

Introduction to Flipped Learning

Abstract This chapter introduces flipped learning, a student-centric pedagogy in which lecture is moved to the online environment and class time is spent engaging in active learning experiences. Following a discussion of the definition and history of flipped learning, the chapter presents eight principles to follow when designing a flipped experience and provides guidance on selecting topics or class periods to flip. The potential advantages and disadvantages of flipped learning are discussed, the primary advantage being the potential to teach a broad range of learning goals that cannot be taught as effectively in a lecture-based course. The remaining chapters examine the research on flipped learning and explain how to create flipped experiences that capitalize on their benefits and mitigate their disadvantages.

Keywords Flipped learning • Inverted learning • Active learning • Assessment • Pedagogy

Flipped learning, in which the lecture is moved to the online environment and class time is spent engaging in active forms of learning, is a relatively new pedagogy that has become increasingly popular over the last several years (Yarbro et al. 2014). The promise of the flipped classroom (also referred to as inverted classroom) has been touted in influential publications such as the *New York Times* (Fitzpatrick 2012; Rosenberg 2013),

Science (Mazur 2009), and *The Chronicle of Higher Education* (Berrett 2012). Unfortunately, the rapid rise in popularity of this teaching technique has outpaced the available information on its effectiveness and fit for different academic disciplines and different types of courses (e.g. introductory classes, seminars, skills courses). While there is growing support for the use of flipped learning in science, technology, engineering, and mathematics (STEM) courses, less is known about the appropriateness of the technique in social science and humanities courses (Roehling et al. 2017). Additionally, there is little guidance or instruction on how to create flipped class videos (also referred to as vodcasts) and activities for different disciplines and types of courses. The goal of this book is to integrate the research and theory in areas such as education, psychology, and communication to provide guidance and practical instructions for teachers in higher education on (1) understanding the benefits and drawbacks of the flipped classroom; (2) understanding the effectiveness of flipped learning in meeting a broad variety of learning objectives and goals; (3) identifying the types of courses and course material which benefit from the flipped pedagogy; (4) creating active learning classroom experiences that facilitate learning and develop a broad range of learning outcomes; (5) identifying, creating, and disseminating vodcasts which will interest and engage students while also imparting knowledge; (6) orienting students and instructors to the flipped class pedagogy; and (7) assessing the effectiveness of the flipped classroom at meeting a broad range of learning objectives and course goals. This book will provide evidence-based guidance for faculty in all areas of the academy (STEM, social sciences, and humanities) on how and when to implement this innovative teaching technique.

DEFINITION AND EVOLUTION OF FLIPPED LEARNING

There are many definitions of flipped learning (Chen et al. 2014). This book adopts the most commonly used description of flipped learning. That is, flipped learning occurs when information that was traditionally delivered directly to the entire classroom, via lecture, is delivered outside of the classroom space, typically online, in digital or video format (FLN 2014).¹ Classroom time is then primarily spent engaged in active learning experiences that stimulate higher-order thinking, as well as a broad array of other learning objectives and goals. Classroom activities include, but are not limited to, group work, peer instruction, discussions, and mastery quizzes.² Flipped learning trades in the passive learning often associated

with lecture, for active learning, during which students are responsible for making meaning and drawing connections while drawing on material that was delivered outside of the classroom.

The concept of flipped learning has evolved. It began with Alison King's influential article "From Sage on the Stage to Guide on the Side" (King 1993), which called for college instructors to stop using lecture as vehicle to transmit information from faculty to student but rather to use class time to actively engage students in their learning. Flipped learning is grounded in student involvement theory (Astin 1999), which posits that the more time and effort a student puts into their learning experience, the greater their cognitive and personal development. This is true for all aspects of the higher education experience, including time in the classroom, time spent in extracurricular activities, and time spent studying. Flipped learning increases involvement because students use class time to engage the course material, constructing their own knowledge as opposed to the more passive involvement associated with lecture. Further, flipped learning provides the opportunity for students to develop other important learning outcomes beyond knowledge acquisition, such as higher-order thinking, communication skills, and metacognitive skills (six learning outcomes will be discussed in more detail in Chap. 2).

In 2000, Lage, Platt, and Treglia published the first research article on the flipped classroom. Students in their flipped economics course reported positive reactions to the teaching method. Later, in 2004, Salman Khan upended high school math instruction by creating short video clips of mathematics lessons that he eventually made available on the Web, free of charge, through the Khan Academy (Edutopia 2011). Teachers in flipped high school math courses across the country assign those videos as homework and spend class time helping students apply concepts and complete math problems. In 2007, Jonathan Bergmann and Aaron Sams, two high school science teachers, began flipping their classrooms and sharing their experiences. They have since become major driving forces behind the movement to flip high school classes with their influential book *Flip Your Classroom: Reach Every Student in Every Class Every Day*, and their work with the Flipped Learning Network (FLN) and the Flipped Learning Global Initiative (FLGI).

The flipped classroom and flipped learning are not synonymous; simply moving lecture outside of the classroom does not result in a true flipped learning experience. According to the FLN, there are four essential pillars which support flipped learning (FLN 2014). Pillar 1:

Flipped learning requires a *flexible environment*. The physical classroom space must accommodate different types of classroom experiences and assignments. Student assessment must also be flexible to reflect the more active types of learning that occur during the flipped class period. Pillar 2: The *learning culture* must shift from the teacher-centric lecture model to the student-centric active learning model. Students must participate in constructing meaning and applying the concepts covered in the course. Pillar 3: Instructors must be *intentional* when designing the flipped learning experience. It is their role to carefully consider which content will be moved outside the classroom and the activities that students will engage in during class time. These decisions must be designed to facilitate higher-order thinking and promote course goals. Pillar 4: *Professional educators*, who create and orchestrate classroom experiences, are essential to flipped learning. Flipped learning is not a paradigm that will make teachers obsolete. Rather, good teachers are critical for the success of the pedagogy.

To be clear, the definition of flipped learning used in this book is different from both online learning and hybrid or blended learning. Online courses involve little to no face-to-face activity between students and the instructor (Fuster 2016). Whereas flipped learning involves regular, highly interactive contact between student and faculty. Hybrid or blended learning, like flipped learning, involves a mixture of online and in-person class time. However, with hybrid learning, the online learning replaces some of the class time, resulting in less face-to-face interactions between students and faculty (Fuster 2016).³ With flipped learning, class time is not traded for online delivery. Rather, class time is preserved and transformed into active, student-centered learning. This means that, for students and for faculty, time spent preparing for and participating in the class may be greater than time spent in traditional and hybrid courses. Flipped learning is not a shortcut for either the faculty or the student.

PRINCIPLES FOR DESIGNING A FLIPPED LEARNING UNIT

Before addressing the actual construction of flipped class periods or flipped courses, it is important to establish some guidelines for an optimum flipped learning experience. Kim et al. (2014) and Honeycutt (2016) recommend several principles to follow when flipping a class or portions of a class. These recommendations provide a solid foundation for any flipped

class by avoiding many of the more common pitfalls that can occur with flipped learning. A merged and slightly modified list of those principles follows below.

1. *Provide an opportunity for students to learn the foundational information outside of the classroom.*

A hallmark of flipped learning is that foundational knowledge is conveyed outside of the classroom via both readings and videos/vodcasts, which usually have some overlap in content. Because flipped learning can increase workload, some instructors assign only recorded lectures or shorten their required reading list. Based on the goals and other demands of the course, the instructor should decide whether to amend reading assignments when moving to a flipped paradigm.

2. *Hold students accountable for pre-class preparation*

For flipped learning to succeed, students must come to class prepared to meaningfully engage in the in-class learning activities. If instructors do not hold students accountable for completing pre-class learning assignments, many will fail to be adequately prepared (Enfield 2013). To circumvent this problem, almost every study of flipped learning reviewed in Chap. 2 included some form of incentive to encourage students to complete the pre-class assignments. When incentives were present, approximately three-quarters of the students report watching most of the videos (McGivney-Burelle and Xue 2013; McLaughlin et al. 2013; O'Bannon et al. 2011). One study that did not report a mechanism for holding students accountable for pre-class work found that the majority of students neither read nor viewed the lectures before class (Sahin et al. 2015). Instructors must also realize that compliance with pre-class assignments typically declines as the semester progresses, and students tend to find methods for circumventing assignments (Guerrero et al. 2015; O'Bannon et al. 2011).

Quizzes and guided reading questions are the most common incentives for completing pre-class assignments. They are typically embedded in the readings or vodcasts, or they are administered prior to or at the beginning of class. Students report that answering questions based on the readings motivates them to read the course material, helps them understand the material, and allows them to be more engaged in the course discussions (Brown et al. 2016).

3. Assess pre-class and in-class learning

Pre-class or in-class quizzes not only hold students accountable for complying with pre-class assignments, they are also a way of assessing student understanding. If an assessment reveals that students do not have a good understanding of the information, the instructor needs to decide how to handle the situation. If the material was too difficult to comprehend, the instructor can engage a mini-lecture to clear up confusion (Berrett 2012), or students can work in groups to clear up their misunderstandings. If the knowledge deficit is due to a lack of preparation, the instructor may ask the unprepared students to read the relevant material or view the recorded videos while their prepared classmates complete the in-class exercises. This reinforces the idea that students are responsible for learning the information on their own and should not rely on the instructor to relay it to them.

It is also important to assess what students learn from in-class exercises (information about how to assess this is in Chap. 7). The reasons for this are threefold. First, the assessment helps the instructor determine whether learning goals are being met. Second, grading an in-class exercise provides valuable feedback to the students, which increases learning. Third, some students do not take in-class exercises seriously and therefore invest little effort (Strayer 2012). Grading the assignments increases student motivation and engagement, which increases the potential for learning. The in-class assignments should be worth only a few points, just enough to motivate but not enough to create anxiety. To avoid grading overload, the in-class exercises can be randomly graded or they can be assigned a broad grade such as not complete, adequate, good.

4. Provide well-defined and structured guidance to students during in-class activities

One complaint about flipped learning is that students feel unmoored and uncertain about what is expected of them (Strayer 2012). To avoid this problem, instructors should clearly structure the in-class experiences so that students understand what they are being asked to do and how they will be evaluated.

5. *Make clear connections between in-class activities, pre-class materials, and learning objectives and goals*

Another common complaint about flipped learning is that students do not understand how the in-class exercises relate to the class's learning objectives and/or the course material (Al-Zahrani 2015). There are some simple ways to address these concerns. First, at the beginning of each class period, list the learning objectives for the day. At the end of the class, the instructor and students can review whether and how the learning goals were met and make connections between the in-class exercises and the course material.

6. *Allow enough time for students to complete the in-class assignments*

It is imperative to allow enough time for students to complete and get feedback on in-class exercises. If students do not receive feedback, the exercise may not meet its learning objectives and students may leave the class confused about what they were supposed to learn. To ensure that the most important learning objectives are met, you can prioritize the exercises so that the ones most fundamental to the goals of the class period can be tackled first. Students should not move onto another exercise until you feel comfortable that the learning objectives have been met and that students understand the connections.

7. *Maximize opportunities for faculty to interact with students*

The flipped classroom provides an excellent opportunity for instructors to interact with students and lay the groundwork for mentoring relationships. Several studies have shown that student-faculty relationships play an important, positive role in a student's education. Student-faculty interactions are strongly related to retention and student satisfaction with college (Astin 1999). They are also related to academic and intellectual self-concept, higher levels of intrinsic and extrinsic motivation, greater intellectual gains, and increased academic performance (Anaya and Cole 2001; Cole 2007; Komarraju et al. 2010; Kuh and Hu 2001; Pascarella and Terenzini 1978; Pascarella et al. 1978). The benefits of student-faculty interaction accrue most strongly to first- and second-year students and non-residential students (Edno and Harpel 1982; Pascarella et al. 1983; Terenzini and Wright 1987).

8. *Give one free pass to students who do not complete the pre-class assignments*

As every instructor knows, there are times when students are overwhelmed by their workload and have to make difficult choices about prioritizing academic tasks. To take some of the pressure off students, a good practice is to offer one “free pass” which exempts them from being penalized for failing to complete the pre-class assignments. This goodwill can go a long way with students.

DECIDING WHAT TO FLIP

Once you understand the principles behind an effectively flipped course, the next step is deciding what to flip. Flipping a class is time intensive, so it is ill-advised to flip an entire course at once unless you have a few months to devote to preparing the course. In the author’s experience, for every hour of lecture, it takes at least four hours to record, edit, and upload a comparable digital lecture or vodcast. For those who spontaneously speak eloquently, the ratio of lecture time to preparation time may be closer to 1:3. Once the recorded lecture has been created, active learning exercises such as quiz questions, worksheets, or discussion guides need to be prepared. Enfield (2013) reports that it takes him 50 hours to prepare for 13.5 hours of videos and quizzes. Remember, the more structured the in-class exercise, the better students will respond to it. After class, assessments may also need to be scored and recorded. If you decide to embark on a flipped course without having the recorded lectures and class activities completed, you may quickly find yourself underwater.

If you are new to flipped learning, you may want to begin by flipping specific class periods or even segments within a class period—flipped moments. In STEM courses, problem sets and other forms of “homework problems” make excellent in-class exercises and are a good way to begin flipping. Recorded lectures can explain the relevant principles and formulas and demonstrate how to solve sample problems; students can then complete the “homework” in class with the assistance of peers and the instructor.

For non-STEM courses, Honeycutt (2013) recommends that instructors begin by flipping lecture material that either is fundamental, is confusing, or engenders boredom in students. The author followed this advice when flipping sections of her introduction to psychology course. One unit that was flipped was particularly uninspiring to teach. Once flipped, the

unit generated a higher degree of engagement among the students and simultaneously enhanced the instructor's experience. Another unit that was flipped was both fundamental and difficult for students to master. Flipping that unit improved students' comprehension of those concepts and allowed the instructor to identify and correct misunderstandings during class time. The other units that were flipped involved material that was particularly amenable to active learning exercises.

ADVANTAGES AND DISADVANTAGES OF THE FLIPPED CLASSROOM

The major and most important advantage of flipped learning is that it is a more effective way for students to achieve a broad range of learning outcomes. The research supporting this proposition will be the focus of Chap. 2. Aside from this pedagogical advantage, students who have participated in flipped learning report several other advantages associated with the pedagogy (see Table 1.1). Flipped learning can be dynamic and flexible. However, if not implemented correctly, it can increase student workload and frustration without adding value to a student's education. See Table 1.1 for other commonly reported disadvantages. The following chapters will address these points, providing advice on how to capitalize on the advantages and mitigate the disadvantages of flipped learning.

Table 1.1 Student perspectives on the potential advantages and disadvantages of flipped learning

Advantages of flipped classroom
Enhanced learning
Students can view recorded lectures at own pace
Recorded lectures can be reviewed at convenient times and places
Class time can be used for more effective active learning activities
Instructors can work directly with students when they encounter difficulties
Instructors can have more direct contact with students, facilitating and deepening relationships
Disadvantages of the flipped classroom
Recorded lectures can be less engaging than live lectures
Compliance with watching videos is difficult to monitor
Instructor is not available to answer questions while viewing vodcasts
Flipped classes often require a greater time commitment and workload for the student
Technical problems may interfere with learning
Quality of recorded lectures and in-class exercises can be variable

There are also advantages and disadvantages for the instructor. One major disadvantage is the tremendous time commitment needed to convert a class into a flipped learning experience. Despite this significant time cost, the pedagogy continues to gain in popularity among educators (FLN 2014). Why, given the time and effort involved, are increasing numbers of instructors flipping their courses? The FLN (Aronson et al. 2013) identified the top motivations among instructors for flipping their classroom. They can be broken down into three broad categories, listed in order of importance. (1) Flipped learning improves the educational value of the course by increasing a broad range of learning outcomes such as higher-order thinking, engagement, and collaborative skills. (2) Instructors enjoy using the flipped pedagogy. One study found that 88 % of K-12 teachers who employed flipped learning reported that it improved their job satisfaction (FLN nd). Instructors enjoy flipped learning because it is more interactive than lecture and allows for more creativity. It also encourages collaboration among faculty as they work together to flip common courses. (3) Flipping the classroom solves some practical problems. Having an arsenal of vodcasts and activities is useful when students or instructors have to miss class, or when there are practical constraints to teaching (such as limited classroom space).

OVERVIEW OF BOOK

This book is designed to help the reader understand when and how to effectively flip their class periods or courses. Chapter 2 examines the research on student reactions to the flipped learning and the effectiveness of the technique. Special emphasis is placed on the effectiveness of flipped learning at meeting six learning domains that are essential to thriving in a global, connected society. Chapter 3 explains how to create and implement active learning exercises that will help students meet the learning objectives for your class period and the learning goals for your course. In particular, you will learn how to create exercises that meet a broad variety of course goals, such as higher-order thinking, the ability to collaborate, presentational skills, and engagement in the course material. Chapter 4 identifies sources of high-quality educational videos that you may assign to your students and evidence-based advice on how to design your own effective vodcasts. When you are ready to create your own vodcast, Chap. 5 provides guidance on selecting the hardware and software to create your vodcasts and the hosting service for disseminating them to students. Chapter 6 provides advice on how to prepare and orient students to flipped learning so they can thrive in the flipped classroom. Finally, Chap. 7 explains how you can assess the

effectiveness of your flipped course or class period. Advice is given on how to embed assessment into daily assignments and class activities and the assessment tools available to measure global learning goals such as higher-order thinking and multicultural awareness.

ADDITIONAL RESOURCES

There are several useful websites for faculty who are interested in flipped learning. The FLN (flippedlearning.org) is an excellent resource for those new to flipping the classroom and for those with experience. Their website includes articles about how to flip a class, advances in technology related to teaching, advice for new and experienced flipped learning educators, and information about flipped learning conferences. Another useful resource is the FLGI (flglobal.org). The primary goal of this organization is to create and promote international connections and partnerships in the flipped learning community. The FLGI provides certification in flipped learning and promotes products, vendors, and instructors with demonstrated competence in the flipped pedagogy.

NOTES

1. Courses that do not include some form of digitized lecture will not be considered flipped learning.
2. Flipped learning can include occasional mini-lectures that clear up confusion or misunderstanding of the readings or digitized lecture.
3. While some researchers (e.g. Koo et al. 2016) label hybrid classes as flipped learning, a stricter definition of flipped learning is employed in this book.

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