Best Practices for the Flipped Classroom
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The information in this handout has been gleaned from the online reports and personal interviews of instructors who have actually used the flipped model in class. It therefore contains the advice of those who have actually “walked the walk”.

What is the “Flipped Model” of Instruction?

In a general sense, “flipping” a class means to do in-class what is normally done out-of-class, and vice-versa.

SkillsTutor (n.d.) says:

“In a flipped class, instruction is provided to students at home through video or Internet based lectures and class time is used to complete homework-like assignments. By moving instruction to the home and homework to the class, students are given more 1:1 time with their teacher to work through their assignments....the role of the teacher has been flipped from a lecturer to a tutor”

Hanover Research (2013) notes:

“The term ‘flipped classroom’ can apply to a wide range of blended instructional methodologies in which students remotely access pre-prepared lecture materials and then engage in structured in-class activities. While there is no singular model for a flipped classroom, the underlying concept is to reverse the traditional approach, with digital lecture materials viewed at home in advance of class, and in-class time used to work through
problems, advance conceptual knowledge, and engage in peer-centered learning activities.”

Lorenzetti (2013) says:

“Instead of using class time to convey the basic information you want your students to remember and asking them to work on more difficult learning tasks alone, a flipped class asks students to come to class prepared with the foundational information and then to work on the challenging tasks of analysis, evaluation, and creation with others.”

**Why Flip?**

Instructors usually flip because of a desire to provide more personalized instruction and use active learning activities in their class.

Demski (2013) says:

“Robert Talbert, a professor of mathematics at Grand Valley State University (MI), was drawn to the flipped model because it requires students to be active agents of their own learning, rather than rely on the expertise of their professor. ‘The whole point of college is to learn how to teach yourself--that's what the rest of your life is going to require,’ he insists. ‘You have to know how to find your own resources, make sense of them, and then put them to work as best as you can.

‘In a flipped classroom, a professor is able to teach both content and process’, he explains. ‘The kinds of problems that people with degrees in mathematics get hired to work on are amorphous and poorly defined,’ Talbert continues. ‘A lot of the problems my students will face don't even exist yet. We can't just focus on content coverage. We have to teach the ability to adapt and evolve along with the problems.’”
SkillsTutor (n.d.) notes the following benefits to students:

- “Personalized educations for slow and fast learners
- Greater opportunity for 1:1 help from teachers
- Stronger bonds with teachers
- Encouragement to collaborate on ideas and projects with other students
- Ability to rewind, save, review lesson plans at any moment (especially useful for students who are absent from class)”

In discussing the benefits of flipping, Restad (2013) says:

“In the end, the benefits of the flipped approach are considerable. Students take more responsibility for their own learning. Working in class along with a master of the discipline (you), they learn to think more critically, communicate more effectively, and have a greater appreciation for the unique importance and logic of the subject. And they experience at least some of the satisfaction of learning how to think in a new and, in some cases, life-changing way.”

Hill (2013) says:

“The flipped classroom approach offers clear advantages:

- Video lectures can be edited, polished, and rerecorded. Students can pause, replay, and watch lectures repeatedly at their convenience. Faculty may even find that with editing, lectures become shorter and more on point.
- By a simple analysis of performance on past examinations, identification of trends in frequently asked questions and student course evaluations, faculty can determine areas where students often falter, and use this information to determine how classroom time will be used.”
• Faculty can then devote time to helping students develop synthesis and explore application during class time through: experiential exercises, team projects, problem sets, and activities that previously had been assigned as independent homework. In particular, students can receive direct faculty input on those segments of the material that have historically been the most [difficult] or ambiguous.

“Many faculty spend considerable unpaid, out-of-class hours helping individual students make sense of difficult course material and bring it all together in a relevant way. And that’s if they’re lucky enough to have students who proactively seek help when they are ‘stuck.’ The flipped model allows instructors to help students during assigned, compensated class time within their respective teaching loads; guiding students as they engage with the content in any number of active learning activities. It also makes it easier for faculty to identify and correct stumbling blocks to learning as they are happening.

“I also suspect the increased focus on the synthesis and application of knowledge will find considerable favor with employers who deride the lack of a more competency-based approach in much of higher education.”

Dr. Tim Newby (T. Newby, personal communication, November 21, 2013), Professor in the Department of Learning Design and Technology at Purdue, raves about the higher level of engagement that occurs in his flipped class. He says that when he taught a large lecture class all of the students brought their computing devices but only the students in the first few rows were paying attention and doing class work on them. The rest of the students were Facebooking or doing other things. Now, in his flipped classroom, every student has a mobile device and every student is doing classwork on it, and having vigorous discussions with each other while doing so. His students are MUCH more engaged than they were in the large lecture class!
**Is the Flipped Model Appropriate for My Class?**

Hanover Research (2013) gives the following advice:

> “Before implementing a classroom flip, educators should carefully assess whether the model is appropriate for their curriculum and students. Critical considerations include whether the students will be receptive to a change in instructional ideology, whether the subject material will translate well to the new format, and whether the technology is accessible for all teachers and students.”

Dr. Tim Newby (T. Newby, personal communication, November 21, 2013) says that he was motivated to flip by the fact that he was covering similar material every semester, and this material lent itself to being put online. He was using the case study method and students would work on the cases outside of class. When he lectured he was telling the students what they should be doing instead of having them actually do it. He wanted to do it with them in class. So the combination of having repetitive content and a desire for participative learning with his students moved him to adopt the flipped model.

Dr. Regena Scott (R. Scott, personal communication, November 25, 2013), Assistant Professor of Technology Leadership and Innovation at Purdue, says:

> “[The Flipped Model] is not appropriate for every class. Don’t force it! Evaluate the course outcomes. Can the class be interactive? Is it a team environment? Would [flipping] strengthen learning? Can they learn from each other? Is it project-based, in some way? The course must be fundamentally interactive for a good flip.”

Dr. Scott feels that the flipped model is more appropriate for classes where students have to produce a product such as a group project, rather than strictly take exams. Above all, deciding to flip because it is “cool” or “modern” is a poor reason. You should talk to someone who has taught using the flipped model and get their opinion.
Content considerations

Hanover Research (2013) notes:

“A common pitfall occurs when teachers assume that all prepared in-class lectures will translate well to digital mediums – reducing a full lecture to a succinct seven-minute video is inherently difficult. Additionally, many teachers fail to incorporate effective scaffolding activities into the lecture to help students absorb, reflect on, and ultimately learn the material.

“Advocates of the flipped classroom model typically recommend that teachers rely primarily on their own digital content, despite the challenge of creating meaningful digital content and increasing availability of third-party online lecture materials.” (see the Resources section below).

Digital content and online and in-class activities should complement each other, and be part of a single design process. One should not be developed as an afterthought to the others.

Caldarera (2013) says:

“Don’t Reinvent the Wheel. Although there are many ways to develop your own materials and videos, the collaborative nature of teaching and sharing of educational materials will save you so much time. Find what is out there already and spend more time on the timing, sequencing, and creating clear instructions. Create your own videos or materials as needed, not [for] every lesson.”

Vary content to reach students with different learning styles, and don’t use only video. Caldarera (2013) notes:

“Lecturing is not bad pedagogy, although it should not be the only method of delivering instruction. It is a consideration to keep in mind for auditory learners. A narrated presentation or a pre-recorded lecture would
supplement other audiovisual media materials nicely in a flipped lesson….Vary your instructional materials as much as possible for all learning types. Include music, music videos, humor, lecture, multiple perspectives, and varied follow up activities as much as you possibly can.”

It is important to remember that flipping doesn’t necessarily require the use of video, as Bruff (2012) points out:

“In fact, flipping the classroom doesn’t require video at all! There are plenty of us (many inspired by Eric Mazur) who teach in the math and sciences who ask students to come to class prepared to ‘assimilate’ by having read their textbooks. The textbook is not a new technology, but it’s one that college teachers have perhaps not embraced to the extent that they could.”

**Student Considerations**

Ullman (2013) notes:

“She enjoys flipping, but cautions that it requires students to be independent. ‘It’s an excellent growth opportunity, but the student has to be willing to put in the time and be an active participant in the learning. Some kids listen, do a little homework, and get by. That won’t cut it in the flipped classroom.’”

Dr. Tim Newby (T. Newby, personal communication, November 21, 2013) notes that students who are poor planners won’t do well in the flipped model. Since his class contains a lot of freshmen, this was a concern. He compensates for this by giving online quizzes associated with the videos and setting the release criteria so that the quizzes expire before the next class period. Without setting an expiration date, he feels the good students may do the quizzes in a timely fashion but other students may not. With rigid release criteria, 80% - 90% of the students complete the quizzes.
Strayer (2012) notes that the flipped model may not be the preferred design for an introductory course:

“Many students in an introductory course do not have a deep interest in the subject and could be frustrated when they encounter learning tasks that aren’t clearly defined. In more advanced classes, students might be more willing to persist in prolonged investigations and make connections with online learning experiences, provided that the structure of the course supports their meaning making in the activity.”

**Start with Learning Objectives and Outcomes**

Berrett (2013) notes:

“Whatever method a faculty member attempts...he or she should start by defining the underlying concepts to be taught and the learning outcomes that will be demonstrated. And it is not enough...to simply declare that the learning outcome is to cover the first four chapters of a textbook.

"...It's a whole different paradigm of teaching...likening the professor's role to that of a cognitive coach. A good coach figures out what makes a great athlete and what practice helps you achieve that. They motivate the learner to put out intense effort, and they provide expert feedback that's very timely."

Dr. Tim Newby (T. Newby, personal communication, November 21, 2013) says that he uses two types of videos in his flip: Content videos which deliver just that, course content, and “Where We Are Going” videos which give students a vision in the form of an “Advance Organizer” of what they will be doing in the upcoming unit. In the Where We Are Going videos, he always includes some sample test questions and tells the students, for example, “You should be able to answer _____”. The students love this!
Select and Master the Instructional Paradigm First

Miller (2012) says:

“We must first focus on creating the engagement and then look at structures, like the flipped classroom, that can support [the engagement]

“Just because I record something, or use a recorded material, does not mean that my students will want to watch, nor see the relevance in watching it. I mean, it is still a lecture. Also, this ‘need to know’ is not ‘because it is on the test,’ or ‘because it will help you when you graduate.’ While that may be a reality, these reasons do not engage the students who are already struggling to find meaning and relevance in school. If the flipped classroom is truly to become innovative, then it must be paired with transparent and/or embedded reason to know the content.

“One of the best ways to create the ‘need to know’ is to use a pedagogical model that demands this. Whether project-based learning (PBL), game-based learning (GBL), Understanding by Design (UbD), or authentic literacy, find an effective model to institute in your classroom. Become a master of those models first, and then use the flipped classroom to support the learning. Example: Master design, assessment, and management of PBL; and then look at how you can use the flipped classroom to support the process. Perhaps it is a great way to differentiate instruction, or support students who need another lesson in a different mode. Perhaps students present you with a ‘need to know,’ and you answer with a recorded piece to support them. This will help you master your role as ‘guide on the side.’”
Be Willing to Give Up Some Control

Demski (2013) says:

"'If you were to step into one of my classrooms, you'd think I was teaching a kindergarten class, not a physics class,’ laughs Harvard University professor Eric Mazur. ‘Not because the students are children, but because of the chaos and how oblivious the students are to my presence.’ Such pandemonium is a good thing, insists Mazur.... ‘That's how we all learn: by actively engaging in the material rather than sitting in a classroom and writing down the words said by the professor.

“Step aside and allow students to learn from each other. ‘Pre-class, my students access digital readings using a web-based, collaborative PDF annotation tool called NB, which was designed by MIT,’ says Mazur. ‘I have been truly impressed by the energy with which my students dive into the readings. I thought I would need to give much more extrinsic motivation [for them] to do that, but the answer is no, not at all...Within a couple of weeks, my 35 students created 2,000 annotations in their text, discussing the readings asynchronously with each other. Their discussions were incredibly thorough, exciting, and in-depth. Yet, every time I participated in the NB annotations, I killed the discussion among the students, because I was seen as the authority. It stopped them from working it out on their own and finding the solution. [Now] I participate only if there is a situation where they are completely and utterly stuck.’

"Running a flipped classroom requires an agility toward what you teach...In a traditional classroom setup, you prepare a lecture, and that lecture does not change between making it and giving it. Whereas, with the flipped classroom, I'm not really sure what my students are going to need to know once I get there. It doesn't make sense for me to prepare a lecture that covers the entire set of material. They may be really good at all of it and can jump right into the problem solving, or maybe they're stuck on one
point that we really need to drill into...In order to be more responsive to students' specific needs, [you can use] clickers to conduct a quick quiz on the pre-class material at the beginning of class time. ‘I'm able to see what I need to do at the line of scrimmage to really target what they need, [one professor] explains. He also monitors students' understanding of course material via the web. ‘My students use [a] discussion board...to post questions and comments as they're reading, and every morning I scan through their discussions to see how they're doing. Oftentimes, misconceptions can get cleared up just through students answering each other's questions...When the software reveals that a lot of students have questions about one particular issue, [you] can then cover the material in class....the flipped model requires more flexibility on the part of the professor. ‘With the flipped classroom, I can't plan; I can only anticipate,’ notes Talbert. ‘I've taught the class enough in the past to know where the trouble spots are going to be, but really I have no idea what's going to happen from one day to the next. That's what makes it interesting and exciting to teach.’”

Dr. Tim Newby (T. Newby, personal communication, November 21, 2013) says that he likes to lecture, and when he flipped his class he lost control of that. With the lectures online and in-class sessions devoted to group work monitored by TAs, he has a sense that his students don’t need him anymore. This has bothered him somewhat on a visceral level, even though he knows that his students will have a better learning experience. He plans to go on sabbatical and knows that with his TA running the class everything will go on well without him. This can be a bit discomfiting to long-time lecturers. It is not only students that must make adjustments when flipping a class!
**Start Small**

Dernski (2013) says:

"'When a professor comes to my office and says he wants to try the flipped classroom model, we'll start by thinking about the pedagogy,' remarks Millet. 'We'll look at the class to determine what problems [the professor is] trying to solve. And, maybe, as an introduction to classroom flipping, we won't try to flip the entire class, but identify particular units where students could really benefit from this model. Then we look at what technologies could solve the problems that we've identified.' In a STEM class, for example, the technologies need to support annotation, mathematical equations, and other scientific concepts, whereas a liberal arts class might need more support for capturing audio and video.'"

**Plan Accompanying Activities**

Miller (2012) notes:

“Every time you have students watch a video, just like you would with any instructional activity, you must build in reflective activities to have students think about what they learned, how it will help them, its relevance, and more. If reflection is not a regular part of your classroom culture, then implementing the flipped classroom will not be as effective. Students need metacognition to connect content to objectives, whether that is progress in a GBL unit, or work towards an authentic product in at PBL project.”

Reflection helps the student to connect the new knowledge to their past knowledge and experience, thus reinforcing the learning and helping them to make sense of it.
Concerning non-reflective activities, lower-division or lower-ability students may need activities with more structure. Higher-division or more gifted students can handle more open-ended activities, such as Problem-Based Learning.

Strayer (2012) reinforces the need for reflection:

“...students in an inverted [flipped] classroom become more aware of their own learning process than students in more traditional settings. Thus, students in inverted classrooms need to have more space to reflect on their learning activities so that they can make necessary connections to course content....Using appropriate online communication tools to create space for this important reflection to take place can be crucial for the success of an inverted classroom. Further, because this technology provides opportunities to interact with others, this reflection can happen at multiple levels and can be done in community.”

**Change your notion of Class Time**

Ullman (2013) says:

“...flip all the redundant materials that are ‘time suckers’... time is the biggest challenge to delivering a flipped classroom....Flipping your classroom takes a constant level of engagement that can be very tiring because of the research and content that you have to create prior to the lesson itself. However, it is worth it.

“When he started flipping, Seigel didn’t realize how much extra time he’d have in class every day. The activities he previously used were not as effective because they were designed around the idea that he would control the pace. Today, every unit contains a guided-inquiry activity, assessments that involve engaging in a conversation with classmates and the teacher, and critical-thinking questions in labs that require an Internet search to produce more complete answers....The biggest challenge I face every year is getting the students accustomed to thinking for themselves.
Often I hear, ‘Can’t you just tell me what to do?’ or ‘Can’t you just lecture today? I don’t feel like thinking.’ Because students have been trained to work at the pace the teacher sets, it takes time for them to be comfortable learning in an alternative environment.”

In her class, Dr. Regena Scott (R. Scott, personal communication, November 25, 2013) always feels she needs more time, and her students would frequently like more time. Flipping has forced her to come to class ready. She has to be extremely organized. She has found it to be helpful to distribute to her students outlines of how to navigate the processes they will be doing in that class period. She has also found it helpful to place at each table a Plexiglas sign holder that displays a list of what the students will be doing that day. These two tools – an advance organizer and a task list visible to everyone – help keep her students on track and avoid wasted time. They can come to class and jump right into the activity.

Dr. Scott says that it is not unusual for the pace of the class to control you, and that it is important that instructors not be uncomfortable with this. She stresses that this is not unlike industry, where things move constantly and you have to change. If students finish their work quickly, you have to have some activities planned to take them to another level. Dr. Scott finds that she has to change her activities each semester.

Concerning fears that instructors may not cover enough in a flipped class, McGivney-Burelle, & Xue (2013) say “It is possible to cover the same amount of material in the same amount of time in a flipped unit of study as it through a traditional lecture.”

Enfield (2013) noted various administrative advantages to the flipped approach:

“Providing video lessons that students could watch as many times as needed greatly reduced the need for repetitive instruction. Administratively, the videos provided a good resource to direct students to when they were absent from class. The videos also provide the department
with the option of providing the same core instruction to all students taking the course, regardless of the instructor.”

Before Introducing Content, Allow Open-Ended Exploration Wherever Possible

For courses where understanding a physical system is important, research by Schneider, Blikstein & Pea (2013) suggests that allowing open-ended exploration with a 3-d model (physical or virtual) before instruction produces better learning than jumping straight into instruction:

“In numerous controlled and rigorous experiments, educational researchers have described how ‘tell-and-practice’ classroom instructions are well-suited for supporting memorization of facts and procedures but prevent students from developing critical thinking and transferring their knowledge to new situations. MOOCs and flipped classrooms are merely recreating the same pedagogical structure without questioning the scientific validity of this model.

“The alternative is to put the ‘practice’ in front of the ‘tell’. Learning scientists call this movement ‘Constructivism’ because it emphasizes the fact that students build new knowledge in ways integrated with their existing cognitive structures.

“This approach is notoriously difficult to implement. This is not about throwing students in a room and letting them figure things out by themselves. It takes time to carefully engineer good exploratory activities for learners. The pay-off, however, is worth the effort. According to educational researchers, students develop higher critical thinking skills and have a better conceptual understanding of an idea when they can explore a domain first and then follow a more standard kind of instruction (such as attending a lecture, watching a video, or reading a textbook chapter).
“The study buttresses what many educational researchers and cognitive scientists have been asserting for many years: the “exploration first” model is a better way to learn. You cannot have the answers before you think of the questions.”

Examples of exploratory models might include an automobile engine that students are allowed to take apart and examine before receiving instruction on how it works, or an online animation of a ball rolling down an incline where students can change variables such as the mass of the ball and the degree of the incline to see what differences these make to the speed of the ball down the incline, etc. These activities could be followed by an online discussion of the student’s experiences and observations. Following discussion, formal instruction in the principals involved would be given.

Consider Having Your Students Construct the Flip!

Pappas (2011) presents a method flipping that involves student participation in the actual content creation of the class:

“Ultimately, we saw flipping the class as a great opportunity to engage our students in taking more responsibility for their learning. Why not let your students curate the video lessons from existing content on the web? As a follow up to our chat, here’s my seven-step how to:

1. Start slow! Pick a single upcoming lesson or unit that you already plan to teach.

2. Recruit a few of your savviest students to do the research to find existing online video material to support the lesson. They should include a text overview defining what the students should be looking for in the video.

3. Also work with the student team to develop an in-class activity that students will do after viewing the video.

4. Post the video lesson to your content manager....
5. Then run the video as a pilot lesson for the whole class. Part of their assignment is to decide what they like (and don't like) about the each component of the lesson. In other words, they assist in the design of rubrics for selection of videos and integration of the video lessons into...classroom activities.

6. Then repeat step 1-3 until you get a good basis for selection of future videos.

7. Repeat 1-6, as needed, until your students have curated a collection of online content to support your classroom. They would also be responsible for better defining what constitutes ‘high-quality’ online content and how that can be best used to support a more student-centered classroom.”

In a university course, this technique could probably be used only for upper-level students, and due to the time constraints involved in covering a semester’s worth of material probably only one or a few instructional units could be created. It would be useful in showing the value of flipping, especially if the students themselves then teach the flipped unit. This would also aid learning, because the surest way to learn something is to actually teach it yourself!

**Technology Considerations**

Miller (2012) notes the following considerations:

“What technology do you have to support the flipped classroom? What technology gaps exist that might hinder it? Since the flipped classroom is about recorded video, then obviously students would need the technology to [view] this. There are many things to consider here. Will you demand that all students watch the video, or is it a way to differentiate and allow choice? Will you allow or rely on mobile learning for students to watch it? Again, these are just some of the questions to consider in terms of technology. Lack of technology doesn't necessarily close the door to the
flipped classroom model, but it might require some intentional planning and differentiation.”

Hanover Research (2013) notes:

“…educators implementing a classroom flip should select simple, accessible, and familiar technology.”

Dr. Tim Newby (T. Newby, personal communication, November 21, 2013) flipped a lower-division learning technology class. Because technology is always changing, he has to regularly update his videos. He redoes about 50% of them per semester and 100% in a year. Instructors who teach in a field where the subject matter is fairly static and won’t change much over time can reuse old videos time after time. Of course, over a period of years students will notice the age difference between the instructor’s appearance in-class vs. online, and this could become an occasion for derision, and instill a sense in the students that the instructor doesn’t care anymore. So be careful about using very old videos featuring your younger self!

Instructors who teach a course with rapidly changing subject matter must build in time to redo videos on a frequent basis. Video editing will be a never-ending chore. Dr. Newby notes, however, that when he lectured he would still have to revise his lectures constantly, so the pressure to revise was still there. He advises instructors to use video editing software that makes it easy to cut and insert changes to existing videos.

Dr. Newby also suggests systematizing the process as much as possible so that the video creation process is as easy and habitual as possible. Always use the same video capturing and editing software, use the same uploading method to the same storage application, etc. The less you have to think about it, the better.

Dr. Newby has other advice:

- Don’t forget that the classroom is part of the technology. Active learning is much easier to conduct in a classroom that is specially designed for it than it is in a large lecture hall. The type of classroom you use is a big deal!
• Use a script and write out every word! Dr. Newby even notates what emotive gestures he plans to use. When he doesn’t use a script he tends to ramble, which ruins the video lecture. This is true even if he uses an outline. A teleprompter is useful when recording live shots, if one can be obtained.

• Don’t make the videos a mini classroom lecture. In the classroom Dr. Newby makes asides and sometimes banters with the students. When he tried this conversational style on video the students didn’t like it at all. You should get straight to the point, and above all, don’t read the textbook!

• The videos must be short. By following the advice of the previous point, Dr. Newby can condense a fifty minute lecture to about seven or eight minutes.

• Students would much rather watch two ten-minute videos than one twenty-minute video!

• Dr. Newby hired a professional photographer who took about two hundred photos of him making different poses with different expressions. He can insert these as appropriate in his video lessons. He feels that these “personalized emoticons” increase the sense of connection his students feel with him!

McGivney-Burelle & Xue (2013) note:

“Creating, editing, and posting videos are time-consuming endeavors as is the development of the in-class quizzes and problem sets. On average, for every class meeting, it took us about 1.5 hours to make one short video and an additional 45 minutes to prepare the quiz and in-class problem set. In contrast, preparing a traditional lecture typically takes us less time. However, once the initial technical and logistical problems were resolved, we were able to spend less time creating a video. Once a polished set of videos and course materials are created the preparation time will be
significantly reduced... Those new to flipping should expect many technology glitches especially when creating the first few videos.”

Dr. Regena Scott (R. Scott, personal communication, November 25, 2013) notes that students need computers to do their in-class work. When they bring their own, there have been problems getting the required programs to install on their computers. She prefers an arrangement where there is at least one ITaP computer per table. She also likes the capability of sending control of the screen to various tables. She feels that this promotes sharing. Smart Boards can be helpful. She says that in situations where students bring their own devices, power supply is a major issue. It is critical that the room have the electrical infrastructure to allow every student to plug in his/her device!

If possible, use a video system that will supply user analytics. Enfield (2013) points out that this can give valuable information that can suggest to an instructor topics that need reinforcement or additional remediation:

“I intend to explore the use of video analytics to better understand how students use the instructional videos. Video analytics will not only let me see when and how many times a student accesses a video, but will also allow me to see when they are pausing, what parts of the video do they repeat, and how long it takes students to get through the video. The latter is a key piece of information for the videos I create because they were designed so that students will not just watch the videos but work along with them as well.”
Assessments in Flipped Classes

**Build assessments that complement the flipped model**

Demski (2013) says:

“The prevalence of teamwork in a flipped classroom presents an assessment challenge. To tackle the issue, Mazur developed a cloud-based classroom-management system called Learning Catalytics, inspired by a technique developed for team-based learning called IFAT (instant feedback assessment technique). Students log into the system for individual and group-based assessments. ‘Six times a year, my students come into class, they sit around the table, and they each log on to their device,’ explains Mazur. ‘They have anywhere from seven to 10 questions that they need to answer. They work on it individually for about 25 minutes. They're allowed to Google anything they want, but they're not allowed to collaborate with others on that part....After 20-30 minutes, I flick a switch on my device and the system switches to team-based mode. Now, if I'm a student sitting at a table with three of my peers, each of our devices displays what the others at our table have answered for each question. Then, as a team, we have to re-answer the questions, but now we can submit only one answer for the table.... As students discuss and agree upon their answers, they learn from each other’, says Mazur.

‘If you were to walk into my classroom during that collaborative part, and I were to tell you that the class is taking an exam, you'd look at me as if I were from Mars,’ he jokes. ‘You'd see students cheering if they've gotten a right answer, talking to each other, working together, and stepping to the movable whiteboards to demonstrate their points. It's very chaotic, but what happens is that, at the end, the students know their scores instantly. And most importantly, they've learned. The assessment has become a learning opportunity.’"
Dr. Tim Newby (T. Newby, personal communication, November 21, 2013) notes that he still offers three exams (two mid-terms and a final) in his class, but the nature of the exams has changed. In his flipped class, the exams are more practically oriented. He asks them to solve case problems similar to the ones they have been working on in class. When he lectured, his exams focused more upon lower-order factual recall. Flipping has allowed him to use cases in his exams. In the review after the exam, he can tell them “This topic was covered in video X. Go back and watch that!”

Dr. Regena Scott (R. Scott, personal communication, November 25, 2013) uses weekly quizzes and in addition has her students write reflection papers, in addition to project-based classroom activities. Rubrics are critical to grading activities in a flipped classroom - otherwise students will take the “shortest line” to completion.

Add Frequent Low Stakes Assessments

Schell (2013) relates the following experience:

“In [this faculty member’s] first implementation [of the flipped model], she used the same approach to assessment that she had in her traditional class. Students had three midterm exams and a final exam. In her second implementation, however, she added nine weekly quizzes plus a portfolio project *in addition to* three midterms. She administered the quizzes with Scantrons.

“WHAT? Certainly this would cause a revolt? It seems not. Students have indicated that the quizzes have motivated them to change their approach to learning – i.e. not cram before the midterm. This is also reflected in their viewing patterns.... in the first implementation [without frequent low-stakes testing] there was a huge spike in views in the week before the exam[s], which was not the case for the students in the [second implementation]...they were watching all along.”
A striking fact is that this professor noted that the grades for the first two mid-term exams were higher in the second flipped implementation (the one that included frequent low-stakes testing) than in the first implementation with standard testing, even though the exams in the second implementation were more difficult!

Schell (2013) notes a frequent fear of instructors that when the lectures are online they will not attend class, and their grades will suffer. She says:

“In closing, my original question about whether students will attend class if I put all my lectures online seems trivial. Who cares? The real question is will they learn to learn better and will they show greater success in so doing.”

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**Overcoming Student Resistance to Flipped Instruction**

**Why Students Resist**

Schell (2012) discusses reasons for student resistance:

“One reason students resist flipped class methods, including those which use Peer Instruction (PI), is that by the time they arrive in our classrooms, most of them have spent nearly 15 years in a schooling system that trains students in and rewards them for performance on simplistic, mostly low-level learning activities that bulk their procedural muscles through memorization and plug and chug. Students are not used to more difficult, relevant activities that require them to take responsibility for their own learning. Such activities include those that bulk their more heuristic muscles through practice with knowledge transfer, experimentation/creative problem solving and autonomy and persistence.

“When I disrupt the expectation of an Easy A among my students (i.e. that they will be able excel without deep conceptual understanding or by
making any authentic meaning), it always creates some dissonance for them, and they resist, often vocally, demanding more lecture or rote problem solving at the board. Many want to be told the answer or more accurately, only the answers that are going to be tested. This is not simply a bad student attitude—but a result of an educational system that has not evolved quickly enough to match the needs of a knowledge-based generation.”

**Communication and Preparedness**

Dr. Regena Scott (R. Scott, personal communication, November 25, 2013) says that if you are really prepared, students won’t have a chance to resist! She has found from experience that a lot of communication is necessary. She uses announcements in Blackboard, email, verbalized communication in class and the table signs mentioned above. The first time she tried to flip, the students said that they didn’t always know what was going on. Intensive communication has helped reduce confusion in subsequent semesters.

**Set Clear Expectations**

Caldarera (2013) says:

“Convey to your students that in the Flipped Classroom format, they will be expected to complete the lesson as homework. All instructions are to be followed so as to allow more time for engaging enrichment activities in class.”
Explain to Students How the Flipped Format Will Help Their Learning

Schell (2012) says:

“Two common recommendations for stemming off student resistance before it starts include 1) explaining new techniques on your syllabus, including a rationale for why you are using them in your class and 2) having conversations with students at the start and throughout the semester about how they are learning.

In our classes, we also often show aggregated data that helps students see the kinds of behaviors that correlate with better performance on their exams.

Another tip is to develop your own understanding of why students resist innovative pedagogies. Check out Brookfield’s sources of student resistance and Felder’s publications on addressing student resistance to interactive teaching.”

Market the Model

Demski (2013) notes:

"Students come in with a specific mental model of how a classroom ought to work that is quite ingrained... It starts with the professor telling them what to do, and it ends with the professor telling them what to do. When you invert that situation and make them active participants, it really takes a long time, a lot of repetition, and a lot of marketing to get students to buy into this...In order to get students on board, faculty need to be clear and enthusiastic about the flipped model. Prepare to be the marketer for that particular mode of instruction...It takes a great deal of positivity, and every day you need to discuss with your students why we're doing it this way and
not the traditional way, what the benefits are, what they're getting out of this that they wouldn't be getting if we did the traditional lecture style, and so forth."

Hanover Research (2013) says:

“Additionally, teachers should clearly communicate the benefits and the reasoning behind such a dramatic classroom shift to students. Teachers who have explained the theory underlying the flipped classroom model often report improved student attitudes.”

**Don’t tell students you are “flipping” or “experimenting”**

Note the experience described by Schell (2013):

“In the first implementation of her flip, Stealth [a pseudonym] used the word ‘flip’ to describe her class to her students. Everything in the literature says to spend time upfront describing exactly what you are doing as a means of meeting the inherent student resistance that will come when you try flipping for the first time.

“I told the students that they were in a ‘flipped’ class and tried to make them partners in creating the learning environment” she says.

“When I heard about what happened next, it caught me like a deer in headlights. I was stunned and had no idea how to help.

“Students in Stealth’s class started a Facebook Page with a thread titled ‘I hate the flipped class.’ This thread was not only active, it had quite a bit of disturbing content. Apparently, students did not complain about the content or the teacher but their dissatisfaction with the ‘flipped class’ was vocal and aggressive. Comments included plans to blast the class in the end of course evaluations and that students were not paying to go to a top university to watch their teacher on a video or to talk to their peers in class.
“Such student resistance can be a huge turn off for instructors who are spending an inordinate amount of care, time, energy, and emotion toward creating a better learning experience for their students. Albeit small, an uprising of vocal, angry, dissenting students can be enough to send some teachers packing their flipped-class suitcases back to the land of lecture for good. I’ve seen it happen myself, at Harvard, and heard about it elsewhere.

“Not so for Stealth...my new hero.

“In several conversations over the past year, Stealth told me that in reading between the lines, she felt students actually had some valid concerns. Instead of chalking it up to the flip class itself and abandoning ship, she sifted through their comments, took them seriously and listened carefully.

“Through this exercise she got an idea that would change the trajectory of her flip and her teaching.

“She discovered that her students seemed to be latching onto the word ‘flip.’ She made several tweaks to her flip approach, but the most interesting to me is that the following semester she did not decide to give up on the flip class. Rather, she decided to give up on using the word flip. ‘I haven’t used the word flipped or flip once in the course or in talking with my students,’ she recently told me–hence the moniker, Stealth Flipper.

“According to Stealth, this tweak has worked brilliantly. ‘Student resistance hasn’t just lessened, it has entirely disappeared,’ she says. Students now come to her office and report how much they enjoy how she teaches, whereas in the fall, they would come in and complain about their ‘flip class.’

“So, she must have just made the class easier, and that’s why they liked better, right? On the contrary, she made it harder and added many more formal assessments.”

Students apparently react viscerally to any indication that they are being experimented upon, and highly resent it. Doesn’t this contradict the advice given
above, to set expectations, explain how the flipped format will help their learning, and market the model? Not at all! Just don’t use the words “Flip” or “Flipped”, don’t give any indication that this is a new teaching method either for you or for the course in general, and don’t indicate out loud or in writing that the class is doing anything “cutting edge” or “revolutionary” or “non-traditional”, even though you are. Just keep it low-key and carefully explain to the students what they will be doing and how it will help them and leave it at that.

**Vary Your Instruction**

Dr. Tim Newby (T. Newby, personal communication, November 21, 2013), as noted above, flipped a lower-division course that has a lot of freshmen in it. He typically uses fourteen case studies per semester. Dr. Newby notes that even with an active learning model, doing the same thing over and over again becomes boring for the students. Typically, by the time of the fourth case study, he hears groans from the class! He has found that varying the instruction helps.

For instance, usually the students work on the cases in groups, but to introduce variety he will have the students complete some of the cases by themselves. He will bring in guest speakers, and even delivers a traditional lecture on occasion. He says that it is important to break up the routine. Remember that in an active learning classroom, an occasional lecture can be a welcome respite! Having variety in the class routine also helps reach students with different learning styles because they are not exposed to the same learning modality all of the time.
Getting Students to Come to Class Prepared

Hanover Research (2013) notes:

“Unsurprisingly, many teachers find that students who are unlikely to complete homework in a traditional classroom are just as unlikely to review lecture materials [in a flipped class] and thereby come to class unprepared. While unprepared students can be difficult in any classroom setting, they are especially disruptive in a flipped classroom where participation in classroom activities requires a basic understanding of the concepts presented in online lectures.

“Practitioners have developed a number of strategies to motivate such students, including:

- Developing a series of online, post-[video]-lecture quizzes that may or may not be factored into a student’s overall grade,

- Beginning class with a short recap and Socratic discussion of materials presented in the lecture, and

- Beginning each class by reviewing students’ lecture notes or requiring that each student ask at least one relevant question related to the lecture material.

- These rapid assessments can potentially encourage students to actively engage in the video lectures and to increase teachers’ responsiveness to students’ needs.”

Instructors can also institute peer grading, and have the members of each group evaluate the others for the quality and timeliness of their contributions, and other factors.

Restad (2013) remarks that it is important to participate along with the class:
“Be ready to give a five-minute flash lecture to address a confusion you discovered while circulating through the teams. Challenge one team to defend its conclusions against those of another. Build on the class’s insights by making a well-timed observation or summation that furthers the conversation.”

But remember Mazur’s remarks (as quoted by Demski above) – participation by the instructor in certain online collaboration activities can kill discussion. It may be better to restrict active participation to in-class activities.

Schell (2013, June 20) says that properly “chunking” the information into several short videos and having a quiz after each one will encourage learning. The best questions for these quizzes are multiple choice or short answer. She also recommends giving a final quiz at the end of a sequence of several related videos. Quizzes for individual video segments followed by a summative quiz at the end encouraged students to take more notes during the lecture videos.

Brame (n.d.) points out the need for students to complete a task associated with their preparation, and that that task be associated with points. Points for completion may work as well as quizzes in some cases:

“The assignment can vary; the examples above used tasks that ranged from online quizzes to worksheets to short writing assignments, but in each case the task provided an incentive for students to come to class prepared by speaking the common language of undergraduates: points. In many cases, grading for completion rather than effort can be sufficient, particularly if class activities will provide students with the kind of feedback that grading for accuracy usually provides.”

Weinstein and Wu (2009) (as cited in Weimer, 2012) suggest for reading assignments, a more effective strategy for encouraging preparation than quizzing might be the “Readiness Assessment Test”, or “RAT”:

“These tests, done on paper at the beginning of the period or online before class, employ open-ended questions. In this case, students answered two or three of them. The questions were purposefully broad ‘to prevent
students from skimming though the readings in search of answers to detailed questions.‘…Answers to these questions were graded, with each answer earning up to four points.”

The following differences between quizzes and RATs were noted:

“…RATs and quizzes were equally effective at encouraging students to read assigned materials thoroughly and helping them prepare for exams. However, with the RAT, the percentage of readings completed was statistically significantly higher. Also, exam scores for those units during which students completed RATs were higher; in the case of the first and second exams, those differences were statistically significant.

“Student surveys indicated that 56 percent of the students preferred the RATs, compared with 33 percent who preferred the quizzes. ‘Students who preferred RATs indicated in their open-ended responses that the questions helped them look at the overall meaning of the articles and focus on the main points. In addition, having the RATs due before class helped them prepare to participate in classroom discussions. Students who preferred frequent quizzes reported that their preference was due to quiz questions showing them what to expect from exams and having only one correct answer.’”

It must be noted that this study dealt only with reading material, not with other kinds of multimedia such as videos that might be assigned in a flipped class, although it seems reasonable that it should work with videos as well. Also, due to the time involved in grading open-ended questions, this strategy would best be used in small classes or larger classes with significant TA support.
Flipped Classrooms and Online Learning

To many people, the terms “flipped classroom” and “online learning” are synonymous and are often used interchangeably. If you look at the following list, one can make an argument that both flipping and online learning satisfy one or more of these issues:

- Addresses the issues of a student’s diverse styles of learning
- Gives the instructor an effective way to present and manage course content
- Overcomes limitations of time or space in a traditional setting
- Reaches out to homebound or lifelong learners that cannot be on campus

But for the purposes of this article, “flipping” will be considered a component of “online learning” used to deliver content that might otherwise have been presented via a face to face conversation or lecture. With that defined, there are some best practices to keep in mind for online learning in general:

1. **Make it personal** – As opposed to flipped lectures that free up time in the face-to-face classroom, these may be the only opportunities students have to see their instructor and make that personal connection that can make a course more effective. While you certainly do not have to (or want to) make the video 75 minutes of you lecturing to the camera, there is tremendous benefit in either short openings, closings or both that show you speaking to the camera (and in turn, the student). It is a simple but powerful addition to a flipped lesson.

Dr. Tim Newby (2013), in a video response to questions about this topic, spoke of his EDCI 531 course at Purdue (a graduate level course offered online):

“One of the things that happens within online instruction of course is that you aren’t in the same place and I really felt the need for the students to have a
feeling of not only me, but of the place of ‘Purdue University’. And so I wanted to come up with something so they could get the feel of that. At the same time I am very strong in my feelings towards summarizing and advance organizers that kind of tell you where we are and where we are going and that is really needed, especially in that course. So I thought I could tie all of that together by creating end of the week, or start of the next week videos.

“I sat down and said, ‘Ok, if I were a student, what would I want to know from the professor?’ So I wrote a few notes, then I just walked through them. I would say ‘Hey, what about this, did you get this out of it?’ and ‘did you miss this?’ . I was trying to give them hints along the way of where those connections are. I think those are the important parts of learning we sometimes miss. Some of the most watched videos I create are the connection videos that tie everything together. There is something about making that “connection” that is important, and it is magnified for the student who never has that connection. So you can just sit down and talk about it and just be normal. It’s the real Tim Newby. If you were sitting right in front of me, that is how I would be talking to students.”

2. **Make it engaging** – With online learners, you are always competing for their time and attention. It is too easy to open another browser tab and surf the web if the content of your lesson does not engage them. Use color, sound, voice inflection and humor to keep their interest. Remember, you are competing with people falling off skateboards and cute kittens. As Kevin Makice, Ph. D at Indiana University in Informatics and Computing, says of using online lectures, “Moving a lecture online changes where that information is consumed, not necessarily the degree of student engagement or its effectiveness” (Makice, 2012).

3. **Make it short and segmented** – Long, full lectures present problems for online learners. Many rely on downloading content to view during commutes or when not on reliable Internet connections, so divide flipped lessons into chunks that they can easily grab and go. It will also be an aid in keeping their attention and make it easier for them to return to the content if they have an issue later. Dr. Newby says that “Timing is important. I think if you go too long, students won’t
listen and there needs to be regularity. For me, weekly worked, but if the content is more difficult, then maybe more often that that is needed.” (Newby, 2013).

4. **Make it relevant** – Good flipped lessons are often presented from a standpoint of being a solution to a real-world problem or situation. It gives context to the viewer that can hold their attention and provides a purpose for your message as well. Use that hook whenever possible. Students are always looking for better feedback, which is relevant to their success. Dr. Newby mentions that “In the past, I have used audio to grade student work. I would put their paper in the background of the video and just walked them through the work and talked to them just like they were in my office, and many students have really liked that approach and it lets me give greater detail than what I would if I was typing feedback.” (Newby, 2013).

5. **Make it a two-way street** - Flipping the classroom in an online setting can also mean having students create video answers for submission to the instructor. This is a great tool for courses with creativity aspects or where public speaking might be a factor. It engages the students in the creative process, and puts a face to their name for the instructor as well. As Colorado Chemistry teacher John Bergmann, a man often cited as inspiring the term “flipped classroom” said, “I talk to every kid every day.” (Makice, 2012).

6. **Keep it fresh and always evolving** – Dr. Newby is constantly thinking of new videos he can add to make the experience for the online learner more satisfying. “I have actually been thinking of being able to present straight forward content in 5-10 minute videos, where I introduce content, mention things to watch for in the readings, or even saying ‘hey, there is nothing of any value in this section of the readings, so skip over that if I were you’ which students would greatly appreciate knowing. It would help them see the thought process behind how I do things, and they can either agree or disagree with it. That is very important particularly early on in a course.” (Newby, 2013).”
Resources

Face-to-Face Help

A consultant from the Instructional Development Center would be happy to meet with you if you are considering flipping your class. For contact information, see here: https://www.itap.purdue.edu/learning/help.html.

Web Resources

Publications on Minimizing and Eliminating Student Resistance to Student-Centered Instruction:


Student Learning: Six Causes of Resistance:


Three Tools for Improving Flipped Video Lessons:


Existing Content to use in your flipped class:

https://www.itap.purdue.edu/learning/innovate/hdiseries/videotutorialsites.html

Flipped Classroom Learning Community:

http://flippedclassroom.org/

Flipped Classroom Blog:
http://larryferlazzo.edublogs.org/2012/08/11/the-best-posts-on-the-flipped-classroom-idea/ (archive of good blog posts)

What is the Flipped Classroom?:
http://www.knewton.com/flipped-classroom/

Reference List


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This instruction set was developed by ITaP for instructor and student use.

For comments, suggestions, correction, etc. please contact us at:

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