

THE INVISIBLE MICROSCOPE

Imagine teaching your biology students how to use a compound microscope without using innumerable variations of "don't touch anything until you have completed the directions", without hearing your name at least 100 times during each class period and without coming perilously close to losing your patience. What follows is a brief description of a method to teach microscope skills that avoids these frustrations - and results in solid learning. This approach to helping your biology students learn to use a compound microscope is called the "The Invisible Microscope".

A. The lesson

1. Introduce the objective of the lesson in any way that piques their desire to use the compound microscope.
2. Have a compound microscope at a lab station where you are positioned. Inform them that the first thing they must do is obtain a microscope and properly carry it to their lab station. Tell them to come over to where you are and get their microscope. It may take a few seconds but with some encouragement, the kids will begin to move over to where you are, thinking perhaps the microscopes they are to use today are hidden in the cabinets.
3. At this point they are all up by the counter with puzzled looks on their faces - the learning begins! You start with some kind of simple admonition, "Your microscopes are right here on the counter. How silly of you. Just get one and properly carry it back to your lab station". Of course, there are no real microscopes, only "invisible microscopes" are available on the counter. The light bulb will go on in the heads of a few students and they will push forward grabbing their invisible microscope. Now that the crowd is beginning to get the idea and are moving to lab stations with their microscopes, you can usually count on at least one character to act like he is tripping or waving his microscope around in the air. The lesson is in full swing!
4. Once they are all at lab stations with their invisible microscopes, we go through all of the motions required to prepare a wet mount and view it successfully on high power. As we move through the motions, all the parts of the microscope and their functions are covered.
5. Some kids will really get into it and will do exactly as you would not want them to do if they were using real microscopes. They act like they are moving the stage up and down, twirling knobs, putting their fingers on the stage, etc. With some classes you may need to prompt a few students, "Josie, I told you not to use the fine adjustment on high power, now look how you have cracked the slide", etc. The point is that the kids' comments, along with a little quick thinking on your feet, will allow you to cover everything they need to know on microscope use.
6. After returning our invisible microscopes to their original location, I ask them to complete a simple fill-in study guide. I check it upon its completion and the study guide is placed in their lab book for future reference.
7. Next they proceed to get a "real" microscope. They make wet mounts, make labeled drawings of their specimen and learn how to measure the size of what they are viewing.

B. Preparations

1. Have an alternative lesson for those students who just cannot let themselves participate in this type of learning. (In my experience, out of 6 classes, I will have a total of no more than three students that need an alternative lesson.)
2. Write a "script" and rehearse once. Make a list of what is most critical for them to know in order to successfully use a compound microscope. Even though I have done this for several years, I still find it helpful to run through it once.
3. Be prepared to feel quite foolish at first. It is worth it. This format, this variation of "hands-on, minds-on", has been successful in helping my students learn how to use a microscope. It has also been great fun.