due to various curriculum subjects, learning environments, and learning tasks (Pintrich et al., 1991). The average reliability coefficients (Cronbach's coefficient alpha) of MSLQ subscales ranged from 0.61 to 0.88, which indicates that the MSLQ can be used across a variety of different samples with a good internal consistency (Feiz & Hooman, 2013).

Using data available from the learning management system, the first researcher collected the data of overall topics visited, number of visits to content pages, and overall time spent on content pages for each participant. With those data, the researcher calculated the Content Topics Visited Rate, Times Visited per Topic, and Content Time Spent on Each Topic (seconds) using the following formulas:

> Content Topics Visited Rate = overall topics visited / all topic posted by the instructor
>
> Times Visited per Topic = overall content visited times / overall topics visited
>
> Content Time Spent on Each Topic (seconds) = overall content time spent (seconds) / overall topics visited.

RESULTS

DESCRIPTIVE STATISTICS

Motivational scales

Analysis of the motivational subscales data revealed positive motivational beliefs towards the flipped class with a mean overall motivation score of M = 5.16, SD = .82 on a 7.0 scale. The mean overall expectancy score, calculated by computing the average of the control of learning score and the self-efficacy score, was M = 5.50, SD = 0.96. Similarly, data analysis revealed a mean of overall value score, which was calculated as an average of the intrinsic value, extrinsic value, and task value scores, of M = 4.81, SD = 0.90.

Performance and perception measures

The percentage of total possible course points earned (excluding any bonus points awarded for activities not directly related to content learning) represented students' learning performance. Analysis of course grade data (see Table 2 for results) revealed a mean final grade percentage of M = 91.30, SD = 7.47, indicating that, on average, students got an A-grade in these two undergraduate flipped classes.

Table 2: Descriptive Statistics of the Final Grade, Flipped Classroom Perception, and Use of Course Material

	N	*M*	*SD*
Final grade percentage[a]	59	91.30	7.47
Flipped classroom perception score	59	3.6	0.56
Content Topics Visited Rate[a]	59	74.63	20
Times Visited per Topic	59	3.02	1.11
Content Time Spent on Each Topic (seconds)	57	513.79	417.36

[a] data was measured as percentage of the total.

Three variables based on the LMS log data (see Table 2) represented the use of course materials. The first one was Content Topics Visited Rate, which was the percentage of mandatory content topics visited by the students. A percentage was used because the number of mandatory topics differed by class. The HM course had 60 mandatory topics and LS group had 18 topics. The Content Topics Visited Rate variable revealed a mean percentage of M = 74.63, SD = 20, indicating that, on average, students viewed most of the content topics posted online by the instructor and only a subset of them viewed all the content topics. The second one was Times Visited per Topic, which was the total number of times that students visited all topics divided by the number of content topics they visited. This variable provides a measure of the extent to which students visit the same topic several times. The Times Visited per Topic variable revealed a mean of M = 3.02, SD = 1.11, indicating that even though most students did not view all the content posted online, they viewed some of the topics they visited more than one time. The last one was Content Time Spent on Each Topic, which was the total time students spent on all content divided by the number of content topics they visited. This variable provides an estimate of the average time students spent on each topic they visited. Two extreme records of Content Time Spent on Each Topic, which was greater than 1862 seconds, were removed after observation with Boxplot and Stem-and-Leaf plots. The most likely explanation for these outliers is that students forgot to close a course webpage after viewing the content. After removing these outliers, the Content Time Spent on Each Topic variable revealed a mean of M = 513.79, SD = 417.36, indicating that, on average, students spent 513 seconds, which is about eight minutes, on each topic they visited.

Table 3: Descriptive Statistics of Flipped Classroom Perception Scale (N = 59, α = .72)

ITEM	*M*	*SD*
1. Viewing the audio lectures and course materials before scheduled class prepared me for the class activity.	3.59	1.07
3. Viewing the audio lectures and course materials was essential to successfully participating in the class activity.	3.19	1.15
4. The instructor made meaningful connections between the topics in the audio lectures and course materials and the class activity.	3.92	0.93
6. I enjoyed being able to view the audio lectures and course materials prior to schedule class as opposed to live class lecture.	3.32	1.14
7. The instructor required student participation in the in-class activity.	4.53	0.75
8. I am confident about my ability to address the topics in the exams or projects.	4.03	0.81
9. I want more interaction between students and faculty in class.	3.24	0.80
10. I wish more instructors used the flipped classroom model.	3.02	1.15

Students' perspectives towards flipped classrooms were measured by the mean of a 10-item scale. While inspecting the internal consistency and reliability of the flipped classroom perception scale out of the original 10 items, the initial Cronbach's alpha coefficient was .47. The removal of Item Two

from this scale increased the Cronbach's alpha coefficient to .65, and the removal of Item Five further increased the alpha to .72. Because α = .72 is a more acceptable internal reliability score (George & Mallery, 2003), the researchers decided to remove items two and five from the original scale as was adopted from Pierce and Fox (2012). The flipped classroom perception scores were calculated out of eight scale items, which revealed a mean of M = 3.6, SD = .56 on a 5.0 point scale (see Table 2), which indicated an overall positive attitude (See Table 3). Students reported a high score of 4.53 on the item of "instructor required student participation in the in-class activity". This was a reasonable and expected result as flipped classrooms ask students to actively participate in in-class activities to integrate and apply the learning concepts. However, students reported a mean of 3.02 when asked if they wish more instructors used the flipped classroom model.

Relationships between Motivation and Outcomes

The researchers used the Shapiro-Wilk test to examine the assumption of normality before performing the parametric inferential statistics. However, the data were not normally distributed on some scale items. Because most frequency histograms distribution was either quite skewed or flat, the researchers used non-parametric tests.

Motivation and learning performance in flipped courses

A Spearman's Rho test (see Table 4) indicated that, of five motivational subscales, only the self-efficacy motivation score had a significant positive relationship with students learning performance at 0.05 level, rs (59) = 0.433, p = 0.001. The self-efficacy score was moderately correlated with students' final grade percentage, rs (59) = .43, p = .001. According to Field (2018), the expected r for random data can be calculated by the number of predictors over sample size minus one. In this study, the number of predictors was five and the sample size was 59, which brings a small effect of 0.086 (Cohen, 1988, 1992).

Table 4. Summary Statistics and Correlations Results to Predict Students' Final Grade Percentage

			SPEARMAN'S RHO		COLLINEARITY STATISTICS	
Motivational Beliefs	*M*	*SD*	Correlation	Sig.(2-tailed)	Tolerance	VIF
Control of Learning	5.58	1.08	.157	.157	.502	1.992
Self-efficacy	5.42	1.06	.433*	.433*	.596	1.679
Intrinsic Motivation	4.50	.99	.144	.144	.601	1.663
Extrinsic Motivation	5.19	1.19	.089	.089	.872	1.147
Task Value	4.74	1.31	.070	.070	.483	2.069

Note. $N = 59$.
*$p < 0.001$.

Motivation and students' use of course materials in flipped courses

The two courses featured different implementations of the flipped learning design regarding online learning materials. The HM group posted 60 topics, which included narrated PowerPoint lectures. The LS group had 18 topics, which included all downloadable documents, such as PowerPoint slides. Under this condition, students' Content Time Spent on Each Topic and Times Visited per Topic were not measured for the LS group. The authors analyzed students' use of materials separately for the two groups. The researchers conducted a series of Spearman rank-order correlations, to determine if there were any relationships between students' motivation and their use of online course materials, based on analysis of Content Topics Visited Rate, Times Visited per Topic, and Content Time Spent on Each Topic for the HM group and the Content Topics Visited Rate for the LS group.

In the HM group, 32 students visited 65.2% of content topics on average. Moreover, they visited each topic an average of 2.49 times and spent 355.84 seconds on each topic on average. The LS group had a Content Topics Visited Rate of 85.8% on average. There was no significant correlation between students' use of online materials in flipped classrooms with their motivational beliefs for either group (see Table 5). All the Correlation Coefficients were between .013 and 0.317, which indicated the strength of the correlations was weak. In the HM group, students' Content Time Spent on Each Topic was positively correlated with all motivational beliefs. Moreover, the HM students' Time Spent per Topic was slightly negatively correlated with extrinsic motivation, rs (32) = -.183, but was positively correlated with the other motivational beliefs. Furthermore, students' Content Topics Visited Rate was negatively correlated with extrinsic motivation, rs (32) = -.008, and self-efficacy, rs (32) = -.040, but positively correlated with intrinsic motivation, task value, and control of learning. For the LS group, students' Content Topics Visited Rate was positively correlated with extrinsic motivation and control of learning, but negatively correlated with intrinsic motivation, task value, and self-efficacy.

Table 5: Spearman's Rho Correlation Coefficients of Motivation and Use of course materials

	INTRINSIC MOTIVATION	EXTRINSIC MOTIVATION	TASK VALUE	CONTROL OF LEARNING	SELF-EFFICACY
HM					
Content Time Spent on Each Topic	.205	.238	.229	.033	.317
Times Visited per Topic	.153	-.183	.285	.247	.242
Content Topics Visited Rate	.149	-.008	.200	.076	-.040
LS					
Content Topics Visited Rate	-.226	.156	-.243	.013	-.049

Note. All coefficients were non-significant in this table at $p < 0.05$.

Motivation and students' perspectives on flipped courses

To determine the relationship between 59 students' motivational beliefs and their perspectives towards an undergraduate flipped classroom, the researchers used a Spearman's correlation. A two-tailed test of significance (see Table 6) indicated the there was a significant positive relationship between students' flipped classroom perception score and their motivation scores of intrinsic value [rs (59) = .457, p < .05], task value [rs (59) = .443, p < .05], control of learning [rs(59) = .413, p < .05], and self-efficacy [rs (59) = .554, p < .05] at 0.05 level. The strength of the correlations was moderate as the rs values were all between .40 and .59. Despite the significance, the coefficient itself is less than 0.9 and there is no worry about collinearity (Field, 2018). The higher the students' motivation scores of intrinsic value, task value, control of learning, and self-efficacy, the higher the flipped classroom perception scores. However, a similar two-tailed test of significance indicated that students' extrinsic value of motivation score was unrelated to their flipped classroom perception score rs (59) = .148, p > .05.

To evaluate how well the five motivational subscales predicted participants' perspectives of a flipped class, the researchers conducted a multiple linear regression analysis. Scatterplots indicated there was a linear relationship and the Normal P-P Plot suggesting the residuals were normally distributed. Multicollinearity tests were also performed and found that the VIF values are well below 10 and the tolerance statistics are well above 0.2, which indicated there probably was not cause for concern (Field, 2018). All predictors were forced into the model simultaneously. The linear regression results indicated the five predictors explained 40% of the variance, R2 =.40, F (5, 53) = 7.053, p < .001.

Table 6: Summary Statistics, Correlations and Results from the Regression Model to Predict Students' Perspectives of a Flipped Classroom

			SPEARMAN'S RHO		MULTIPLE REGRESSION			COLLINEARITY STATISTICS	
Motivational Beliefs	M	SD	Correlation	Sig. (2-tailed)	b	β	Sig.	Tolerance	VIF
Control of Learning	5.58	1.08	.413**	.001	.012	.023	.879	.502	1.99
Self-efficacy	5.42	1.06	.554**	.000	.191*	.356*	.013	.596	1.68
Intrinsic Motivation	4.50	.99	.457**	.000	.105	.185	.183	.601	1.66
Extrinsic Motivation	5.19	1.19	.148	.264	-.015	-.031	.785	.872	1.15
Task Value	4.74	1.31	.443**	.000	.099	.229	.141	.483	2.07

Note. $N = 59$.
*$p < 0.05$. *$p < 0.001$.

Participants' predicted perspective score towards a flipped classroom is equal to [1.639+.012(Control of learning score) +.191(Self-efficacy score) -.105(Intrinsic motivation score)-.015(Extrinsic motivation score)-.099(Task value score)]*100%, where the perspective score was measured on a 5.0 scale and motivational subscales were measured on a 7.0 scale. Only the self-efficacy score significantly predicted students' perceptions towards a flipped classroom ($\beta = .356$, $p = .013$). Motivational beliefs of intrinsic value, extrinsic value, task value, and control of learning did not contribute to the linear regression model. Table 7 displays a summary of the regression model. The adjusted R square shows the amount of variance that explains if the model was derived from the population rather than a sample.

Table 7: Regression Models Summary (N = 59)

MODEL	R	R SQUARE	ADJUSTED R SQUARE	STD. ERROR OF THE ESTIMATE
Motivational Beliefs Predict Students' Final Grade Percentage	.478	.229	.156	.0685771
Motivational Beliefs Predict Students' Perspectives Towards Flipped Classroom	.632	.400	.343	.45903

There were no significant differences in final course grade percentage, students' flipped learning perceptions scores, and any motivation related scale scores between the two courses. Although the HM group had slightly higher mean scores, the differences were not statistically significant. As the researchers found no significant difference in the overall flipped classroom perception score and motivation-related scores, they used non-parametric tests to explore item-by-item. Results of this analysis showed that two flipped classroom perception items and four motivational belief items were significantly different between the two courses (see Table 8).

Mann-Whitney tests suggested that two flipped classroom perception items were significantly different for the two groups. A Mann-Whitney test indicated that the flipped classroom perception scale item seven, "the instructor required student participation in the in-class activity" was greater for the HM group (Mean Rank = 34.59) than for the LS group (Mean Rank = 24.56), $U = 285.000$, $z = -2.63$, $p = .009$, $r = -0.34$. The effect size showed a medium to large effect that accounted for 11.56% of the total variance. A Mann-Whitney test indicated that the flipped classroom perception scale item nine, "I want more interaction between students and faculty in class" was greater for the HM group (Mean Rank = 34.66) than for the LS group (Mean Rank = 24.48), $U = 283.000$, $z = -2.54$, $p = .011$, $r = -0.33$. The effect size showed a medium to large effect that accounted for 10.89% of the total variance. Students in the HM course had stronger perceptions of their instructors requiring participation, and a stronger desire for student-instructor interaction, compared to the LS group.

Table 8: Statistics Results of Flipped Classroom Perception and Motivational Belief Items

	LS M *(SD)* *(N = 27)*	HM M *(SD)* *(N = 32)*	MANN-WHIT-NEY U	ASYMP. SIG. (2-TAILED)
Flipped Classroom Perception Scale				
The instructor required student participation in the in-class activity.	4.33 (0.68)	4.69 (0.78)	285.00	.009
I want more interaction between students and faculty in class.	2.96 (0.65)	3.47 (0.84)	283.00	.011
Motivation Scale				
I think I will be able to use what I learn in this course in other courses.	4.78 (1.25)	5.63 (1.56)	268.50	.011
I believe I will receive an excellent grade in this class.	5.00 (1.14)	5.75 (1.46)	270.00	.011
I am very interested in the content area of this course.	3.74 (1.26)	4.63 (1.70)	282.00	.020
I like the subject matter of this course.	3.48 (1.34)	4.41 (2.00)	299.50	.041

Four motivation scale items were significantly different for the two groups as indicated by Mann-Whitney tests. They were item 4, 5, 18, and 27, among which item 4, 18, and 27 were under task value subscale, and item 5 was in the self-efficacy subscale. A Mann-Whitney test indicated that the task value motivation subscale item four, "I think I will be able to use what I learn in this course in other courses" was greater for the HM group (Mean Rank = 35.11) than for the LS group (Mean Rank = 23.94), U = 268.500, z = -2.55, p = .011, r = -0.33. The effect size showed a medium to large effect that accounted for 10.89% of the total variance. Moreover, the task value motivation subscale item 18, "I am very interested in the content area of this course" was greater for the HM group (Mean Rank = 34.69) than for the LS group (Mean Rank = 24.44), U = 282.000, z = -2.32, p = .020, r = 0.30. The effect size showed a medium effect that accounted for 9% of the total variance. Furthermore, the task value motivation subscale item 27, "I like the subject matter of the course" was greater for the HM group (Mean Rank = 34.14) than for the LS group (Mean Rank = 25.09), U = 299.500, z = -2.04, p = .041, r = -0.27. The effect size showed a small to medium effect that accounted for 7.29% of the total variance. The three task value items all had a higher score for the HM group. Students in the HM group indicated that they had more interests, liked the subject, and were able to use the learning material more than the LS group. One self-efficacy motivation subscale item that, "I believe I will receive an excellent grade in this class" was greater for the HM group (Mean Rank = 35.06) than for the LS group (Mean Rank = 24.00), U = 270.000, z = -2.5, p = .011, r = -0.33. The effect size showed a medium to large effect that accounted for 10.89% of the total variance. This showed that students in the HM course were more confident about their final score.

DISCUSSION AND CONCLUSIONS

This research aimed to understand to what extent motivational characteristics relate to students' perspectives, performance, and use of course materials in video-based flipped learning environments. Overall, students reported positive motivational beliefs towards the flipped design. Among the five motivational beliefs, self-efficacy was a significant predictor of students' academic learning performance and perceptions of flipped classrooms. Students' motivational beliefs of intrinsic value, task value, control of learning, and self-efficacy were significantly positively correlated to their perspectives towards flipped classrooms. However, students' motivation was not significantly correlated with their use of online materials. Student's previous experiences of flipped classrooms and online learning may not always affect their motivational beliefs, learning performance, and perceptions of the course format in a flipped classroom.

Motivation and Learning Performance in Flipped Courses

Expectancy beliefs and value beliefs can influence students' academic choices (Eccles & Wigfield, 2002). In this study, students had positive motivational beliefs about the flipped classroom with mean scores higher than 5.16 on a 7.0 scale. Self-efficacy belief had a significant correlation ($rs = 4.33$, $p = 0.01$) with students' learning performance. The positive correlation between motivational beliefs and learning performance indicated that students have similar motivation patterns in flipped classrooms as in traditional classrooms.

This research concluded that self-efficacy was a significant predictor of students' learning performance in an undergraduate flipped classroom. This result was expected as Wigfield and Eccles (2000) mentioned that student expectancy and value beliefs have the power to predict their learning performance. The researchers also found that all five motivational beliefs accounted for 22.9% of the variance in students' final score percentage. This was similar to findings from Garcia and Pintrich's (1996) research in a traditional classroom, where a subset of MSLQ variables accounted for 22% of the variance in students' final grade. These modest amounts of explained variance are not surprising, as many factors can account for variance in learning performance (Garcia & Pintrich, 1996); such as affective attitude (Xu & Wu, 2013). Many studies had proved the significant predictive power of self-efficacy on academic performance (Wigfield & Eccles, 1992; Zimmerman, 2000). For example, Garcia and Pintrich (1996) discovered that self-efficacy emerged as one of the strongest predictors of performance. Schunk and Pajares (2002) also indicated that in online courses, students with higher positive self-efficacy are usually more motivated and perform better as self-efficacy impacts students' task choice, academic persistence, and learning achievement. From this point of view, even though the value component of motivational beliefs - intrinsic motivation, extrinsic motivation, and task value - have the ability to directly influence students' academic choices (Eccles & Wigfield, 2002), they failed to predict students' learning performance (Pajares, Miller, & Johnson, 1999). The current study, therefore, reinforces previous research showing the relationship between self-efficacy and learning performance, and provides some evidence that the relationships previously demonstrated in face-to-face and online environments hold in a flipped learning environment as well.

Motivation and Students' Use of Course Materials in Flipped Courses

Wigfield and Eccles (2000) argued students' subjective value relates directly to students' beliefs about the reasons to perform a task. Therefore, the lack of a significant correlation between students' use of online materials in flipped classrooms with their motivational beliefs was not expected. The strength of the non-significant correlations was also weak. In the HM group, 32 students visited 65.2% of the content topics provided by the instructors on average. Moreover, they visited each topic 2.49 times on average and spent an average of 355.84 seconds on each topic. The LS group had a Content Topics Visited Rate of 85.8% on average.

The small sample size of 59 might contribute to the inability to achieve significance. It was also possible that this non-significant finding was due to the imperfect measure of students' use of online materials. The Content Time Spent on Each Topic variable included outliers that had log data of more than 30 minutes spent on the course page. A likely explanation is that students failed to close the course window after visiting the content. The measure of time spent viewing each page may be inflated for the same reason. Conversely, students might open the learning content outside of the course site, such as viewing downloaded files, resulting in data that underestimate their real working time.

Given that students' motivation is positively related to their learning behavior (Christophel, 1990), it was surprising to find in the HM group students only viewed 65.2% of the assigned content topics. Students only stayed for an average of fewer than six minutes on the visited topics while eight lectures had a length of 11 to 38 minutes. As suggested by Tullis and Benjamin (2011), students might

allocate learning time based on their needs, such as to a more difficult task. It is possible that students skim through the lecture and did not find it necessary to watch the whole lecture. Overall, students displayed positive motivation; however, some might feel less motivated by the increased responsibility that comes with the flipped classroom (Johnson, 2013). Johnson stated that using learning materials in a self-paced learning environment could be more stressful for some students (2013). It was possible that students only skimmed through the lecture notes to search for pre-class quiz answers but did not watch all the lecture videos. This would be consistent with previous studies showing that students perceived flipped learning as being very time-consuming and burdensome (Smith, 2013; Xiu et al., 2019; Tune et al., 2013). Researchers observed that some students were new to the instructional model (e.g., they asked the researcher "what is a flipped class?") and did not know exactly how the flipped classroom could facilitate their learning. This could be another reason that students failed to use posted materials to prepare for participating in in-class activities.

Motivation and Students' Perspectives about Flipped Courses

On average students had a 3.6 out of 5 perception score towards the flipped classroom design, which was consistent with early studies, which showed that the majority of students have positive perceptions of the flipped classroom (Love et al., 2014; Pierce & Fox, 2012; Roach, 2014; Smith, 2013). Meanwhile, students in this study had a neutral response overall when asked if they wish more instructors used the flipped classroom model. This is also consistent with previous studies that students had mixed feelings about the flipped method (Moran & Young, 2014) and some do not favor the flipped design compared to traditional classrooms (Zhonggen & Wang, 2016). Pierce and Fox (2012) also concluded that 38% expressed they do not wish to take other flipped courses.

There was a significant positive relationship between students' flipped classroom perception score and their value beliefs of intrinsic value, task value, control of learning, and self-efficacy beliefs. Self-efficacy had a significant predictive power on students' flipped classroom perspective scores. The significant correlations were consistent with Eccles and Wigfield (2002) assumption that students' expectancy and value beliefs have a direct impact on their achievement choices. The extrinsic motivation was the only tested motivational belief that failed to have a significant correlation with the flipped classroom perception score. Benware and Deci (1984) suggested that students with high intrinsic motivation would be more willing to engage in active learning and result in greater learning with more positive self-related affects and cognitions. They also linked extrinsic motivation with passive learning, which also supported the non-significant correlation with extrinsic motivation in this study.

Instructor Implementation Differences

The two courses implemented the flipped learning environment in different ways according to the subject matter and instructor preferences. The HM professor had flipped the course for three years and was satisfied with the flipped course structure, while this was the first time the LS professor flipped the course and she acknowledged that she would set up the course slightly differently next time to improve it. For example, she mentioned that she would add pre-class quizzes to make sure students read the books before coming to class.

The LS course had significantly more students who had never experienced a flipped course before. It was possible the LS students did not know how the flipped design works and they were not used to preparing themselves before coming to class. In addition, students with several years of experience with traditional classrooms (e.g., seniors) might be more reluctant than underclassmen to take an active role in their learning behaviors (Burke & Fedorek, 2017).

The HM course included pre-class audio narrated PowerPoint lectures and other learning materials for 60 content topics, while the LS group included 18 topics presented through PowerPoint slides.

The HM students had to do pre-class quizzes, which may force them to preview the learning materials and prepare for the class. The LS professor acknowledged that she had to lecture for about two-thirds of the class time, as she noticed that the students did not prepare for the in-class activities.

The results of the study indicated that there was no significant difference in students' motivational beliefs, learning performance, and perspectives about the flipped classroom between the two groups. However, two flipped classroom perception scale items were significantly different between the two groups. The HM group indicated "the instructor required student participation in the in-class activity" more than the LS group. Another significant scale item was that the HM group students indicated that they "want more interaction between students and faculty in class". The first item was an objective statement about the degree of the in-class activities of flipped classrooms. This could have been because the LS instructor had to lecture about two-thirds in some of the class periods, which left less time for students' participation for in-class activities. The second item indicated that HM students want more interactions, which may relate to their previous experience. The HM group students had more previous experience with flipped classroom than the LS group. Because they had in-class activities in other flipped learning environments, they may have anticipated more in-class interactions between students and the instructor. The finding that students wanted more student-instructor interactions may be due to them not liking the collaborative learning with each other, but wanting more instruction from the professor, as the professor observed the groups but was not actively involved with any group discussions.

The HM group had significantly more confidence that they would receive an excellent grade when compared to the LS group. Partial reasons may be that the HM professor allowed 8.62% bonus points over all the possible points, which may have given students more confidence in getting a good grade. It was also possibly because the HM group students had significantly more previous experience with flipped classrooms, which may have led to higher motivational beliefs in self-efficacy. In the HM class, 37.5% of the students indicated that they had taken a flipped class before, while only 14.8% of LS students experienced one before. Schunk and Pajares (2002) reported that students who had previous learning experience would demonstrate higher levels of self-efficacy. The experience and familiarity with the course structure might have the power to boost students' confidence and self-efficacy. It was important that the instructors fully introduce the principles, foundations, and rationale behind flipped classrooms, so students would have a better understanding of the importance and the expectation of preparation before coming to the class.

IMPLICATIONS FOR PRACTICE

The results of this study suggest several implications for practice when designing a flipped learning experience, as described below.

Instructors should model, encourage, and monitor students' before-class preparation to ensure they are ready for in-class activities. Only when students are ready for in-class activities will they have the chance to get the most out of a flipped class. If the students are not prepared, the instructor will have difficulties implementing the in-class activities and might have to use the in-class time for a lecture or other preparations to familiarize students with learning materials, as the LS professor did in this study. Gilboy, Heinerichs, and Pazzaglia (2015) suggested that some students would not prepare for in-class active learning strategies. One way to encourage students to complete the pre-class activities before coming to class is to set up mandatory pre-class assignments such as a quiz, which could count towards their final grade. Findings suggest that instructors should set up pre-class activities related to credits that account for the course grade to reinforce students' effort spent on course preparation. Broman and Johnels (2019) found that the pre-class quiz could motivate students to keep up the material and complete the necessary course preparation requirements. The motivation and stimulation of getting a good grade might prompt students to spend more time and effort preparing for the course. Research has suggested that the flipped model will work if students are well prepared (e.g., Burke & Fedorek, 2017).

Instructors should not overwhelm students with too many online learning materials. In this study, students' use of online materials was relatively low. Having suitable amounts and lengths of the pre-class instructional videos could also affect the success of a flipped course. Research has shown that students reported 20 minutes to be an enjoyable length for paying close attention to an instructional video (Thompson, Xiu, Tsotsoros, & Robertson, 2020). Khanova, McLaughlin, Rhoney, Roth, and Harris (2015) found that students prefer organized short online modules with a clear distinction between essential and supportive materials. This suggests that the online portion of a flipped classroom should integrate with the face-to-face activities and not feel like a completely separate online course. The HM course had eight out of 11 narrated PPT lectures that were over 20 minutes long. Some students in the HM group reported that the "outside of class long videos and assignments seem like an online course". It was essential to have appropriate online learning materials and out of class activities that would not overwhelm students' workload. The overwhelming amount of online materials could lead to a lower use rate of the materials, which can result in lower academic achievement (Burke & Fedorek, 2017). While instructors should provide enough material to present essential content and prepare students for class activities, they should also be mindful of the relevance of the pre-class materials they require.

Adequate in-class interaction, explanation, and facilitation are also important to boost the effectiveness of a flipped design. Interactive in-class activities should scaffold students' learning by explaining important concepts and clearing misunderstandings. In this study, students reported a desire for more in-class interactions with the instructors. This highlights the importance of the teacher's role as a facilitator of in-class activities, which is different from the traditional classroom. Guidance is essential when students interact with the information or manipulate ideas and relate them to previous knowledge (King, 1993). It is also important to have students' group activities with instructor facilitation and guidance.

Instructors should actively support students' self-efficacy. This study found that student self-efficacy in a flipped learning environment is a significant predictor for students' academic achievement. The research suggested that instructors should provide students with learning strategies as well as adequate feedback (Graham, 2007) to scaffold their self-efficacy in the learning environment, such as what role students should have while participating in-group activities. Girasoli and Hannafin (2008) demonstrated that using asynchronous tools to support online instruction could promote self-efficacy, boost motivation, and ultimately improve performance. For example, instructors could set up online discussion boards, which allow students to have a pre-class discussion or ask questions about the misunderstanding. In this study, the HM professor had bonus points that counted almost 9% of the final grade, which could be a factor that influenced the self-efficacy as well. The bonus points assigned could be an encouragement for accomplishing extra learning tasks.

LIMITATION AND FUTURE RESEARCH

This study was limited by the use of a convenience sample using two classes at the researchers' university where the flipped environment was implemented. In addition, the participation rate was not 100%. It was possible that the students who were not willing to participate in this study may have a lower motivation or more negative perceptions of the flipped classroom compared to those who did participate. In this way, the results may be biased and fail to represent the whole population of the undergraduate students who experience a flipped classroom.

In addition, the MSQL instrument developers Garcia and Pintrich (1996) suggested that students' motivation and learning strategies are contingent on the context and situation, instead of generalizable individual differences or learning habits. Students' responses might vary depending on the nature of different academic tasks and course structure itself (Pintrich et al., 1991). For example, students might have different motivations and interests toward different subjects, and they could use different

learning strategies for science or art subjects. The current study included students in two applied disciplines: leisure studies and hospitality. Students may have different levels of motivation in a flipped learning environment in other academic disciplines.

Continuing research is needed to improve the effectiveness of the flipped learning approach to facilitate learning among all students, including those with low self-efficacy beliefs or low overall motivation. This study explored relationships between motivation and flipped learning but did not prove cause and effect. Continuing research should use control groups to help eliminate other confounding variables. Empirical studies are still needed in the field for assisting instructors who want to adopt this teaching style with better practices.

Overall, students and instructors presented positive attitudes towards flipped classroom design. The flipped classroom model is a valuable teaching strategy that can apply at any educational level (Milman, 2012) to maximize learning time (Tucker, 2012). While the flipped learning model challenges instructors to shift emphasis from providing content to designing active learning experiences, this role remains vitally important for facilitating in-class activities, scaffolding out-of-class preparation, and effectively implementing the flipped design.

COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of potential conflicts of interest: There is no known conflict of interest.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: All aspects of this study, including the informed consent process, were reviewed and improved by our university's Institutional Review Board.

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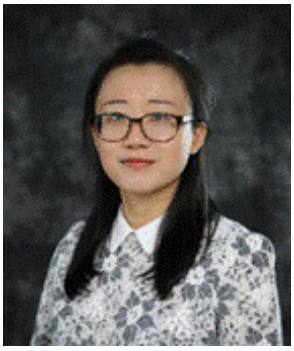
BIOGRAPHIES



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