



Steps to Flipping Your Class

The goal of flipping your class is to practice a more student-centered pedagogy, thereby engaging your students in active learning experiences. In the flipped model, instructors structure 6 active learning environments that guide and support students as they work through them individually and collaborative. This is a process of reorganizing and redistributing content-related activities over sequences and cycles of in-class and out-of-class instructional practices and student experiences. In the context, appropriate uses of media and technology can play a valuable role.



Case Study of a Physics Lesson on Sound Intensity

PLAN & PREPARE LESSON

Step 1: Define Content Scope, Learning Objectives, & Instructional Strategies

The success of your flipped class depends on the alignment of what you want your students to accomplish before, during, and after the class.

What is the scope of your topic? Defining scope is important in terms of providing your students relevant and connected content that is not too granular or wide in terms of scope, otherwise students will have difficulty building a mental model and connecting content. Concept maps are useful exercises to help define scope. The biggest challenge is to determine how much of your subject matter can be taught within the time frame (e.g.; semester). Your goal should be to take the galaxy, so to speak, that makes up the breadth of your content and select the only most essential and relevant “constellations” of sub-topics that will make up a lesson. Each lesson should build or connect to the next within the sequence of the learning experience. For your flipped class you should select just one of these small “constellation” of sub-topics to focus the lesson. Think in terms of the amount of time needed to cover



the material and time for the students to really learn it through application. Concept maps are useful exercises to help define scope as well as demarcate clusters of sub-topics that can be turned into digestible lessons.

Defining Scope in Sound Example: A concept map was drawn to define the scope for the lesson on Sound Intensity. According to Mayer (2008), people learn more deeply when the information is broken into manageable and meaningful chunks. To create manageable and meaningful chunks for Sound Intensity it can be segmented into three goals; measurement of the intensity of a sound wave, measurement of intensity in relation to amplitude and distance, and measurement of intensity in decibels.



Scope of Lesson on Sound Intensity Using a Concept Map

How will you contextualize the topic? Set expectations by preparing an explanation of how the new instructional material fits into the overall existing course structure. Students, especially adult learners, want to know why they are doing something, how it fits into the overall learning objectives, and used beyond the class. These explanations, of the process and how the new material fits into the course overall, provide vital contextual information to students.

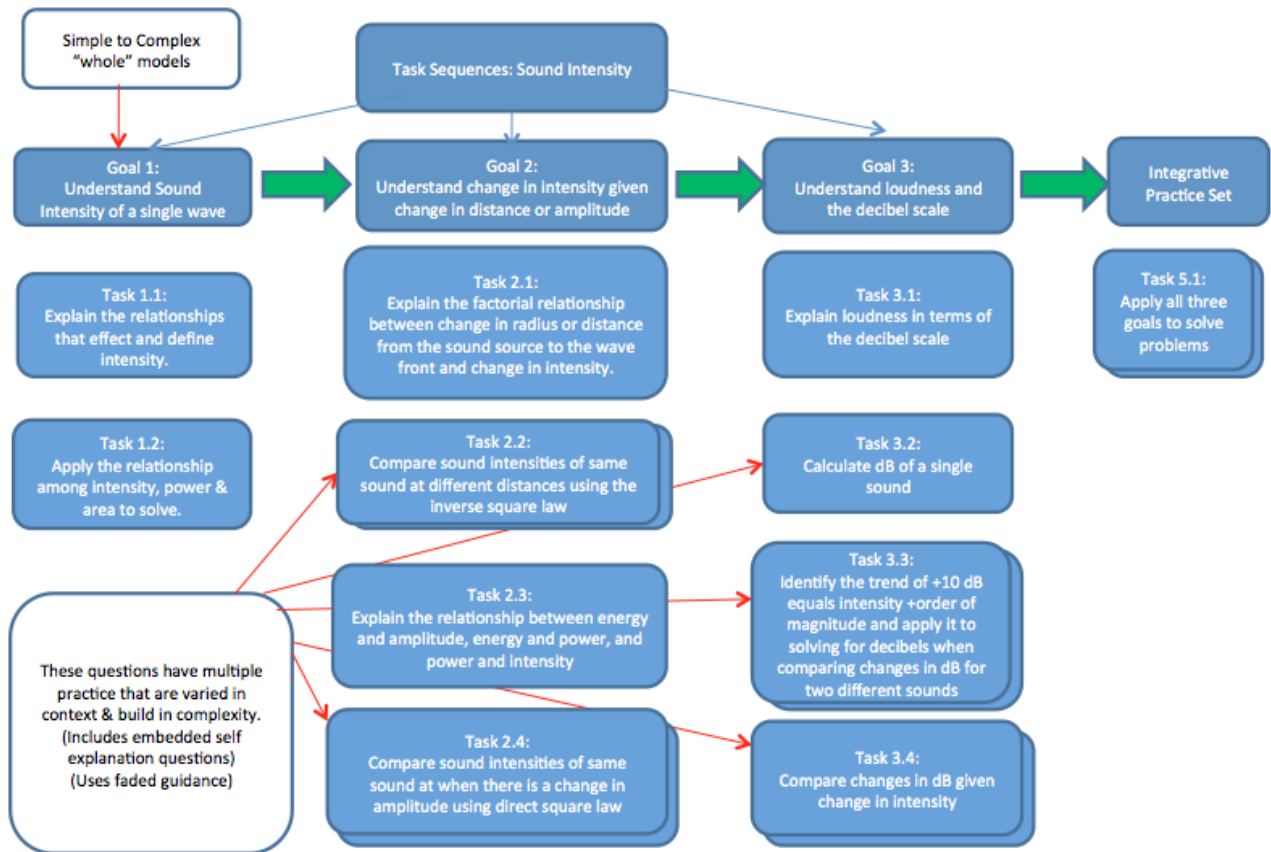
Contextualizing Sound Example: Show students the concept map and how the lesson fits into the overall structure and sequence of the topic on Sound.

How will students use or apply the material? Clearly write the learning objectives and outcomes that align with the activities students will do before, during, and after the class. It is not enough to for



students to just read, listen, watch, and take notes. They need to use it to really learn it. Consult *The Revised Bloom's Taxonomy* for selecting higher order action verbs to help write your learning objectives. What do you want your students to know and be able to do? And how will you assess what they know or can do?

Learning Objectives Sequenced in Sound Example:



How will students meet the learning objectives? Describe the task that matches the learning objective and goals.



Aligning the Goals, Learning Objectives, and Tasks in Sound Intensity Example:

Learning Goal 1: Understand Sound Intensity of a Single Wave

Content Type	Learning Objective	Student Task	Instruction & Learning Format
<p>Facts and Concepts: The intensity of a sound wave is defined as the amount of power of that wave per unit surface area of the wave. $I = P/A$ If the power remains constant why do sounds get softer the farther from the source? What is the relationship between intensity, power, energy, and amplitude at a fixed area?</p> <p>Process/Concept Imagery: What does it look like? How does it work?</p> <p>Principle: $I = P/A$ and $I = P/A$</p>	<p>Students will explain the relationships that affect and define intensity....</p>	<p>...By manipulating the variables power and surface area in a simulation and observing the consequences in terms of intensity. [Task 1.1]</p>	<p>Direct instruction: Video/Animation explaining the concept + knowledge check questions.</p> <p>Interactive instruction: Manipulative Simulation.</p>
<p>Recurring and Non-recurring Procedures:</p> $I = \frac{P \text{ (W)}}{A \text{ (m)}^2} \quad I = \frac{E/T}{4\pi r^2}$	<p>Students will apply the relationships among intensity, power & area to solve...</p>	<p>...By analyze 4 different intensity relationships to find the one with the greatest or least magnitude. [Task 1.2] (Varied & Spaced Practice)</p>	<p>Direct Instruction: Worked Examples. Practice: Problem Solving Questions.</p>

Which instructional approach fits best for the main learning activity? Choose the evidence based instructional approach will fit the main learning activity (i.e.: peer-instruction, team-based learning, case-based learning, process-oriented guided inquiry learning)

Instructional Approach for Sound Intensity Example: The main instructional approach for the Sound Intensity lesson will be **peer-to-peer instruction** while solving problems.



Step 2: Student's gain familiarity with new material before class

What instructional materials and resources will you use for students to familiarize themselves with the content prior to class? Plan and prepare the new instructional materials that students will engage with prior to class. Ask yourself: What is the best way to communicate and present the new instructional material (e.g., video, text, animation, simulation, online multimedia module, or other). Will my students be able to process this content in this format effectively?

Instructional Materials for Sound Intensity Example: Students will watch three animations on sound intensity. Each animation will target one of the three goals. Animations are chosen because of the complex conceptual nature of the content. It is difficult to convey these messages with just text and images. Additionally, worked examples will be provided for students to compare and contrast. Worked examples will be in text format because it will be easier for students to process the entire example. Worked examples will be varied and increase in complexity.

Step 3: Activities that motivate students to prepare before class

What kinds of activities will motivate students and prepare them for class? Refer to the learning objectives and tasks that you outlined in step 1. Ask yourself what incentives or motivation students will have to prepare for class and how you will know students have adequately prepared for the in-class activity.

Pre-class activities for Sound Intensity Example: After viewing the animations, students will answer knowledge check questions after each animation. After studying worked examples students will explain the principles that arise from them. Students will identify an example that is incorrect and explain why it is incorrect. Students will also complete some partially worked examples that cover learning objectives in all three goals. Students will bring to class any questions they have about the concepts to help clarify them.

Step 4: In-class activities that provide students opportunities to deepen understanding

What kind of in-class activities will focus students on attaining on higher-level cognitive abilities? Refer to the learning objectives and tasks that you outlined in step 1. Plan, prepare, and develop in-class activities that focus on higher-level cognitive activities. Will students be working individually in the classroom as you walk around and provide help or in groups to solve the problems or will you solve problems together as a group? The activity you choose will depend on the learning goals and objectives as some activities lend themselves best to certain types of content.

In-class activities for Sound Intensity Example: At start of class instructor will elicit questions from



students based on pre-class activities and provide clarification. Next, students will independently solve full completion problems, post their answers online, and then converse with a peer on their problem-solving strategy. Problems will increase in complexity.

Step 5: Post-class activities that extend student learning

How will students continue the learning experience from the inside class activity to outside of class?

Refer to the learning objectives and tasks that you outlined in step 1. Plan, prepare and develop the continuation of the learning experience from the inside class activity to outside of class individual or collaborative practice. Determine what students should do after the in-class activity to continue learning or bridge to the next topic. We don't learn something very effectively in one instance. Rather we learn through practicing in a diversity of ways over an extended period of time. Think about and plan how often students will need to practice or revise their thinking to really master the material and be successful.

Post-class activities that extend student learning for Sound Intensity Example: Students will continue to solve problems independently or with peers after class. These problems will be more complex.

Step 6: Ongoing Evaluation and Assessment

How will you evaluate student's learning and progress? Evaluation and assessment are ongoing throughout the process. Plan how you will evaluate the effectiveness of the flipped experience and assess student understanding at all stages.

Evaluation and Assessments for Sound Intensity Example: Instructor will review student work and assignment reports prior to class to anticipate any misconceptions or errors that will need to be addressed at start of class. Instructor will answer any questions students have during the main activity. Instructor will walk around the class as students solve problems independently or as they work in pairs in order to make him/herself available for guidance. Instructor will end the class with follow up instruction to any questions that were particularly difficult to answer and provide full expert explanations of problems. Instructor will post additional resources for students to use during the post-class activity and be available for office hours.

The instructor will evaluate him/herself in terms of the effectiveness to communicate complex concepts and explanations based on student results. Instructor will note any areas that still need to be communicated more clearly for future class sessions and iterations thereof.

Ensure that all six of these steps are closely aligned and that they support the learning goals and objectives. Have a colleague or instructional designer review your plan and give you feedback.