Chapter 3

Flipped Learning Environments

An Introduction for Librarians Who Design and Teach

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Introduction

Think back to a time when you had a "peak" learning experience, a time when you learned about something or how to do something in such a way you were confident in applying that newly acquired knowledge or skills in a different context. Did you picture yourself reading an article? Listening to a lecture? Watching a show? Probably not. You may have recalled using a YouTube video to guide you through repairing a small home appliance, mastering a mathematical formula, learning to knit, having a cooking lesson with a friend or relative, participating in a team sport, riding a bicycle without training wheels, or practicing a dance for your wedding. Odds are, if you recalled an experience similar to the examples above, you described a meaningful learning event—one in which you were mentally, and often physically, engaged in activities involving gathering information, critically examining that information, and then using it to tackle a challenge or a problem.

Librarians in every setting are often called upon to engage in instructional partnerships, co-design classes or trainings, and even teach as lead instructors. Considering our backgrounds in information literacy and technology-enabled learning, librarians developing digital learning environments such as hybrid, blended, fully online, or flipped settings is a logical next step. However, before diving into flipped anything, I would like to take a moment to define and explore meaningful learning with you, the reader. I do this because first, flipping a lesson, a course, or a training flips the learning *setting* but not the learning itself. In other words, if your lesson, course, or training is poorly designed, if its design does not result in students meaningfully learning, no amount of flipping will improve it. Second, I want to define meaningful learning in this article so that you have a full picture and understanding of what I consider to be the human learning process. There are folks who disagree with me. Their definitions of learning will impact how they design and describe learning settings such as flipped classrooms. In my writings, I describe and advise the design of flipped classrooms based on the meaningful learning definition I hold dear, so that is why I would like to take a moment to discuss my interpretation with you.

Meaningful Learning

Meaningful learning is active, constructive, intentional, authentic, and cooperative:[1]

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- **Active**—Students can handle objects, changing their positions and parameters, to observe how these changes affect the environments where these are located. Students can explore and experiment on their own or with others. Students have ample time to practice and manipulate information, advancing through and processing at their own pace. The activities they engage in "brew curiosity" and a desire to continue learning for enjoyment.
- **Constructive**—Students can ask questions, develop ideas and opinions, and respond, helping them build mental models to explain knowledge acquired. They connect what they are currently learning to past and future learning. With new knowledge, experience, and reflection, mental models become more involved and complex.
- **Intentional**—Students clearly understand what is expected of them and have identifiable goals in view. They are in a safe environment where they are comfortable contributing their own thoughts. Students verbalize what they have learned, reflecting on the process and the reasoning behind decisions made (they think about their thinking). They then apply the knowledge acquired to new situations or contexts.
- **Authentic**—Students complete learning activities based on real-world tasks. Learning activities based on real-world tasks are not only better understood by students, but knowledge and skills acquired in authentic contexts are also more likely to be applied to a new situation.[2] Consequently, students can demonstrate their understanding in a broader variety of ways.

The Flipped Classroom

The easiest way to define a flipped classroom is to think of it in contrast to a traditional class. In a traditional class, students are first exposed to new content through direct instruction (such as a lecture or presentation) by the teacher. For example, a student would first be introduced to the lunar cycle in a science class. In a flipped learning environment, the student is exposed to the new concept *before* the class meets. In our lunar cycle example, the student first learns about this concept by watching a video his or her teacher developed and shared, by completing a reading assignment, or by completing an interactive online activity, such as a virtual lab. Then, *during* class, students apply the key concepts or ideas they covered before class. Students collaborate with peers and the teacher *during* class through interactive and hands-on learning activities. *After* class, students use feedback gained during class activities to extend their learning by reviewing concepts they found difficult, confusing, or interesting.

Reasons for Flipping

Flipping the classroom makes it possible for teachers to reserve class time for active learning. In a flipped classroom, students wrestle with new information during class with the support of peers and the teacher. Flipping is especially popular with STEM subjects—disciplines that are traditionally difficult to tackle in depth. STEM teachers and higher education instructors credit flipping for their ability to cover a broader topic list, introduce students to complex material, and deliver hands-on, guided inquiry learning experiences during class time.[3]

Determining what a quality flipped classroom is depends upon our ability to break apart its components, anchoring each one in research-based practices. A well-designed flip reflects effective multimedia design principles, a cognitive apprenticeship approach, or an embodiment of situated learning theory. A poorly designed flip could induce cognitive overload in students, leaving them to sift through a collection of confusing or poorly supported materials and experiences without any clear connection to learning goals. Examining components for research-based practices helps us to identify good flipped classroom design choices.

For example, we know that video lectures should contain interactive components: note-taking devices, guided practice, or the ability for students to create video responses.[4] We know that students should have multiple options for sharing questions and identifying areas of struggle so the instructor can address these during class. We know that in-class activities should be student-centered, encouraging learners to meaningfully explore the content and apply their understandings to new situations.[5] Finally, any independent student learning should be scaffolded with resources available at the point of need.[6]

How Research Informs Flip Design

When reviewing research on flipped learning settings, it is possible to identify common themes in descriptions of successful flipped efforts. One might argue that solid pedagogical practice is solid pedagogical practice regardless of the learning environment and so it should not be surprising that good instructional design results in better student learning outcomes, regardless of the learning setting. As previously mentioned, *flipping* seems to integrate different pedagogical approaches. I would like to highlight a few studies that offer promising results when these are based on strong instructional design.

Talley and Scherer used distributed practice when

flipping an undergraduate psychology course.[7] Distributed practice is a learning strategy where practice is broken up into short sessions over a longer period of time. In this instance, Talley and Scherer combined distributed practice with testing and video lectures. Students viewed the lecture, then completed a practice test several times, correcting mistakes and reviewing the material. Finally, during a third session, students created their own video lecture using the information from the instructor-provided materials. In this instance, results were significant—almost a full letter grade between class sections.

Enfield combined instructional videos with note taking to flip an undergraduate cinema and television arts class.[8] He then used face-to-face class time to guide students through the application of the information presented in the instructional videos to new scenarios. While students found the videos to be helpful, engaging, and challenging, Enfield discovered that conducting in-class group activities as the only instructor was a challenge. Students had to wait for long periods of time for him to answer questions—and so in this case, flipping caused him to rethink the structure of group work in a face-to-face class.

Boucher and colleagues flipped a physical therapy course focused on musculoskeletal curricula at Texas State University.[9] As is common in the health sciences, the goal for flipping this course was to make more time for case-based learning and assessment of patient needs. By providing lectures and examples online, instructors found they could spend more time discussing content, clarifying student misunderstandings, and stressing clinical reasoning and decision-making using the Socratic teaching approach.

Several instructors required students to create and submit video responses, giving students the opportunity to explain concepts in their own words. The idea of accountability was present. Almost all studies I explored indicated the need for quizzes, short tests, or reflection posts to track student viewership of the videos created. One unexpected theme that popped up repeatedly was the need for instructors to really beef up their game in the face-to-face classroom. Freeing up all the traditional "lecture" time really placed a burden on teachers to design interactive and explorative activities. People were continually surprised at how much time and organization this took as compared to a passive lecture.

Structuring Activities Before-During-After Class

As previously discussed, flipped learning settings require that students get a first exposure to course content before class through readings or interactive videos, then spend class time deepening their understanding of that content through active learning exercises. During class, you want to limit the amount of time you lecture and increase the time students spend applying the day's material to interesting problems. Leverage the fact that everyone is in the same place at the same time by asking students to work collaboratively on problems, giving each other support and feedback. Give yourself opportunities to circulate among your students to check in on their understanding, answer their questions, and prompt them to think more deeply. Table 3.1 briefly outlines how instructional materials and activities may be organized.

"What if they don't watch/complete the activities before class?" This is a common concern expressed by librarians, teachers, and trainers who are considering flipping a course or training. When working to maintain student engagement and completion of out-of-class activities (as much as we are able) in a flipped learning environment, I find it helpful to remember that even in a traditional classroom, there will be students who choose to be absent, who choose not to complete out-of-class activities, who choose to not participate. To believe that flipping or not flipping will solve the issue of a nonactive student is to believe in a fantasy. However, I believe nonactive students, or students who do not complete out-of-class activities, do not have as much of a negative impact on flipped classrooms as might be assumed.

While unprepared students seem to defeat the purpose of flipping, this can actually result in a positive situation. Unprepared students may be paired with prepared students. This provides prepared students with the opportunity to further interact with material as they explain and review concepts with their peers, reinforcing understanding and retention in both groups of students. For those students who need even further guidance, the teacher now can dedicate time

Table 3.1. Before-During-After Class Activity Organization

Before Class	During Class	After Class
• Reading with guides • Note-taking devices • Videos • Podcasts • Web challenges • Social media • Exchanges with experts	• Teamwork • Debate • Case studies • Challenges • Hands-on projects • Experiments • Creative works • Presentations	• Social media • Self-reflection • Curation and annotation • Concepts applied to a real-world scenario • Quizzes • Comics/Stories

for one-on-one support. This would not be possible if the teacher or instructor were trying to directly teach all students at the same time.

Successful Flipping

The key to a successful flip is the key to any successful pedagogical approach—making sure that the instruction, learning activities, and assessments are properly aligned and supportive of the overall learning goals. Dr. Betina Hsieh, assistant professor of teacher education at California State University, Long Beach uses Gagné, Briggs and Wager's nine events of instruction as a helpful framework for well-aligned flipped learning settings.[10] I have summarized her thoughts below:

Event 1: Gain the Attention of Students

Consistently introduce the week's topics with a weekly email or blog post or newsletter that serves as an overview page. Introduce the topic, assignments and readings due that week, and a link to a checklist that students can use to track task completion. Dr. Hsieh recommends breaking up the checklist into pre-class, in-class, and after-class activities to facilitate student use. Short personal videos from the instructor can also be added if you are using a learning management system or a personal teaching website.

Event 2: Inform Students of the Objectives

In a flipped model, students need consistent, clear communication of the learning objectives throughout the learning process. Make sure the objectives can be located in multiple places, including the weekly overview document, the syllabus schedule of topics, the beginning of a lecture, and the beginning and end of the in-class session. This helps students to stay aware of the learning objectives in each phase of instruction while also contextualizing how goals fit together in the larger picture of the course.

Event 3: Stimulate Recall of Prior Learning

Draw on prior knowledge from previous weeks in class as well as from the lecture itself during the face-to-face sessions. However, avoid the temptation to use class time to review or redeliver a lecture.

Event 4: Present the Content

Present content outside of the course, then reinforce it in face-to-face sessions. Due dates for pre-class assessments should remain consistent throughout the semester to facilitate routine for students.

Event 5: Provide Learning Guidance

Student self-management and scaffolding are a priority. Give learning guidance in face-to-face sessions by providing opportunities for structured feedback and for lecture-based questions and discussion and by using various learning strategies. Consider scaffolding understanding of the lecture with both pre-class check-up activities and role-playing or visualizing activities in class. Remember:

- Student self-regulation and preparedness should be graded components.
- Techniques for self-regulation, study, reading response, coping with challenging readings, and interacting with group members should be intentionally addressed.
- Students should be guided through selection of technology tools for efficiency and class work.
- Check in on student comfort level throughout the flipped learning experience and adjust when necessary.

Event 6: Elicit Performance (Practice)

Make sure students participate in many practice-based activities, including scenario-based concept application and reflective writing or sharing. These opportunities for performance and practice are especially important for students as they encounter more complex challenges. When students work through these challenges, they develop deeper conceptual and practical understandings.

Event 7: Provide Feedback

Provide structured opportunities for feedback in face-to-face sessions so that students benefit from receiving consistent feedback from both the instructor and their peers. Provide formative feedback prior to assignment submission rather than solely giving evaluative feedback following submission.

Event 8: Assess Performance

The summative assessment process might remain essentially unchanged in the course flip. However, pre-class assessments should count for a small percentage of the course total points, an amount that you think is fair given that the purpose of pre-class assessments is to measure prerequisite, basic knowledge of core course objectives. The pre-assessment process is important and should not be shortchanged. It will help you assess what knowledge, skills, and dispositions your students bring to the class.

Event 9: Enhance Retention and Transfer Knowledge

The final event in Gagné and his colleagues' framework was perhaps the most important, as it involved internalization of knowledge and the ability to transfer this knowledge to a workplace setting. Make sure that your course or training flip allows for multiple exposures to concepts, as well as deeper understanding and engagement with topics for more than just the hours per week that you meet with students.

Dr. Hsieh explained: "Whether a physicist, mathematician, teacher educator or historian, we all have concepts that need deeper coverage or for which students need additional supports and regular opportunities for interaction and feedback. Through the use of consistent structures to promote learning, the flipped classroom can allow for such opportunities on a weekly basis, changing the nature and degree of teaching and learning in the classroom."[11]

Resources for Flipping

Flipped learning settings, while certainly possible without technology tools, can be designed with a broader variety of activities and assessments when technology is appropriately applied. The annotated list below includes readings and online resources that will help you consider the many options you have available when putting together your flip.

1. *The Flipped College Classroom: Conceptualized and Re-conceptualized.* Edited by Lucy Santos Green, Jennifer R. Banas, and Ross A. Perkins. Cham, Switzerland: Springer International, 2017. ISBN 978-3-319-41853-7.
    - There are several reasons why this should be your go-to manual on flipping in higher education. The book is divided into two sections. Part one includes a step-by-step guide on flipping both a shorter activity and a full course, a full chapter on tools of the trade and flipping in low-, mid-, and high-tech settings, and a thorough discussion of evaluation in flipped courses. Part two contains over thirty case studies of flipped courses in the humanities, education, engineering, STEM, and health sciences.
2. "The Flipped Classroom: Six Myths," by Kris Shaffer. Kris Shaffer website, July 9, 2015. https://pushpullfork.com/the-flipped-classroom-six-myths.
    - Kris Shaffer, PhD, is a data scientist and computational disinformation analyst for New Knowledge and Data for Democracy. With a background in digital humanities, computational musicology, and instructional technology, Dr. Shaffer addresses myths commonly held by academics regarding flipped learning settings.
3. Flipped Learning Network, https://flippedlearning.org.
    - Catering primarily to K–12 educators and K–12 teacher trainers (although in recent years a higher education constituency is now more visible), the Flipped Learning Network describes itself as "the original non-profit online community for educators utilizing or interested in learning more about the flipped classroom and flipped learning practices." Here you will find resources, professional connections, social media, a podcast, newsletter, and details about flipped learning conferences. FLN uses Slack, a team messenger tech tool that functions as Twitter should—including the option of setting up private channels.
4. Best Apps for Teaching and Learning (http://www.ala.org/aasl/standards/best/apps) and Best Websites for Teaching and Learning (http://www.ala.org/aasl/standards/best/websites).
    - The American Association of School Librarians has two committees that evaluate and select award-winning mobile apps and websites for teaching and learning. With lists going back ten years, each committee has organized award winners into searchable categories. For apps, these are Books, Content Creation, STEM, Social Sciences, Humanities & Arts, and Organization & Management; for websites, Curriculum Collaboration, Social Networking, Content Resources, Digital Storytelling, Curriculum Sharing, Media Sharing, and Manage & Organize. While the apps selected can either be free or purchased, websites selected must be free for users.

Conclusion

As you prepare to flip, do not be afraid of starting small. Take time to think through the nuts and bolts. For example, are there institutional policies that mandate what technologies you integrate in your course? Are there resources available through the university library or through a teaching and learning center? If you are hesitant about flipping solo, consider a team approach. Surrounding yourself with a supportive community will help you build on the work of others while also giving yourself the permission and room to make mistakes. When creating materials for the flipped classroom, be consistent in your design. Cover flipped classroom procedures with your students and help them to practice these procedures repeatedly. Collect feedback throughout the flip and be prepared to provide alternatives if necessary. Finally, expect

that flipping a course, a module, or a training will take time. However, be assured that you are working toward the end goal—student mastery.

Notes

1. Jane L. Howland, David Jonassen, and Rose M. Marra, *Meaningful Learning with Technology*, 4th ed. (Upper Saddle River, NJ: Pearson, 2011).
2. Lucy Santos Green, Fethi A. Inan and Nancy J. Maushak, "A Case Study: The Role of Student-Generated Vidcasts in K–12 Language Learning Academic Language and Content Acquisition," *Journal of Research on Technology in Education* 46, no. 3 (2014): 297–324.
3. Nathaniel Lasry, Michael Dugdale, and Elizabeth Charles, "Just in Time to Flip Your Classroom," *Physics Teacher* 52, no. 1 (2014): 34–37.
4. Jacob Enfield, "Looking at the Impact of the Flipped Classroom Model of Instruction on Undergraduate Multimedia Students at CSUN," *TechTrends* 57, no. 6 (2013): 14–27; Lasry, Dugdale, and Charles, "Just in Time to Flip Your Classroom"; Richard Pierce and Jeremy Fox, "Vodcasts and Active-Learning Exercises in a 'Flipped Classroom' Model of a Renal Pharmacotherapy Module," *American Journal of Pharmaceutical Education* 76, no. 10 (2012): 1–5.
5. Adam Butt, "Student Views on the Use of a Flipped Classroom Approach: Evidence from Australia," *Business Education and Accreditation* 6, no. 1 (2014): 33–43.
6. Shannon Flumerfelt and Greg Green, "Using Lean in the Flipped Classroom for At Risk Students," *Journal of Educational Technology and Society* 16, no. 1 (January 2013): 356–66, https://www.jstor.org/stable/jeductechsoci.16.1.356.
7. Cheryl P. Talley and Stephen Scherer, "The Enhanced Flipped Classroom: Increasing Academic Performance in Student-Recorded Lectures and Practice Testing in a 'Flipped' STEP Course," *Journal of Negro Education* 82, no. 3 (2013): 339–47.
8. Enfield, "Looking at the Impact."
9. Brenda Boucher, Eric Robertson, Rob Wainner, and Barbara Sanders, "'Flipping' Texas State University's Physical Therapist Musculoskeletal Curriculum: Implementation of a Hybrid Learning Model," *Journal of Physical Therapy Education* 27, no. 3 (2013): 72–77.
10. Robert M. Gagné, Leslie J. Briggs, and Walter W. Wager, *Principles of Instructional Design,* 4th ed. (Fort Worth, TX: Harcourt Brace Jovanovich, 1992).
11. Betina Hsieh, "Step by Step, Slowly I Flip," in *The Flipped College Classroom: Conceptualized and Re-conceptualized*, ed. Lucy Santos Green, Jennifer R. Banas, and Ross A. Perkins (Cham, Switzerland: Springer International, 2017), 33.