

THE FLIPPED LEARNING SERIES

flipped
learning
for
Science
INSTRUCTION

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adaptation is to make a time-shift in the lesson. Shift the direct instruction out of the class space and the independent practice back into the class space. Complex rearrangements of lesson elements are certainly possible in a flipped class. A simple shift in time and space allows a teacher to implement the flipped model even if they are working in an environment that does not allow much flexibility in lesson planning. In the following sections, we will break this down by looking at how to organise a unit, a week and a day.

Flipping a Unit

How does planning a unit change when you implement a flipped model? In many ways, there is no great need to change how you plan a unit. Figure 3.1 is a chart of a unit we used in our chemistry course. We identified each of our learning objectives, tied this with practice and hands-on activities, and created a video. Our assumption is that most science teachers already have a list of objectives similar to this chart. They have some practice activities (we created worksheets) and some hands-on experiments. Most likely, these are in place in most classes, with the exception of the creation of a video. Therefore, the only new thing a teacher needs to do is create a flipped video.

	Objective	Learning Objects	Required Activities
Gases-1	Be able to understand how gases differ from solids and liquids and how gas pressure is measured.	Video 1 Worksheet 1 Text Section 12.1–12.2	
Gases-2	Be able to conceptually and mathematically explain Boyle's Law, Charles's Law, and Gay-Lussac's Law.	Video 2 Worksheet 2 Text Section 12.3	Online Simulation Boyle's Law Lab Charles's Law Lab
Gases-3	Be able to calculate using the Combined Gas Law.	Video 3 Worksheet 3 Text Section 12.3	Take Home Lab
Gases-4	Be able to calculate using the Ideal Gas Law.	Video 4 Worksheet 4 Text Section 12.4	
Gases-5	Be able to conceptually and mathematically explain Dalton's Law of Partial Pressure and Graham's Law of Diffusion.	Video 5 Worksheet 5 Text Section 12.5	Graham's Law Demo
Gases-6	Be able to do gas-stoichiometry where gases are not collected at standard temperature and pressure.	Video 6 Worksheet 6 Text Section 12.5	Gas Stoichiometry Lab
Gases-7	Be able to determine the molar mass of a gas that is collected at non-standard conditions.	Video 7 Worksheet 7 Text Section: Not in Text	

FIGURE 3.1 One of our charts for a chemistry unit on gases.

One benefit of taking this approach is that it presses us as teachers to be very organised with content. The process of writing down objectives and creating or curating appropriate learning objects is a powerful process that teachers should implement regardless of whether they flip. Figure 3.1 is an example of such an organising document. This kind of careful planning helps teachers to be thoughtful about which resources and assessments best fit each objective. This process is also helpful to those who often fly a bit by the seats of their pants – us included! Before we flipped our classes, we often walked in and “taught” what we wanted or just explained what was next in the curriculum. When