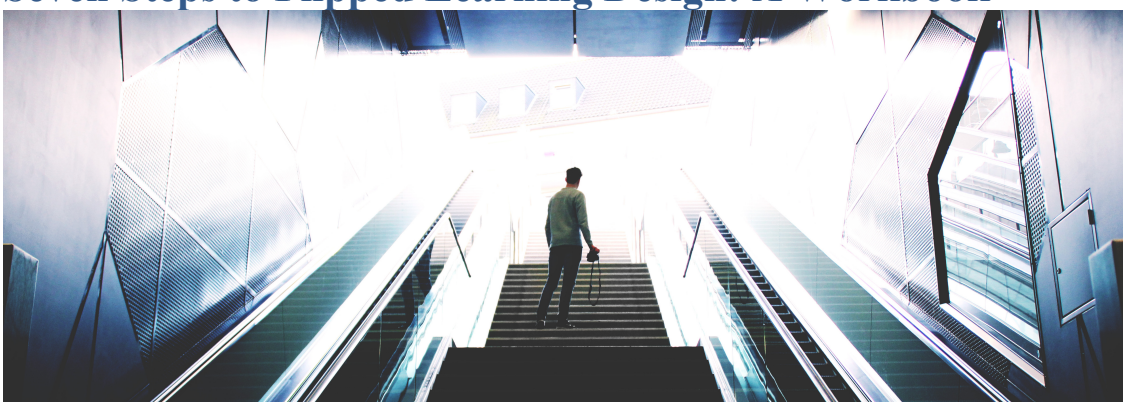
Seven Steps to Flipped Learning Design: A Workbook



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Introduction

What (and who) this workbook is for

This workbook is a guide for participants in my (Robert Talbert's) workshops on **flipped learning design**. It is a brief overview for higher education faculty who are interested in a systematic, structured approach for planning lessons based on a **flipped learning** framework. The purpose of this book is to provide a framework for **planning a single lesson in a flipped learning environment**. By working through this workbook, you'll be introduced to a simple, repeatable workflow that can help you get started planning your lessons using sound principles of flipped learning design in a way that won't overburden or overwhelm you.

This workbook was originally written for a two-day minicourse on flipped learning design that I facilitated at the Mathematical Association of America MathFest conference in Washington, D.C. on August 6–8, 2015. It was inspired by Dee Fink's article/workbook *A self-directed guide*

to designing courses for significant learning[1] which I highly recommend as a companion piece. Dee Fink's booklet serves as a highly useful guide for "macro" design of courses at the large scale, whereas this workbook hopefully is useful for designing lessons at the "micro" scale and in an environment specifically oriented toward flipped learning.

A significantly expanded version of this workbook will appear in my forthcoming book *Flipped Learning: A Guide for Higher Education Faculty* coming from Stylus Publications in May 2017. More information about the book is found on my website, and you can preorder the book at Stylus' website.

How use this book

The recommended way to use this book is as follows:

- First, choose a **course** that you teach, or will teach soon, to which you'd be interested in applying the principles of flipped learning. (If you're not sure what those are, we'll define them shortly.)
- Then, select a **single lesson** from within that one course. By "lesson" we mean the block of content that you might set aside for a typical class meeting of 50 to 75 minutes. Variations on that definition of "lesson" are OK.
- Then, **follow through the process** outlined in this booklet to design a flipped learning-oriented plan for that one lesson in that one course.

Then, of course, go and teach the lesson with that plan and see how it goes. Then repeat. You might wish to read through the workbook once with the lesson in mind, then read it again and get your hands dirty with planning the second time. By doing the activities with an awareness of the overall picture and the background, you should end up with something that is close to a coherent, workable lesson that stays true to the pedagogical framework of flipped learning.

Once we get to the seven actual steps of flipped learning design, each step is given in its own section. Each section except for Step 5 contains:

- **Philosophy:** We'll describe the ideas behind the step you're about to perform.
- **Activity:** This is a guided set of tasks to help you complete the step.
- **Frequently asked questions (FAQ's):** Questions commonly asked about this part of the process.

Eventually the hope is that you'll find the right mutation of this workflow that works for you, commit it to your academic muscle memory, and then the book won't be necessary except as a reference or something to pass along to others.

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[1]Fink, L. D. (2003). A self-directed guide to designing courses for significant learning. University of Oklahoma, 35. Retrieved from http://www.bu.edu/sph/files/2011/06/selfdirected1.pdf

What to do if you have questions or corrections

If you have questions or corrections, please just contact me by email or Twitter; my contact information is on the front of this book.

Background: What exactly is flipped learning?

What is flipped learning?

Throughout this workbook we will use the following definition of flipped learning:

Flipped Learning is a pedagogical approach in which first contact with new concepts moves from the group learning space to the individual learning space in the form of structured activity, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter.

This definition is a variation on one given by the Flipped Learning Network.

Two terms show up in this definition that perhaps need more explanation. By **individual space** we mean the context in which students operate when they are working mainly by themselves, or perhaps in a small informal group that meets apart from a formal class meeting. By **group space** we mean the context in which students operate when they are working with a formal group as part of the class itself. Group space is what students encounter, in other words, when they are learning *with the entire class* or some intentional, regulated subset of that class such as small groups formed during class by the instructor.

Note that for traditional face-to-face courses, "individual space" means "pre-class" or "post-class" times; and "group space" means "class time". For online and hybrid courses, we cannot use such synonyms. The design principles in this workbook still fit for online and hybrid courses. But we will stick with the more common "in-class" and "pre-class" language for the workbook.

Flipped learning is based on three premises:

1. Students get first contact with new material prior to group meetings, rather than during group meetings.
2. The process by which students get first contact is *structured* by the instructor. Students are not merely turned loose on a collection of content but *guided* by the instructor in some way as they learn.
3. The group space then focuses on higher-order tasks like application, synthesis, and creativity.
4. The group space is an *active learning* space that focuses on student learning. Instructor-centered activities such as lecturing are to be used sparingly.

Note that very little about the specifics of flipped learning are given in this definition, and that's appropriate, since **flipped learning can look like many different things** and different instructors implement flipped learning in many different ways in different disciplines, and between subjects within a discipline. Flipped learning is a *platform* for teaching, not really a specific instructional technique like inquiry-based learning or POGIL or the Oxford tutorial method. There's room here for all shapes and sizes of teaching and learning preferences.

What flipped learning is not

- **Flipped learning is not "videos before class, homework during class".** This is an oversimplification that is perpetuated by the popular media. Video is not necessary for flipped learning, and homework in class isn't either. In fact if the video is poor or the homework is not actively done, this is *not* a flipped learning environment.
- **Flipped learning is not "assign readings before class, discuss the readings in class".** Simply *assigning* readings often fails because students do not know how to structure time or how to read a text analytically. Unstructured pre-class activities usually fail for all but the most expert learners. Flipped learning, by contrast, insists that *all* learners in a class have meaningful, self-regulated learning experiences prior to class. It also insists that *all* learners have rich, challenging learning experiences during class, and not leave discussion only to the most vocal.
- **Flipped learning is not "videos before class, more lecture during class".** Using flipped learning simply to cover more material is abusing the model. Instead, we use the time liberated by moving direct instruction and other structured learning experiences out of the class to reinvest it in deep learning activities that involve students and activity.

A quick overview of the seven steps

This workbook focuses on the process of designing a single lesson based on flipped learning principles, using the following seven steps:

1. **Come up with a brief but comprehensive list of learning objectives for your lesson.**
2. **Remix the learning objectives so that they appear in order of cognitive complexity.**
3. **Do a rough design of the in-class activity you intend students to do.**
4. **Go back to the learning objectives list, and split it into Basic objectives and Advanced objectives.**
5. **Finish the design of the in-class activity.**
6. **Design and construct the pre-class activity.**
7. **Design and construct any post-class activities you intended students to do.**

The rest of this book is meant to provide details and activities for each of these steps. But before you begin, notice some themes in the process:

- It starts, and is centered on, having clearly-articulated learning outcomes given for your students (and *to* your students).
- We focus on designing the *in*-class activity before we design the *pre*-class activity. This is a little counterintuitive to some people, because we tend to plan classes in chronological order (first plan the beginning, then the middle, then the end). But we claim that starting in the middle is a better approach.
- We outline the in-class activity first and *then* the pre-class activity; then circle back and finish the in-class activity. You'll see why.

What you need to get started

Before we begin, you'll need to have the following ready:

- **A class you intend to focus on, and one lesson within that class that you wish to design.** This is ideally one 50- or 75-minute class meeting. If your "lesson" is spread over multiple days, focus for now on one of those days. If your class period spans a longer amount of time than this (e.g. three hours) then focus on one block of content that might occupy 50 to 75 minutes of that time.
- **A computer or other device with internet access** so you can write up what you are doing and search the web for resources.
- **Any textbook or other resources that you will be using for your lesson**.

Step 1: Come up with learning objectives

Philosophy of Step 1

When designing either a course or a single lesson or even a single activity, we have to ask:

What are students supposed to learn, and what (in my, the instructor's professional opinion) constitutes acceptable evidence that they have learned it?

The answers to these questions are what we call *learning objectives*. They vary in their specificity depending on the context; they tend to be broad and sweeping when designing a course (for example, "Exhibit the ability to apply basic material to applied problems you have not seen before") and more specific the more we "zoom in" on the course (for example, "Set up and solve an applied optimization problem", which is an instance of the larger course-level objective).

No matter what the level of "zooming" is, though, learning objectives work best when they are **concrete** and **unambiguous** and somehow **measurable**. It's helpful to phrase learning objectives as **tasks** that a student performs and which the instructor assesses, to determine whether the student has performed the task at a level that is acceptable in the instructor's best professional judgment. This means that learning objectives should be:

- **Unambiguous.** The student should be able to tell exactly what they need to do, and how exactly *they* will know if they have learned something. (Importantly, not only should the instructor assess students' work, the students themselves should learn to assess their own work.)
- **Action oriented.** Objectives should only refer to actions we can actually measure, rather than internal states of mind or other non-measurable things. As a consequence, words like "Know" or "Understand" or "Appreciate" should not be part of a learning objective — although we obviously want students to know and understand and appreciate things. Determine what, in your best professional judgment, could a student do to convince you that he/she "knows" or "understands" something. That action is the real learning objective.
- **Comprehensive.** Everything of importance in the lesson should be addressed by a combination of learning objectives (if not by its own learning objective). In other words, if something is important in the course and you feel students need to know it, write a learning objective for it, or else determine how a combination of existing learning objectives will provide you with the evidence you need.

- **Minimal.** At the same time, we want to eliminate any redundancies in learning objectives so as to make the cognitive load on students as low as possible (but no lower!). There's no point in having five learning objectives that all say essentially the same thing, or a single learning objective that is really just a combination of two or more other objectives.

Step 1 Activity: Brainstorm your learning objectives

So the first thing you need to do is **think carefully about your lesson, and come up with the specific learning objectives for that lesson**.

Decide on a list of 3–8 learning objectives that meet the above criteria, and write them out. Remember to use action verbs; write clearly (because the student is the audience here); and make them comprehensive and yet minimal. You may need to make choices about what material to cover and what to leave out. Write those in a list in the space below. **Just list these in the order in which they appear, or the order in which they occurred to you.** We may change that order in Step 2.

If you need more space, or have more than 8 objectives, just put them on a separate page.

1. Objective:
2. Objective:
3. Objective:
4. Objective:
5. Objective:
6. Objective:
7. Objective:
8. Objective:

FAQ's about Step 1

Q: *Help! I can't seem to come up with decent learning objectives for my lesson. What should I do?*

A: If you are using a textbook, start by skimming it and seeing what kinds of activities and exercises appear in the section you are teaching. Ask yourself: *What seem to be the most common tasks that these activities, examples, and exercises are expecting students to accomplish?* This will give a good start on a list of learning objectives. You can also look around online for syllabi and materials from similar courses taught by others, and mine those resources for *their* learning objectives. Finally, you can ask other people — colleagues in your department, people in your personal learning network, etc. — what *they* think are the top 2–3 things students should learn in your lesson.

Q: *What if I have more than 8 learning objectives for my lesson? Am I expecting too much from students?*

A: The number "8" is just an arbitrary number here. It's quite possible that a complex lesson could have a fairly long list of learning objectives. However it's also possible that you are being overly ambitious. Take a good look at your list and ask yourself: *Are some of these objectives not strictly necessary for my lesson, and therefore I can remove them without harming the academic rigor of my class?* Also: *Is it possible to combine some of these objectives into one larger objective of which the smaller ones are instances?* Also: *Am I trying to do too much in one class meeting, and should I see if I can carve out more time in a second session to cover all these objectives?*

Q: *And what if I only have one or two objectives? Is this not enough?*

A: It's possible that your lesson involves just one or two concrete learning objectives. But it's not likely! It's probably that the learning objectives you have can, and possibly should, be split up into smaller ones that can and perhaps should be measured separately. For example, "Write the equation for a line" would be a pretty concrete and unambiguous-seeming objective for a basic algebra class. However, actually there are layers to this objective. Do we want students to write the equation for a line given just two points on the line? Do we want students to write the equation for a line given a point and the slope? Do we want students to write the equation in standard form and also in slope-intercept form? It would make sense in context to make this into *three* objectives, each more atomistic than the bigger objective.

Step 2: Remix the learning objectives in order of complexity

Philosophy of Step 2

Your list of learning objectives from Step 1 might not list the objectives in any sort of order, other than the order in which you thought of them. For example, you might have listed a "harder" objective before an "easier" one. In Step 2, we are going to **put the learning objective list in order, from least complex ("easiest") to most complex (hardest)**.

A useful framework for doing this is **Bloom's Taxonomy** ([2] and revised/updated in [3]). Bloom's Taxonomy is often depicted as a pyramid:

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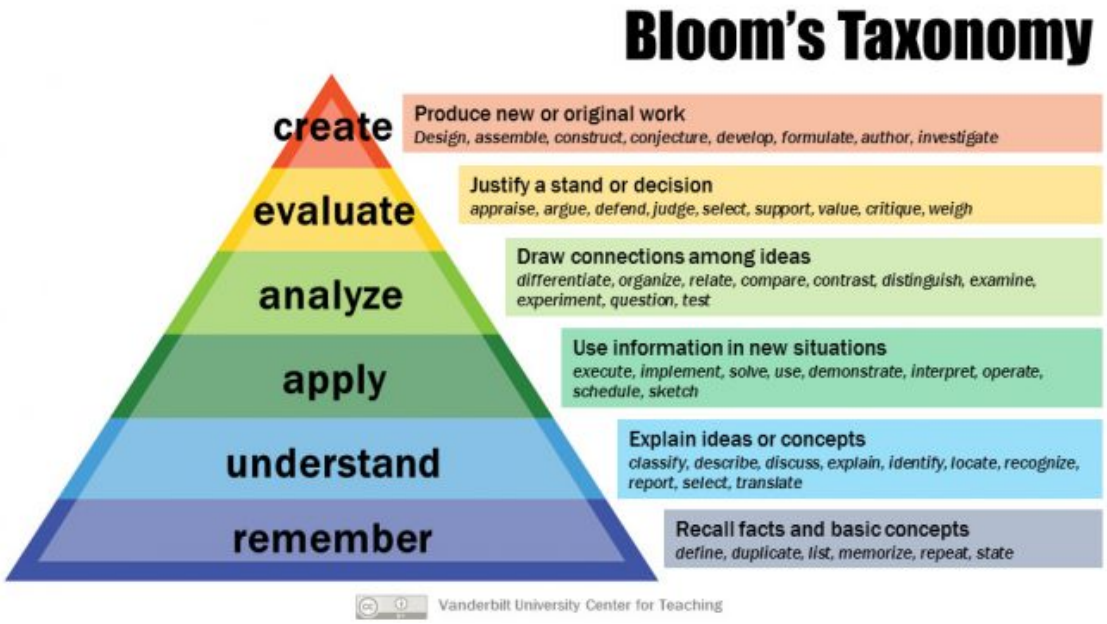
[2]Bloom, B. S. (1956). Taxonomy of Educational Objectives. Educational and Psychological Measurement, 16, 401–405. http://doi.org/10.1177/001316445601600310

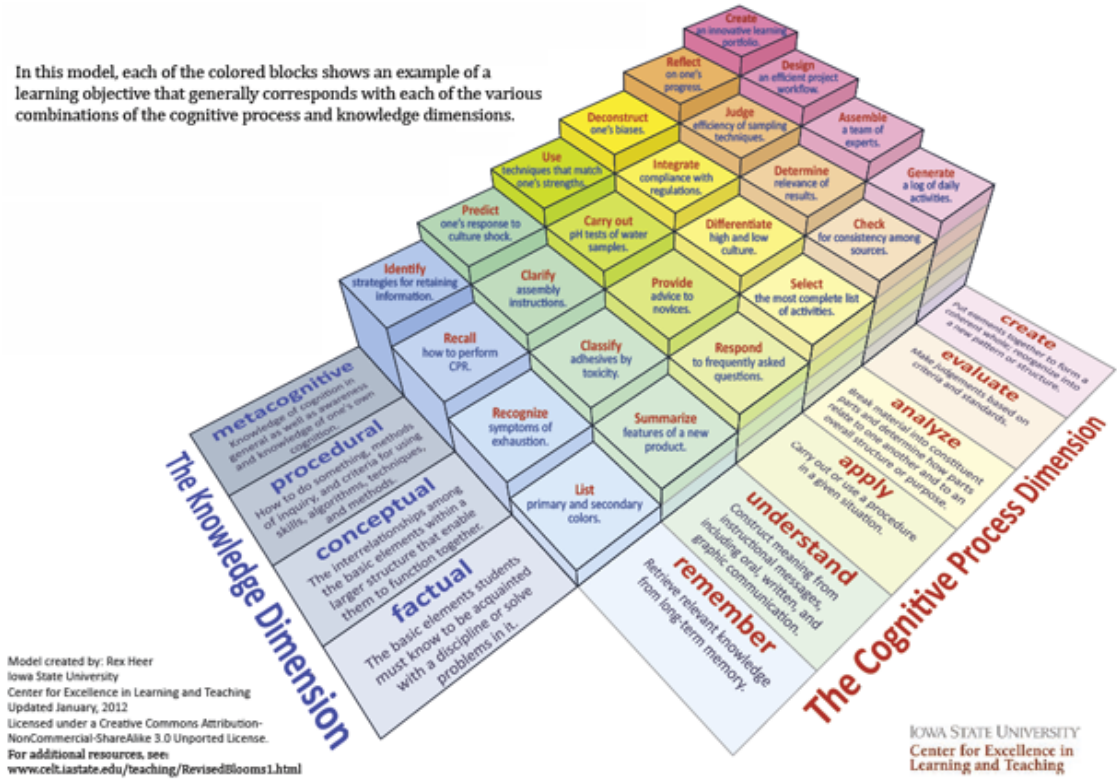
[3]Sosniak, Lauren A. Bloom's Taxonomy. Ed. Lorin W. Anderson. Univ. Chicago Press, 1994. APA



Bloom's Taxonomy

Categories of cognitive tasks that are lower on the pyramid are considered to be less cognitively complex, and the complexity increases as we move up the pyramid. Note in this picture the *action verbs* that are often associated with the various levels.

Here is a 3D depiction of Bloom's Taxonomy made by Rex Heer at Iowa State University that splits student learning activities into two dimensions (Knowledge and Cognitive Processes) and then vertically by complexity level:



3D Bloom's Taxonomy

The 3D version is particularly helpful in university-level mathematics where a distinction between **procedural knowledge** (recall of formulas and methods, and performance of mechanical computation) and **conceptual knowledge** (deeper understanding of mathematical concepts, as measured in different ways such as applications and proof) becomes important. If you go to the Iowa State CELT website ([4]), the graphic is interactive.

Here's an example of how we might use the Bloom's Taxonomy framework to re-order the learning objectives. Suppose we're planning out a lesson in algebra focusing on the quadratic formula, we wrote down the following objectives in this order:

- Use the quadratic formula to find the roots of a second-degree polynomial.
- Apply the quadratic formula to solve a real-world problem.
- State the quadratic formula.
- State the conditions under which a second-degree polynomial will have two real roots, one repeated root, or two complex roots.

The first objective is about applying the basic formula to do a rote, mechanical computation. So this is an *Apply* task (third level of Bloom). The second objective is also an *Apply* task, but since it involved application to a real world problem and not just a mathematical expression in

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[4]http://www.celt.iastate.edu/teaching-resources/effective-practice/revised-blooms-taxonomy/

isolation, it's a little more complex than the second objective. The third objective is pretty clearly a *Remember* task (lowest Bloom level). Finally the fourth objective seems to be the most complex one, asking learners to *Analyze* a situation and draw general conclusions.

So, using a combination of our professional judgment and Bloom's Taxonomy, we can see that the list is out of order, and perhaps how to reorder it. If this were my class, I would probably re-order the learning objectives as follows:

- State the quadratic formula.
- Use the quadratic formula to find the roots of a second-degree polynomial.
- Apply the quadratic formula to solve a real-world problem.
- State the conditions under which a second-degree polynomial will have two real roots, one repeated root, or two complex roots.

The reason *why* we are ordering the Learning Objectives in this way will become more apparent when we get to Step 4. For now, what we are aiming for is to end this step with a list of things we want students to be able to *do*, given as concrete and measurable actions, sorted in increasing order from least complex to most complex.

Step 2 Activity: Remixing

Using one (or more) of the Bloom's Taxonomy visualizations, take the list of learning objectives that you wrote in Step 1 and reorder the items in the list in order from **least complex** to **most complex**. It's OK if you feel like there is more than one way to do this; you are probably right. Some professional judgment will be necessary here.

1. Objective:
2. Objective:
3. Objective:
4. Objective:
5. Objective:
6. Objective:
7. Objective:
8. Objective:

FAQ's about Step 2

Q: Does every lesson I plan need to have an instance from each of the six levels of the pyramid? For example, is it OK to have a lesson made entirely of "Knowledge" tasks?

A: This *can* happen sometimes. For example, there are courses in the health sciences for pre-medical and pre-nursing students that are entirely focused on medical terminology. Many of the lessons in those courses will focus on recall of terminology, so you might expect to see a lot of *Remember* tasks and not too many *Evaluate* tasks. Conversely some courses, for example

capstone courses in a major or service-learning courses, may have very few low-level tasks and focus instead mostly on higher-level tasks. However: Good pedagogy generally speaking requires a balance of tasks across the cognitive spectrum. If you find yourself giving only low-level tasks, consider ways to introduce higher-level tasks in your course design. (This is advice for all teaching, not just for flipped learning.)

Step 3: Outline the in-class activity

Philosophy of Step 3

We now have a list of well-honed learning objectives that has been put into order from least complexity to greatest. You might think this is to set up the creation of a pre-class activity. But actually in step 3 we are going to **outline the activity learners will do during class**.

The whole point of flipped learning is to focus valuable class time — when students and instructor are together and can help each other — on tasks that are rigorous, creative, and challenging and therefore benefit the most from being together. Those activities usually involve the items that are now in the bottom half of your remixed list of learning objectives. These objectives are at the heart of a university-level "understanding" of the subject, and therefore they are of utmost importance. That's why we are going to put the design of the in-class experience next, at the heart of the process.

The purpose of this step is to have a rough idea of what you will have students do in class, so that the pre-class activity you design will be focused and free of redundancies and unnecessary work (which will in turn raise the probability of being completed). You want to use your time in class to focus on the learning objectives that you've identified that are at the "bottom" of the list — that is, the ones that you've identified as being the hardest, or the most complex, or the ones that students will need the most help in doing.

So, in this step you need to think about activities that your students can do in class that address the hardest elements of your learning objective list. This may be just a single objective! But if that one objective is so problematic that your student need to spend 45-50 minutes of laser-like focus on it, then so be it. (College students rarely have a sense of how to focus on one thing for an extended period of time, so flipped learning design is helping them acquire and master this skill.)

As an example, let's go back to our hypothetical algebra class, where the objectives were:

- State the quadratic formula.
- Use the quadratic formula to find the roots of a second-degree polynomial.
- State the conditions under which a second-degree polynomial will have two real roots, one repeated root, or two complex roots.
- Apply the quadratic formula to solve a real-world problem.

Here's what I would brainstorm as far as a plan for a 50-minute class session:

- First 10 minutes: Open Q&A on anything from the pre-class activity. (I haven't determined what that's going to cover yet; but I want to budget time for questions.)
- Next 25 minutes: An activity structured as follows. First, there's a warm-up question that asks them to write out the quadratic formula and then find the roots of two second-degree polynomials. Second, there's a question that involves some real-world situation (there are lots of them!) in which we want to acquire some information that needs the quadratic formula — a classic one is to give a projectile's equation of motion and determine the time at which the projectile will hit the ground. Third, there's a question about determining when the roots of a polynomial are real or complex (to touch on the third objective).
- Last 10 minutes: Some time for debriefing and then a one-minute paper to wrap things up.

There are 5 minutes missing from this outline to give some built-in slack time for the actual class. Again: This is just an outline. I'll flesh it out later.

Step 3 Activity: A rough design of the in-class activity

Answer each of the following:

- What are the **main objectives to address from your list of learning objectives during in-class work?** This should be a **relatively short list** of tasks that students should perform that address the most complex items they need to learn, from which students will benefit by working together and with you present as the instructor to help on the spot.

- Generally speaking (you'll flesh out the details later), what are you going to have students *do* in class to show you how well they are mastering those learning objectives you just listed? (In other words, what's a rough outline of the tasks you are going to give to students?)

- In your best professional judgment, about how long will this take? (*Recommendation*: **If your in-class activity is taking up more than 70% of your contact time (e.g. 35 out of 50 minutes), it needs to be shortened.** Can some of it be done prior to class? Can some of it be moved to post-class? Can you give a simpler activity that still engages students at a high level?)

- What *other* activities do you want students to do in class? How long will they take? When are they going to happen during the meeting? (Also: Are all of these necessary or useful enough to justify spending class time on them?)

FAQ's about Step 3

Q: *What are some ways I can free up even more time in my class for active learning on the most difficult objectives?*

A: There may be several ways you can improve the efficiency of your class meeting by streamlining or eliminating things we often do in class out of habit. Suggestions:

- **Don't give course announcements in class.** Make class announcements via email or your course's LMS instead. This way students will have a record of the announcement, and no class time is taken up. At the very least, you can put announcements up on the board prior to class or in a handout, and then move on, but if they are on the board (and written clearly) there's no need to reiterate them. It's the students' responsibility to handle information flow.
- **Don't hand back papers in class.** Try handing back papers prior to class time, or by appointment in office hours. I recently realized that if I spent 10 seconds per student in a class of 30 students handing back papers, that I've spent 5 minutes transferring pieces of paper. How many times have you wished you had 5 more minutes to finish an activity?
- **Don't use paper at all.** Have students type up their work, or write it up neatly and then scan it to a PDF, then have them submit work via Dropbox or your LMS or a single-purpose GMail account.

Step 4: Split up the list of learning objectives

Philosophy of Step 4

We now have a list of learning objectives that's ordered by cognitive complexity, and a sense of what is going to happen in class. Now we move *backwards* and look again at the objectives.

The list of learning objectives shows all the tasks that students should be able to do in order to provide evidence os mastery – *eventually*. The *timing* of that evidence matters, however. We don't need students to show they've mastered *every* learning objective *prior* to coming to class; that's unrealistic, and if it were the case then there wouldn't be much of a need for a class.

So in this step we are going to do students a favor and specify **what they need to be able to do before arriving at class**, and **what they will focus on doing during and after class**. We do this by simply splitting the list of learning objectives in two – drawing a line that separates the pre-class objectives from the in-class objectives. We'll call those objectives **Basic** and **Advanced** respectively.

Where this line is to be drawn is a function of your professional judgment. Look at your ordered list of learning objectives and ask two questions:

1. *What single item on my learning objectives list is the most advanced task I can reasonably expect a student to be fluent with, through independent study?*
2. *What single item on my learning objectives list is the least advanced task that I plan on having students address through their active work in class?*

By answering these questions, you'll discover a line of demarcation. On one side of the line are learning objectives that are simple enough that students can gain basic fluency on their own through direct instruction and practice, prior to class. On the other side of the line are learning

objectives that are advanced enough that students *might* be able to pick up basic fluency on their own, but they will need to do active work with other students in class to really begin to "get it".

In this step, you find that line and then draw it. This splits your list into two: Basic objectives and Advanced objectives.

Going back to the example from a hypothetical algebra class, we had this ordered list of objectives:

- State the quadratic formula.
- Use the quadratic formula to find the roots of a second-degree polynomial.
- State the conditions under which a second-degree polynomial will have two real roots, one repeated root, or two complex roots.
- Apply the quadratic formula to solve a real-world problem.

What single item on my learning objectives list is the most advanced task I can reasonably expect a student to be fluent with, through independent study? I think that this task would be the second one, using the quadratic formula to find the roots of a polynomial. Both it and the one before it are rote mechanical calculations that can be easily learned through direct instruction and practice, both of which can be provided through materials posted online (video, online homework, etc.). I don't necessarily expect students to *master* those skills before class (although some students will); just get enough fluency to know more or less what they are doing.

What single item on my learning objectives list is the least advanced task that I plan on having students address through their active work in class? I think that this would be the third item about applying the quadratic formula to classify the roots of a polynomial. This is almost simple enough to expect students to get some fluency on it before class, but I think it would work better as an in-class activity.

So for me, my line of demarcation here is:

- **Basic objectives:**
  - State the quadratic formula.
  - Use the quadratic formula to find the roots of a second-degree polynomial.
- **Advanced objectives:**
  - State the conditions under which a second-degree polynomial will have two real roots, one repeated root, or two complex roots.
  - Apply the quadratic formula to solve a real-world problem.

Looking ahead, when we get around to writing up the actual assignment we want students to do prior to class (Step 6) we will want to make it clear that *students are expected to gain fluency on the Basic Objectives only* prior to class. Fluency on the Advanced Objectives prior to class would be awesome but not necessary; the Advanced Objectives merely set the agenda for what's happening in class.

While this document won't discuss much about the *dispositions* that both students and instructors must have for a successful flipped learning experience, here it's important to note that **you should assume that students will do their pre-class work and have meaningful engagement with it through independent pre-class activities**. Decide on your Basic and Advanced lists

based on this assumption. Yes, some students may not do the pre-class work. But we are making a choice here to design the class with *success* in mind and let that choice permeate our management of the class. It would be a mistake to design the class around the students who do not choose to engage, because this attitude fails students who do engage. A "Plan B" for non-engaged students would be a good idea – but this is not "Plan A".

Step 4 Activity: Splitting the list

Go back to your ordered list of learning obejctives from Step 2 and draw a line that demarcates Basic Objectives from Advanced Objectives. **Ask yourself**: Why am I drawing the line here?

1. Objective:
2. Objective:
3. Objective:
4. Objective:
5. Objective:
6. Objective:
7. Objective:
8. Objective:

FAQ's for Step 4

Q: *What if I change my mind about where I want the line to go?*

A: This is OK. This is just a framework and not an exact science. Even in the example with my algebra class, where the line goes is dependent on the particular group of students I'm working with; the line for a class in one semester could be different for a class in another semester. Doing flipped learning does require careful sensitivity to the abilities and needs of individual students and this feeds into the design process. Fortunately, flipped learning also allows you to form personal relationships with each student and talk to each one every day, so this is easier than in a traditionally-structured course.

Q: *What if my line is at the very top of the list — that is,* NONE *of my objectives are simple enough to leave to students prior to class?*

A: Then you need to break down your learning objectives further and identify low-level tasks that you are taking for granted. For example in the algebra class, suppose I only wrote down the last two objectives (which I moved into the "Advanced" list). Thinking carefully about those objectives, I may realize that of course, students should be able to use the quadratic formula in a basic way first — but that's such a low-level assumption that although it's necessary, it didn't occur to me. So I make this as a new objective and put it in the basic list. Same for stating the quadratic formula. Another possibility is that you may be underestimating your students' abilities to learn things on their own, or assuming they won't do the pre-class work. Try not to go down that road.

Step 5: Finish making up the in-class activity

This step has no separate "Philosophy" and "FAQ" sections. All you need to do at this point is finish out the in-class activities you planned in Step 3 – both the main activity and the other activities. Here are some questions to answer as you do this:

- Is the main activity aligned with the Advanced Learning Objectives?

- Are there parts of the main in-class activity that seem too simple (i.e. would fit better in pre-class activities), too advanced (i.e. would be better done after class), or redundant in a non-productive way?

- Are the activities in your main activity substantive, challenging, appropriately pitched to the audience?

- Do you plan on grading the in-class activity? If so, what does the rubric look like, and how will students use the feedback to make improvements?

- Do the other activities for your class session (entrance quizzes, exit tickets, etc.) make sense in the overall context of the class session? Do they take up too much time?

Before moving on, and after answering the questions above, make out a rough timetable for what will happen and when during your class session below.

Step 6: Design the Guided Practice for pre-class work

Philosophy of Step 6

Now we move on to designing the pre-class activity. **The main purpose of this activity is to design a pre-class activity that students will *want* to complete, that prepares them to be productive in the class meeting activity you wrote.**

What makes students want to complete an activity? It's usually a combination of the following:

- **Minimal** – It should keep cognitive load as low as possible without sacrificing academic quality, and ask students to do no more than is necessary to demonstrate fluency on the Basic learning objectives and prepare them to work well in class.
- **Simple** – The structure of the activity, and the student work contained in it, should be easy to understand and lead students to the learning activities along a clear path.
- **Engaging** – The work students are asked to do should spark their interest and encourage them to complete it.
- **Productive** – The activity should actually produce meaningful results, by preparing students well to work in class.
- **Failure-tolerant** – At the same time, the pre-class activity should be relatively forgiving, even welcoming, of initial mistakes. Mistakes and errors should not be a source of stress. Rather, they should be collected and used as learning data.

There are many ways to set up effective pre-class activities that satisfy these properties. One method that I've used for several years that works well is called *Guided Practice*. The name suggests to students that what they are doing in this activity is *practice* on essential ideas, with *guidance* in the form of structured activities – and that they are not being thrown into the deep end of the pool, left to their own devices to learn difficult material without help.

Guided Practice activities consist of the following sections:

1. **Overview**. This is a short (one-paragraph) overview of the material students are about to encounter, with an emphasis on how it connects to other things they have learned. This need not be text; a short video would suffice, or a mind map[5], or some other way of introducing the material and its connections to past content.
2. **Learning objectives**. Here we simply reproduce the split list of learning objectives, clearly labeled "Basic" and "Advanced" so students will know, that we created in Step 4. We give students this list because one of the basic principles of self-regulated learning[6] is that self-regulating learners are in possession of standards against which they can judge their progress as they learn. Eventually in life, students will make up their own objectives. For now, we are traning them to do so.
3. **Resources for learning**. This consists of a recommended "playlist" of items that will help students engage with the basic learning objectives productively and set themselves up for success in the exercises that are coming up. Here we list any text, video, multimedia, or other resources that would be helpful for these tasks.
4. **Exercises**. This section is the main area of activity for students. It consists of a small list of exercises that will instantiate the Basic learning objectives – giving students the "practice" part of Guided Practice.
5. **Instructions for submitting work**. In the final section we give clear instructions on how to submit work. This is an important and often-overlooked step. Students in a flipped learning environment for the first time often feel disoriented, and clear instructions for turning their

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[5]http://www.mindmapping.com/

[6]https://teal.ed.gov/tealguide/selfregulated

work in may seem like an obvious thing, but it goes a long way to helping students acclimate.

Below are some actual Guided Practice exercises from a Calculus course. You don't need to understand any Calculus to use them as examples. Please note that these were made for an online course and each Guided Practice covered several days of material, and students had several days to complete each one. For a more traditional class, Guided Practice should be designed to take no more time than would ordinarily be spent in a traditional lecture in class (45 minutes for a 50-minute lesson, for instance).

- Guided Practice for Module 2 (instantaneous velocity and rate of change): https://goo.gl/ypL2Ng
- Guided Practice for Module 6 (basic derivative computation): https://goo.gl/Z3LOMM
- Guided Practice for Module 11 (applied optimization): https://goo.gl/IKQH52

Here are some thoughts about sections 3–5 of Guided Practice assignments.

- *The resources for learning should contain a mix of media* – both text and video, as well as interactive websites, computer simulations, games, podcasts, and anything else that seems relevant and useful.
- *Students should be given choice in how they learn the material.* Rather than trying to "make sure students have done the reading", give students a variety of resources and then endow them with the ability to choose the resources that work best for them. The only thing that matters in the end is whether they have gained fluency with the Basic objectives and prepared for in-class work. The means by which they did it is a secondary issue.
- *Videos are not necessary for a successful flipped learning experience.* A common misconception is that video is an essential part of flipping, but this is neither historically the case nor is it true today. The first instances of flipped learning in the university were in the early 2000's, predating YouTube by at least five years, and videos were either not made at all or else only recommended and not required[7]. Video is an efficient way to provide lecture in an easily-accessible way, but don't feel constrained to use it if you'd rather not.
- *Even if you use video, you don't need to make your own.* YouTube is a treasure trove of video content, and you can curate pre-existing video materials if you lack the time, resources, or interest in making them yourself. Curating and creating take about the same amount of time if you do thorough quality-control checking of existing videos.
- *Students should not have an undue work load placed on them before class.* A good rule of thumb is that video content should be no longer than a typical in-class lecture would be. Another good rule of thumb is that students should spend 2–3 hours outside of class for every hour of in-class meetings; this rule can be used to judge whether the pre-class activities are too long.
- *Student work on pre-class assignments should be collected before class if possible* so that the instructor knows what students know before the in-class activities begin. Electronic

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[7]More on this in my forthcoming book *Flipped Learning in the University Classroom* (Stylus Publishing 2017).

methods of submission are probably the best way to do this. Students' work on the Guided Practice assignments are not just for the students — they are also for you, so you'll have data coming into the class session about what the questions and "hot spots" are, and you can make informed adjustments to your plans if necessary.

Finally, a word about grading Guided Practice. The recommendation is that **Guided Practice assignments should be graded on a 1- or 2-level rubric, on the basis of completeness, effort, and timeliness only.** My own personal practice is that Guided Practices are graded Pass/Fail, with a "Pass" being awarded if the work is turned in on time (11:59pm of the evening before the class meeting), and each exercise on the assignment shows evidence of a good-faith effort to be right. Actual correctness does not factor into the grade. This makes the assignment more failure-tolerant and a lot easier to grade.

Step 6 Activity: Making a Guided Practice assignment

1. Write out an overview for your lesson; or give a mind map or similar means of introducing the new material and connecting it to previously-learned materials.
2. Copy the split lists of learning objects you made in Step 4.
3. Gather any text, video, or other resources for learning that you can find or make and include this as a list in your document. Remember not to make this too long; and encourage students to add resources that they find and exercise choice in what resources they use.
4. Write up a short list of exercises – "low hanging fruit" that students can do that will lead them through successful engagement with the Basic learning objectives.
5. Determine how students will submit their work, and give clear instructions on how to do this. If you have time, actually make up the form for submitting work and include a link to it.

FAQ's for Step 6

Q: *I'm concerned that my students simply won't do the work prior to class. How can I make sure they get it done?*

A: This is the #1 most frequently asked question when it comes to flipped learning. I think the answer lies in the Guided Practice structure. These activities are clear, well-structured, unambiguous, and while they require significant engagement and time they are also very easy to complete. In fact the only way not to pass is to not do it, or not give your best effort. Since I started structuring pre-class assignments in this way, I typically see a 90% to 95% completion rate on each pre-class activity. It's simply not been a problem. It *used* to be a problem when I was grading them heavily or grading on quality rather than completeness and effort; students would paradoxically rather take a 0 with no work submitted, than take a bad grade for work they did submit. And, especially, it was a problem before I started splitting up the learning objectives into Basic and Advanced and telling student clearly that they were only responsible prior to class for the Basic objectives. Before this, students got the wrong message that I was expecting them to know *everything* about the unit prior to class, and so they would just shut down and not do the work; now they see that I'm only expecting them to grasp the simplest stuff, and once it *appears* possible to them it suddenly *becomes* possible.

Q: *Aside from just the structure of the pre-class activity, what else can I do to increase the likelihood of students completing the work?*

A: You also have to hold the line and insist that students complete this work, and refuse all requests to reteach the material in class. Even if the entire class should show up having not completed their work, stick to your principles and insist that this is their problem, not yours. This is not being mean or being a bad teacher. This is establishing boundaries around how the class will go. Students didn't have to take your class, but now that they are, they are choosing to operate by its rules, and one of those rules is you have to get certain things done before class time. You're being very deliberate about giving students only what they can handle in a reasonable amount of time, prior to class. In return, they have a responsibility to work. Period. I've found that once you establish that perimeter and stick to it, students will get the message; but if you budge any amount on this, even at the beginning of the semester, you may as well drop the idea of flipped learning because students now know what the *real* rules are.

Step 7: Write up post-class activities

Philosophy of Step 7

The work of learning the material in your lesson isn't done just because class time is over. There could be learning objectives that take significant time and space to master, more time and space than are available in a class meeting. It's completely within the definition of flipped learning to have students doing extended work, to reach the uppermost levels of Bloom's Taxonomy, through post-class work – through any of a number of methods:

- Students might be tasked with completing a formal write-up of their in-class work to submit later as homework.
- Students might be given a post-class project that expands further upon the objectives done in class.
- Students might be given a lab or service-learning assignment that applies the advanced objectives to something even higher up Bloom's Taxonomy.
- Alternatively, students might be given more practice work that focuses on drill and mastery of the lower-level tasks on Bloom's Taxonomy.

The possibilities are extensive here.

Step 7 Activity: Writing post-class activities

- What advanced learning objectives from your list will need further attention after the in-class activity has been completed?

- What other learning objectives (Basic or Advanced) would benefit from further practice?

- What activities outside of class would provide continued engagement with the Advanced learning objectives?

- What activities outside of class would provide further depth and breadth with Basic learning objectives?

- Now make a list of activities to assign for post-class work. Estimate the time required for the average student to complete these activities.

- Write up the assignments you intend to give for post-class activity.
- Looking at the time estimates for the post-class activities and the time estimates for the pre-class activities, determine whether your total time requirements for out-of-class work average out to 2-3 times the amount of time spent in class. If it's more, then think of ways to trim back the size or extent of some of your activities.

FAQ's for Step 7

Q: *So, Step 7 seems no different than a traditionally structured course.*

A: In some ways that's right. Every course regardless of structure has these extended activities that take time and space not available to us in class. The big difference here in flipped learning is that we have devoted significant class time to drilling deeply into the Advanced learning objectives, so every student has a reference point for those objectives as they move forward. For example, suppose students in our hypothetical algebra class from earlier were given a post-class assignment to go out and collect some data that have a roughly parabolic shape to them, find a formula that fits the data, and then use the quadratic formula to say something interesting about it. (Fitting a model to data would probably be an additional learning objective, or maybe this was an Advanced objective from an earlier lesson.) If a student had trouble with the math, we could say: "Remember the activity we did in class that was similar to this? How did this work, then?"

Q: *Is it possible that I could* NOT *focus class time on the most advanced objectives, and instead use a post-class activity for these and spend class time hitting sort of the "middle" of my objectives list?*

A: Using class time to cover most, but not all of the advanced objectives and then saving the "most advanced" objectives for outside-class work *could* work well for students. But, remember the point of flipped learning is to work on those most difficult tasks *while there is support readily available*. How the objectives are addressed is up to you, but do keep in mind that we want to put students in a position where they are not encountering *new* and *advanced* objectives when they are apart from a corresponding level of help and connection.

Conclusion

This workbook is just a template for one way of designing courses for flipped learning experiences. Your mileage ay vary! What's important is that the **students are the ones who are constructing the meaning and understanding of the material, through intentional design and productive independent learning experiences that are integral to the course**. And in flipped learning, this happens **by students getting productive independent learning experiences prior to class, then engaging with difficult ideas in a safe, dynamic, and creative classroom environment focused on their needs.**

How you make this happen is up to you and is largely a matter of experience, professional judgment, and personal taste.

The research on flipped learning is showing that flipped learning environments are good for students in almost every way. Students get greater ownership over their learning and practice with lifelong learning skills. Student attainment on course content objectives, across different disciplines, is never worse than in a traditional setting and is in most cases better. Flipped environments make it easy to use the kinds of active learning techniques that are proven, through decades of research, to benefit student learning more than traditional lecture environments. All signs are pointing to flipped learning as an emerging normative practice in K-12 and higher education. We owe it to ourselves professionally, and to our students, to embrace flipped learning and build it into our teaching.

Postscript: Some questions we did not answer in this workbook

There are many things not addressed in this workbook, but which you should think about and plan for. Some of those are addressed by the questions below.

- How are you going to deploy your materials? Through a LMS, a website, paper handouts, etc.?
- Are you going to grade any of the activities that you've made up here? If so, how?
- How will you handle issues involving access to technology? (For example, will you require all students to have 24/7 access to a high speed internet connection – and what if a student doesn't have that?)
- What plan do you have in place if a student arrives at class having not engaged in any meaningful way with the pre-class activity? What if it's more than just "a" student but a significant group of students?
- What plan do you have in place if a student complains of having to "teach themselves the material"?
- What plan do you have in place if a student complains that you "aren't teaching"? (Or, that the student is "paying tuition to have a teacher" and you are not delivering?)
- Are you going to contact your department head and/or academic dean prior to running a flipped learning designed class?
- Are you going to "flip" an entire class, or just part of one? If just a part, which parts – and why not the others? Also, if you are only partially flipping, then how will you help students to adapt to the two different teaching modalities in your course?

- Are you going to make your own content for the course? If so, will you be doing your own video, your own text, or both of these? What tools will you use? What is your plan for completing the content in a timely way?
- If you are *not* creating your own content, where will you look for curated content, and what will be the basis on which you decide to give a resource to students?
- What plan do you have in place for making your flipped learning materials usable in the long term, so you don't have to rewrite them all the next time you teach the course?
- What plan do you have for sharing your work with others, either in your department or online?
- Are you connected in with a network of colleagues, either in person or online or both, who are also flipping the same class or the same subject? If not, have you considered using Twitter or Google+ to make those connections?