CREATING A FRAMEWORK FOR UNDERSTANDING AND DEFINING FLIPPED LEARNING

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ABSTRACT

Although flipped instruction is becoming increasingly common, there is still discussion and debate regarding how to define it and distinguish it from other forms of instruction. This article proposes a framework with which to visualize the constituent parts of blended learning and to define what makes a course “flipped.” The definition of flipped instruction provided by this framework can be summarized as instruction that provides large amounts of information online along with face-to-face (F2F) engagement but provides little information during F2F meetings and has relatively low online interaction. This article also presents the results of an empirical study (n = 54) in which students in a flipped scientific writing course participated in an online discussion forum, and a correlation was found between posting discussion topics and scores on in-class group writing assignments. A further connection was found between scores on these group writing assignments and student performance on individual writing assignments. Based on these results, the study recommends that online discussion forums can be used to better connect the online and F2F components of a flipped course.

Keywords: flipped classrooms, online discussion forum, online interaction, online video lecture, Korea

INTRODUCTION

The flipped classroom has become increasingly prevalent during the rise of various forms of e-learning (Breslow et al., 2013). Flipped classrooms generally consist of two major components. The first is a face-to-face (F2F) component where students participate in some form of active learning, which is typically described as instruction that engages students in the learning process by providing them with opportunities to participate in meaningful learning activities and to reflect on what they are experiencing (Prince, 2004). Active learning often takes the form of some type of collaborative group work. The second is an online component consisting of instruction that students take on individually (Bishop & Verleger, 2013). In a flipped class, this individual instruction is generally provided through online lecture videos, which are available for viewing at the students’ convenience and are typically viewed as a homework assignment. In addition to individual instruction, the online component may include an online discussion, which allows learner interaction and builds a sense of community (Muilenburg & Berge, 2000).

As it is difficult to define flipped instruction or differentiate it from other modes of instruction, it is helpful to visually conceptualize the characteristics of different learning environments. This article proposes a model for the understanding of flipped learning that has four separate points representing how much or how little information or engagement occurs either F2F or online (see Figure 1). The F2F information point shows the degree to which the instructor gives information during class time. This F2F information is usually in the form of lecturing. The F2F engagement point, shows the
degree to which students are engaged in some type of activity during the F2F portion of the class; examples might include group work, writing essays, or conducting an experiment. The online information line represents the degree to which information is given to students in the online modality. The most common examples of this are video lectures or readings that the students must complete. The online engagement line represents the amount of activities that students engage in online. Examples of this might include online quizzes, writing essays, or online discussion. The four differing points can be seen in Figure 1.

Flipped learning may be particularly effective where lectures would be the predominant means of delivering instruction (Roehl, Reddy, & Shannon, 2013). This is because flipped classrooms generally expose students to course content before the F2F meeting through online lecture videos or other online instructional materials (Jensen, Kummer, & Godoy, 2015). Instructors spend the F2F class time allowing students to apply their understanding of the content through task-based activities, in-depth analysis and discussion of concepts, problem solving, and learner interaction (Gajjar, 2013; Sarawagi, 2013; Strayer, 2012; Tucker, 2012). One suggested definition of “flipped learning” is providing low-level learning opportunities (basic concepts and definitions) during the outside component of the course and high-level learning opportunities (application of concepts) during the F2F component (Sarawagi, 2013). Much of what takes place during the F2F component of a flipped course may fall under the umbrella term “active learning,” with learning activities devoted to “skill development, problem solving, and active learning of construction concepts while executing assignments” (Roehl et al., 2013, p. 46).

A Flipped Class

One way to understand this model is to look at examples of a few typical classes. This can be done by looking at where a class might fit on the points of each line of our proposed model. The first case is Ashleigh’s Music Theory class, where online work is the students’ viewing of video lectures, listening to mp3s, and reading text. According to our model, this class is high on the online information line and low on the online engagement line. In class, Ashleigh and the students engage in group discussion and group work. Furthermore, a large portion of the class is students applying some music theory skill in collaboration with others. Therefore, F2F engagement is high, while F2F information is very low. Ashleigh’s class can be represented on the model, as shown in Figure 2.

Traditional Nonflipped Class

To further clarify this way of understanding flipped learning, examples of classes that are clearly
not flipped are useful. An example is Jennifer’s Introduction to English Reading and Writing class. She gives a limited amount of information in class, but mostly she focuses on students practicing their academic writing and engaging in group and peer editing. For this reason, her class is high on the F2F engagement line and moderate on the F2F information line. Jennifer’s class has no online component, so her class does not connect with either of those lines, as can be seen in Figure 3.

**A Fully Online Class**

The third example using this model is Sally’s Introduction to Psychology MOOC on EdX. Most of the class work is focused around students watching the lecture videos she creates and reading texts she assigns. However, she has worked hard to implement interactive quizzes as part of the videos, and there is a dynamic and well subscribed discussion board that students are required to use to pass the class. Also, there are some limited group projects and assignments students must complete online. Sally’s class is, therefore, high in online information and moderate in online engagement. Sally’s class has no F2F component; therefore, her class does not intersect with any of the points of the F2F engagement or F2F information lines. Her class is represented in Figure 4.

**Another “Flipped” Class**

Our final example is Kim’s Introduction to Biology class. This is a case in which some practitioners may feel like they are engaging in flipped learning; however, they are not. The online component of Kim’s class is made up largely of video lectures with some supplementary PDFs of readings for students. There are some weekly online quizzes that take the students about 10 minutes to complete. For these reasons, Kim’s class is high on the online information line and moderately low on the online engagement line. In the F2F portion of Kim’s class, most of the time is dedicated to lecturing about the topics covered in the videos, with some details added, and to answering questions that the students have. In one of the fifteen classes during the semester, Kim’s students engage in a mock biological experiment. For these reasons, Kim’s class is high on the F2F information line and moderately low on the F2F engagement line. This is visually represented in Figure 5.

As can be seen from these figures, each shows a different aspect of the relationship between student and instructor behavior and instructional modality. Jennifer’s class is the easiest to describe, as it is a fully F2F class with no intersection with any of the online lines. Sally’s class is also reasonably
easy to describe as a fully online class as none of the points intersect with the F2F lines. Kim’s class is a little more difficult to describe as it has elements of online and F2F engagement contained within it. However, within this framework, it is only Ashleigh’s class then can be described as flipped. That is, the main instructional perspective for the F2F modality is engagement, and the main instructional perspective for the online modality is the giving of information. Kim’s class, on the other hand, mainly focuses on giving information in the F2F modality, and for this reason it may be called blended but not flipped.

The Relationship between Video Lectures and Active Learning

A commonly noted benefit of the flipped format of teaching is that it provides more opportunities for instructors to guide students to higher-order thinking by using peer support, since traditional F2F lectures, which generally require only lower-order thinking on the part of the student, can be replaced by asynchronous online videos without a loss of content (Berrett, 2012). Because video lectures can be viewed asynchronously outside of class, class time is reserved for active learning opportunities guided by the instructor. In such activities, ideally, the problem or task should be closely related to the online content the students have been viewing.

As an example of this, Pierce and Fox (2012) found that flipping a renal pharmacotherapy topic module by providing students with prerecorded lectures enabled the instructor to use class time for complementing active learning activities that required summarizing and applying material from the lectures. The researchers found that students who participated in this flipped format of the module had improved learning outcomes and better attitudes about the course compared to those who took the module in a traditional format.

The Effect of Instructional Clarity on Learning

The clarity with which a lecture is presented can affect the mental processes of the students engaging with it. According to cognitive load theory, a learner has to work within the limits of his or her own working memory when processing information (Tabbers, Martens, & van Merriënboer, 2004). Effective instruction should seek to minimize students’ cognitive processing that is irrelevant or useless to the learning task (known as extraneous load) and increase cognitive processing that is relevant to the learning task (known as germane load). Extraneous load is often caused by instruction that requires unnecessary mental processing, thereby hindering learning (Kalyuga, Ayres, Chandler, & Sweller, 2003; Leppink, Paas, Van der Vleuten, Van Gog, & Van Merrienboer, 2013). Consequently, extraneous load is linked to poor or confusing instruction, and in a number of studies, extraneous load has been used as a proxy of instructional quality in both offline and online learning environments (Cheon & Grant, 2012; Kalyuga et al., 2003; Kalyuga, Chandler, & Sweller, 1999; Mayer, Heiser, & Lonn, 2001).

The Relationship between Clarity of Lecture Videos and Discussion Board Participation

Although instructors should strive to provide instruction that is as clear as possible, unclear instruction will persist. When faced with confusing or unclear instruction, research has shown that students can engage in behaviors that can help to positively mediate the relationship between germane and cognitive load (Costley, Fanguy, Baldwin, Lange & Han, 2018). A common strategy that students engage in when confused is to seek out timely feedback and support. However, as students often report feelings of isolation in online learning environments (Lee & Rha, 2009; Russo & Benson, 2005), seeking guidance may prove challenging. One option in such environments is to participate in online discussion forums, where students can initiate and reply to topic posts in an attempt to reduce or resolve confusion. Yang, Wen, Howley, Kraut, & Rose (2015) found that students
who create topic posts on class discussion boards are more likely to be confused than those who simply reply to the posts created by other students. However, although creating posts on a discussion forum may indicate confusion, it is important to note that such a behavior also represents a proactive step on the part of the student to resolve their confusion through seeking interaction and support.

**Online Discussion and F2F Study**

The learning experience cultivated by the instructor plays an important role in the learner’s ability to successfully navigate the course concepts and requirements (Boling, Hough, Krinsky, Saleem, & Stevens, 2012; Nonis & Fenner, 2012; Shea, 2006). The instructor acts as a facilitator in class discussions and a guide to learners as they construct knowledge (Hew, 2015). Moreover, online discussion boards have been shown to provide valuable support for active learning, particularly in cases where learners must express and negotiate the knowledge structures they are fostering (Greening, 1998). Harrington (1992) noted that learners engaged in online discussion forums encountered a variety of opinions and perspectives, thought critically on their own position, and sometimes changed their minds due to this interaction. Consequently, discussion boards may serve as an integral component of students’ learning interaction in a class.

**Online Discussion and Student Writing Ability**

Online discussion forums help to create a more interactive classroom environment in which students present their ideas in writing to classmates and instructors and/or teaching assistants. Studies suggest several reasons why interactive learning environments may be beneficial to students in developing their writing abilities. When students become aware that their compositions will be read by a broader audience, they tend to put more effort into their writing (Gallini & Helman, 1995). Therefore, online discussion forums may help to increase student attention to audience and to writing quality by providing opportunities for written interactions. Computer-rich environments, which include online discussion forums, have been shown to improve students’ awareness of audience through online interaction, which also affected student writing in other ways including selecting of the writing topic, integration of various modalities, and the process of revision (Baker, Rozendal, & Whitenack, 2000). Cheng, Pare, Collimore, and Joordens (2011) found that students performed slightly better in all course assessments, including two writing assignments that were graded by peers using PeerScholar software. Specifically, the researchers found that one discussion forum post corresponded to 0.039 and 0.035 standard deviations higher grade on the two writing assignments, respectively (Cheng et al., 2011). The notion that posting in online discussion forums improves writing ability seems to also apply to English Language Learners (ELL), as students who posted most frequently on online discussion board had the greatest improvements in their writing posttest scores compared to those of their initial writing pretests (Zheng & Warschauer, 2015).

**The Effects of Flipped Instruction on Learning**

Writing comprises a host of skills, including planning, organizing, expressing, and supporting ideas; reviewing; and editing (Abu-Rass, 2001; Alsamadani, 2010). Immediate guidance and feedback from the instructor and peers may be beneficial to learners as they are tasked with writing assignments. Traditional didactic models of instruction devote large amounts of class time to lecture, which provides students with direction on how to write or complete assignments, but it does not provide tailored feedback in response to the students on their writing. An important advantage of the flipped model of instruction for writing classes is that class time can be devoted to active learning tasks or peer editing assignments that allow for scaffolding between group members of differing knowledge and writing skills and enable immediate feedback from peers and the instructor (Ahmed, 2016). Flipped classrooms enable students to participate in differentiated learning experiences rather than linear and didactic ones (Butt, 2014; Tune, Sturek, & Basile, 2013; Willey & Gardner, 2013). A number of comparison studies between traditional and flipped environments have shown that student writing improves under flipped instruction (Afrilyasanti, Cahyono, & Astuti, 2016; Ahmed, 2016; Leis, Tohei, & Cooke, 2015). Leis et al. (2015) note that flipped formats offer learners the ability to review instruction at their leisure and as often as they like, unlike traditional courses. Ahmed (2016) found that students indicated a greater sense of autonomy and motivation because
of flipped instruction. These findings are in line with prior studies that suggest that students tend to have a positive view of technology in the classroom and that blended learning improves student motivation, independence, and writing ability (Kemmer, 2011; Liu, 2013). However, research has suggested that the differences in learning outcomes found between flipped and nonflipped learning environments may simply be due to increased opportunity for active learning in the former, as no difference was found in learning outcomes between flipped and nonflipped courses that both featured active learning (Jensen et al., 2015).

THE PRESENT STUDY

Although there is a great deal of extant research on the flipped model of instruction, there is a lack of consensus on how it should be implemented. Most definitions of a flipped classroom include some uptake of information done outside of class and an active learning component during the F2F meeting (Bishop & Verleger, 2013). While it is assumed that the outside and F2F components should complement one another, there is no consensus on how that should be achieved. Since the flipped learning model has become a major area of interest in the literature, it is worthwhile to more clearly define the flipped classroom and identify the ways that the component parts of this model of instruction can work together to create a cohesive learning experience.

Prior research has indicated that participation in online discussion boards may help to improve students’ writing ability (Cheng et al., 2011; Gallini & Helman, 1995; Zheng & Warschauer, 2015). However, few studies have examined the effects of online discussion board participation on student learning outcomes in flipped classrooms. In flipped environments, clearly connecting the online instruction with the F2F interaction component is important. Online discussion boards may provide an effective way of doing so, perhaps by allowing students to make connections between the videos they are viewing and the in-class and homework assignments they are completing.

The present study examines the experiences of students (n = 54) participating in flipped graduate-level scientific writing courses at a Korean university. The aim of the study is to assess whether active participation in online discussions leads to improved outcomes on collaborative in-class activities and individual writing homework assignments. Student performance in the course was evaluated through instructor assessment of their writing for in-class group activities and individual writing assignments done outside of class. Student participation in the online discussion forum was assessed, as their weekly posts were tallied and categorized as creating a new topic post or a reply to an existing topic post. Students were also given a survey to assess their experiences with posting messages on the class discussion board and measure their levels of extraneous cognitive load in order to assess the clarity of the online lecture component of the course. The data collected from these measures were analyzed for potential relationships.

Research Hypotheses

H1. Unclear lectures will have a positive relationship with creating discussion threads.

H2. Unclear lectures will have a positive relationship with posting in the discussion threads.

H3. Creating discussion threads will have a positive relationship with F2F learning.

H4. Creating discussion threads will have a positive relationship with students’ final product.

H5. Posting in discussion threads will have a positive relationship with F2F active learning.

H6. Posting in discussion threads will have a positive relationship with students’ final product.

H7. F2F active learning will have a positive relationship with students’ final product.

METHODS

Participants

For the present research, three classes of Scientific Writing were examined. There were 54 students in the three sections of Scientific Writing that were a part of this study. Forty-nine chose to participate in the research, and five opted out. Among these 49 participants, 12 were female and 37 were male. The average age of the participants...
was 26, with the oldest participant being 47 and the youngest participant being 22. The majority of the subjects in this study were master’s students (43), while six were in PhD programs. The majority of students were Korean (43), with six foreign nationals being a part of this research. All participants in the study were students majoring in STEM fields, with engineering majors being strongly represented, as shown in Table 1.

Table 1. Correlations between the Main Variables (n = 54)

<table>
<thead>
<tr>
<th>Class Description</th>
<th>Lecture quality</th>
<th>Discussion created</th>
<th>Post created</th>
<th>Group work total</th>
<th>Paper total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclear lectures</td>
<td>1</td>
<td>-1.40</td>
<td>-0.29*</td>
<td>-0.039</td>
<td>-0.025</td>
</tr>
<tr>
<td>Discussion created</td>
<td>1</td>
<td>0.31</td>
<td>0.354*</td>
<td>0.126</td>
<td></td>
</tr>
<tr>
<td>Post created</td>
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<td>-0.10</td>
<td>-0.078</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group work total</td>
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<td>0.296*</td>
<td></td>
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<td>Paper total</td>
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* = Correlation is significant at the 0.05 level (2-tailed).

Class Description

The F2F component of this flipped course took place once per week during the 16-week semester. Class days generally involved one of two formats. The first was a task-based writing activity, where students were divided into groups of four, were given an imaginary research scenario, and then were asked to compose a particular section of scientific journal manuscript corresponding to the preceding week’s video lectures. The second in-class format involved peer editing, where students were put into pairs and asked to read and evaluate each other’s work using a rubric for the section of the journal article being covered at the time.

Measures

The course included an online discussion forum, and students were asked to post at least three times per week, which could be achieved by creating new topic posts or replying to topic posts created by other students. Discussion board participation accounted for 20% of the total course grade. No specific instructions were given to students with regard to post length or topic, but the instructor provided individual guidance to students with regard to off-topic posts or posts that lacked meaningful content (e.g., contained only a few words). At the end of each instructional week, the day before the F2F meeting of the next instructional week, the instructor would tally up each student’s posts and identify them as new topic threads created and replies to existing threads. Students were encouraged to post on topics related to the course videos or research writing in general. They were also encouraged to offer up thoughtful topics and replies. The instructor and teaching assistant read each reply and responded to posts where this was deemed necessary or helpful.

In order to assess the students’ levels of extraneous load, students were given a survey containing items from Leppink et al.’s 2013 paper, “The development of an instrument for measuring cognitive load.” In this paper they describe the functions and applications of the three primary elements of cognitive load (extraneous, germane, and intrinsic) and provide survey items to measure them. To measure extraneous load, the following items were adapted from their paper: (1) The explanations during the lecture videos were very unclear; (2) The explanations were, in terms of learning, very ineffective; and (3) The explanations were full of unclear language. The Cronbach’s Alpha for the extraneous load measure was .815.

The in-class group work was scored between 0 and 9, based on three criteria. Each criterion could be scored as 0 for incomplete, 1 for poor, 2 for average, and 3 for excellent. Students were scored as a group, so each member received the same score as all other members for that particular activity. The scores for each student’s in-class group work were then combined into a final group work score. For individual writing assignments, each section of students’ final product of writing was scored between 0 and 10. Five categories were scored with 0 being incomplete, 1 being average 2 being excellent. These writing assignments were based around the Introduction, Methodology, Results, Discussion & Conclusion, Abstract, and References of a scientific journal manuscript and were adapted from rubrics in Clabough and Clabough (2016). Each section of the writing was then combined to create a measure of students’ final piece of writing.

RESULTS

Of the 49 participants, nine made no contributions at all to the discussion board, 18
started threads and posted replies, and 22 made only replies to threads. In total, students started 65 discussion threads and made 653 posts in the online forum. The highest number of threads started by a single participant was 10, and the most posts made by a single participant was 24.

Table 1 shows the correlations between the main variables used in this study. It shows that unclear lectures had a negative correlation with all variables, but that relationship was only statistically significant in relation to the creation of posts. That is, as students perceived lectures as more unclear, students were less likely to post. Only the creation of discussions had a statistically significant relationship with the quality of students’ group work. Students who created more discussions were more likely to do well in their group work. Furthermore, higher scores in group work were positively correlated with the quality of the students’ final papers. Students who did better in the group work were also more likely to do better on their final papers. This relationship was statistically significant, as can be seen in Table 1.

To gain more insight as to how demographic variables affected the study, an analysis of all the main variables was also performed in relation to gender. Gender had a statistically significant difference in regard to post creation, with female students making an average of 15 posts while male students made on average 11 posts (Table 2).

<table>
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<tr>
<th>Table 2. Gender and Degree Relations with the Study Variables</th>
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<tr>
<td>Discussion</td>
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In order to take a deeper look at the students’ perceptions and experiences with participating on the course discussion forum, three participants in the study were interviewed after completion of the course. Student A was a 27-year-old female student who was a relatively active poster on the discussion board. She noted that “Simply posting a reply to an existing topic takes less mental energy than thinking up a new topic [by oneself].” Although Student A was often a major contributor of high-quality topic posts and replies, she also, at times, wrote short replies when she felt busy and did not have time to gather her own thoughts on a given topic. She also mentioned that some replies were outstanding, showing a great depth of thought that advanced the discussion, but that shallow “drive-by” replies were probably not helpful in enhancing the poster’s own knowledge or in advancing the class discussion.

Student B was a 24-year-old male who was a low contributor to the discussion board, posting only occasionally. He indicated that he only used the discussion board when there was something he did not understand or that he wanted more information about. As he felt comfortable with most of the content of the course, he often chose to forgo reading posted messages or writing contributions on the board. He also mentioned that some of the posts on the board were rather shallow and lacked content, and this was a particular problem with replies. He felt that students might have been trying to fulfill course requirements by quickly posting replies to existing threads without putting much time, energy, or thought into them.

Student C was a 24-year-old female who was a very high contributor to the discussion board. She indicated that she enjoyed using the board and that participating caused her to think more deeply about course concepts. She noted that classmates “came up with very interesting questions, but the responses might be lacking at times,” which is a theme echoed by all three students interviewed. In particular, she noted a number of instances where people would provide a reply that contained a very short answer to a question with no justification or explanation. However, she also stated that some students and, in particular, the class teaching assistant tended to respond with great depth and high-quality posts, and this made the board particularly useful to her.

**DISCUSSION**

According to the results of the present study, unclear lectures were negatively correlated with creating new discussion topic posts, contrary to what was expected in Hypothesis 1. No correlation was found between unclear lectures and posting
topic replies, so that Hypothesis 2 was also not supported. While creating a topic post and replying to existing topics may seem like similar activities, there may be some important differences between them. In regard to the former, it is likely that creating a new topic post requires a deeper understanding of the course material. Further, creating a topic may indicate a relatively high level of interest of thought on or interest in the topic, representing a deeper-level learning strategy in which the student is seeking improved understanding of the course concepts. Conversely, posting brief replies to an existing topic may represent mere compliance with class posting requirements as a surface-level learning strategy, which Le, Joordens, Chrysostomou, and Grinnell (2010) described as driven by extrinsic motivation where the student performs the minimal amount of effort in order to complete course requirements to avoid failing, often resulting in rote learning.

Such short replies may take the form of simple agreement with the opinion of the original post without providing sufficient details to explain the reasons for that agreement. This type of simple reply without sufficient justification or explanation was noted as a problem with the online discussion board by each of the three students who were interviewed in the study. As mentioned by the interviewees, for a student to post a new topic thread, it seems that a certain level of understanding of the content must occur, as even asking a question represents some basic understanding of the topic being discussed. This may be why there was a significantly negative correlation between unclear lectures and new topic posts, as unclear lectures may have so impeded students’ understanding that a good question or new topic post could not be formulated. If no discussion topics were posted on unclear lecture topics, replies to that topic would be impossible, which explains the lack of correlation between reply posts and unclear lectures.

Creating new topic threads on an online discussion board was positively correlated with performance on group activities in the F2F component of the course, providing support for Hypothesis 3, while no beneficial effect was found with posting replies to existing topics, refuting Hypothesis 5. No correlation was found between individual writing scores and posting new topics or replying to existing ones, which refuted Hypotheses 4 and 6. It is noteworthy, however, that performance on in-class group work was found to positively correlate with scores on individual paper writing assignments, supporting Hypothesis 7 (see Table 3).

<table>
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<th>Table 3. The Study's Hypotheses</th>
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If the timing of these events is considered, there seems to be an indirect beneficial relationship between creating new topic posts on the online forum and improvement of individual student writing assignment scores. The course materials were set up so that a student would presumably engage in the following timeline of events: 1) watch videos on a given section of a journal manuscript, 2) create new topic posts or post replies to related topics online, 3) engage in an in-class group activity as a rehearsal for the individual writing assignment, and 4) compose and submit the individual writing assignment. Deadlines specified by the instructor helped to ensure that this timeline was followed, including deadlines for discussion board posting, in-class group work, and individual writing assignments. Considering the ordering of learning tasks, it seems plausible that there was an indirect relationship between posting new topics and individual writing in that posting new topics led to improved group work, which was positively correlated with high individual writing assignment scores.

The class where this experiment was conducted can be modeled differently from the previously presented models in this paper, and we can refer to this final example as Mary’s class. In Mary’s Scientific Writing class, the vast majority of online work is the students’ viewing video lectures,
though there is some limited online discussion. This means that the class is moderately high on the online information line, and relatively low on the online engagement line. In class, Mary and the students mostly just engage in group discussion and group work, though occasionally Mary gives a short preamble summarizing the contents of the week’s videos. Therefore, F2F engagement is high, while F2F information is very low. Mary’s class can be represented on the model as shown in Figure 6.

![Figure 5. Kim’s “Flipped” class](image)

This is a subtly different way of promoting or understanding the traditional model of flipped learning as defined in Figure 2, Ashleigh’s class. The addition of the discussion board into the online component increases the amount of online engagement and provides a link between the information-giving aspects of the course’s online video component and the F2F in-class activities. This linking may allow learners to find more connection between the online and F2F components of the class. This method of adding an online student-to-student interaction may benefit learners by allowing them to interact in such a way that the knowledge gained in asynchronous online discussion scaffolds the learning from the videos, leading to higher performance on the in-class work.

Asynchronous discussion forums have been shown to facilitate learner’s critical thinking and construction of knowledge (Dede, 2002). This medium has been shown to allow learners the time to think and analyze the contents they have been given in any particular class (Costley & Lange, 2016). This is particularly the case in situations where students may feel uncertain in regard to the details of the administration of the class, how to complete assignments, or a complex of confusing contents (Levin, 1999). Furthermore, it has been shown that asynchronous discussions can be of more benefit to synchronous discussion for developing higher order thinking and the construction of meaning (Lapadat, 2000). For this reason, allowing some discussion to take place online in a flipped learning environment may be of great benefit to learners.

Many learners feel that online asynchronous discussions allow all learners to benefit and “everyone’s voice to be heard” (Black, 2005). In this way, asynchronous discussion may allow for a flattening of interaction with weaker learners being put in a similar position to stronger learners who might dominate F2F interactions. As much of the F2F interaction in flipped lessons is group work, the discussion forum is a place that may allow more learners to participate when they might not participate for in-class activities. Running counter to this idea, however, is some research that shows more advanced students may benefit more from online asynchronous interactions than weaker students (Lewinson, 2005). Although there are benefits to online discussions between students, without making participation on the forum a formal part of the class, interactions might be limited (Nicholson & Bond, 2003). For this reason, requiring students to participate on the class discussion board may be necessary so that more learners can benefit from the interactions. For the reasons mentioned, a balance of online and F2F interaction is useful and may more truly harnesses the potential of flipped instruction as a medium.

CONCLUSION

This article presents a framework for understanding flipped learning and some empirical evidence for how the parts of a flipped class may fit together. Accordingly, a few recommendations for designers and practitioners of flipped courses can be made regarding the use of online discussion boards. Instructors should consider adding or emphasizing online discussion in order to provide greater focus on the online instruction component and to better connect the online instruction to the F2F component of the course. While participation in online discussion may provide learning benefits to students in flipped courses, the findings of this
study suggest that this is only so when students contribute meaningful ideas to a discussion rather than short replies of agreement. Therefore, instructors may also consider assessing online discussion in the quality of the ideas or depth of thought displayed in the messages in order to encourage sufficient depth of thought within student posts.

Despite the contributions of this study, some limitations are apparent. The first is that the framework presented is somewhat simplistic and its operationalization is not clearly manifested. This was done to give a more general overview of the concept and to present the recommendations in a more palatable way. Furthermore, the empirical link presented is tenuous; while there is some benefit shown from discussion to group work, and group work to final product, there is no significant link between the students’ online discussions and their final product. If this link could be strengthened in further research with more robust measures, the central claims of this study would be strengthened. Experiments that vary the degree to which elements of flipped learning can be integrated into a lesson may be helpful in discovering best practices. Also, this study lacks a strong student characteristic measure that may be driving some of the results. Future research should consider aspects of student quality and the role that might have on online discussion, in-class group work, and the students’ final piece of writing.
REFERENCES


