4B: Classroom Demonstration

Ashley Rhodes, PhD, Teaching Associate Professor, Department of Biology, Kansas State University [00:00:00] The value of visual learning is actually, I think, in our DNA. It's how the first humans attempted to communicate with other humans and it's really been part of our learning ever since. But somewhere we got off track when we went more to a linear, logical model, which doesn't work for most people.

Ashley Rhodes, PhD [00:00:25] Let me give you a little introduction to the heart anatomy. I know you guys have seen a little bit of this in lab, but if we look at the mammalian heart, the human heart, we have this big muscle and we're just going to draw this right into fourths here. And what I want to do is talk about how we can get blood into this heart and out of this heart really, really efficiently to meet the body's demands for oxygen, nutrients.

Ashley Rhodes, PhD [00:00:54] So let's start with our timeline. And I'm talking about seconds. This is all going to happen in under one second. We're going to talk about all the sequences of events that have to happen for one heartbeat in this little, tiny bit of time.

Ashley Rhodes, PhD [00:01:08] A timeline is great because they need to understand this has to happen first and that, that happens next, and then this.

Ashley Rhodes, PhD [00:01:14] Just to recap, we've got rapid filling, reduced filling, and then we have the atria contracting.

Ashley Rhodes, PhD [00:01:19] And so the value of that is just to help organize their thoughts and introduce a complicated topic before we just dive right in and they're sort of taken aback by how much information is associated with this topic.

Ashley Rhodes, PhD [00:01:31] Does blood flow into the ventricle happen passively or actively, for the most part? It is passive, it's very passive. Filling happens before atrial systole. This timeline helps us understand that.

Justin, Student, Kansas State University [00:01:43] Sometimes when you just look at words, you can get steps confused. You don't know if something's occurring concurrently or if it happens before or after. A timeline helps me understand how a process works.

Ashley Rhodes, PhD [00:01:57] The title of this flowchart is Structures of the Heart That Relate to the Cardiac Cycle.

Ashley Rhodes, PhD [00:02:02] I use flowcharts after a timeline because I want them to have a basic concept of chronological order or chronology before we dive into the, more details of all the structures that are related to this chronology.

Ashley Rhodes, PhD [00:02:14] So, what we're going to see first is venous return. So think about blood flow coming back to the left side of the heart. And then, of course, it's going to flow passively through this into the what?

Student [00:02:28] Left ventricle.

Ashley Rhodes, PhD [00:02:30] The ventricle. So we've got blood passively entering. We've got a little bit of blood entering as a result of contraction. We see just the absolute rush of blood into the aorta. If you look at this, we've now added essentially a lot of detail to our timeline. I know this is new information, so it's okay if it's a little cloudy, still trying to help you organize it.

Viji Sathy, PhD, Senior Lecturer, Department of Psychology & Neuroscience, University of North Carolina at Chapel Hill [00:02:51] So you all should have this handout in front of you. It says Guidelines for Choosing the Right Statistical Test. So let's walk through the flowchart and see if we can identify exactly what test is appropriate.

Viji Sathy, PhD [00:03:00] I used a flowchart to show what types of tests would be appropriate to use under which circumstances that we have. Now, the question is, do we have two groups? So are there two disturbance schedules or are there more than two disturbance schedules? More than two. Very good. So we are not going to go down this side of the branch. We're actually going to go this way.

Viji Sathy, PhD [00:03:19] Because of course we could have it listed as it is in the textbook in an, a sort of an outline format. But the branching and really showing where things are related and not related, to me that conveys so much more information than just a simple listing of the topics.

Viji Sathy, PhD [00:03:34] So what type of test would we run in this situation?

Students [00:03:39] One-way ANOVA.

Viji Sathy, PhD [00:03:39] Good. Very good.

Anthony Crider, PhD, Associate Professor, Department of Physics, Elon University [00:03:46] It's time to learn about Pluto and to do that there's something that we do called a concept map. Have you guys ever even done a concept map in another class or heard of it before? No? All right, we're going to start with the easy one. I'll let you pick. Do we want to do Harry Potter or Star Wars?

Students [00:04:02] Harry Potter.

Anthony Crider, PhD [00:04:02] Harry Potter, all right.

Anthony Crider, PhD [00:04:04] I'll usually start with some topic that they already know, like Harry Potter or Star Wars.

Anthony Crider, PhD [00:04:10] We'll start in the center.

Anthony Crider, PhD [00:04:12] In a concept map, you pick your topic of interest and place it at the center and then it branches out from there.

Anthony Crider, PhD [00:04:19] Tell me something you know about Harry Potter.

Student [00:04:21] Hogwarts.

Anthony Crider, PhD [00:04:22] Hogwarts.

Student [00:04:25] Magic.

Anthony Crider, PhD [00:04:28] Magic, all right.

Student [00:04:30] The sorting hat.

Anthony Crider, PhD [00:04:31] The sorting hat, where do we want to put that? Do we want to have that be directly related to Harry, do we want to have it be magic, or do we want to have it be something connected to Hogwarts?

Students [00:04:39] Hogwarts.

Anthony Crider, PhD [00:04:40] All right.

Anthony Crider, PhD [00:04:42] What's interesting about the concept map isn't always what they happen to, to list on it, but the connections that they make between them.

Anthony Crider, PhD [00:04:49] You see how we put together a concept map? You got the idea? I want you to do a concept map. We're going to hand out some paper. And in the center, I want you to put a circle. Write the word "Pluto." And in the next five minutes, write everything in your brain that you know about Pluto. I'm looking for everything that you could possibly think when I say the word "Pluto."

Anthony Crider, PhD [00:05:18] You might have students show up and all they know about Pluto is it's a planet. It's a very quick sort of just-in-time teaching approach to say, how am I going to start our discussion of this topic? I'll do it starting where the students are, not assuming that they're a blank slate.

Anthony Crider, PhD [00:05:34] You came into the class, you may not have known that much or not thought that you knew that much about Pluto. Let's find out what we collectively know about Pluto before we start actually learning more about it, all right.

Anthony Crider, PhD [00:05:47] Small.

Student [00:05:49] Cold.

Anthony Crider, PhD [00:05:49] Cold.

Student [00:05:51] Planet question mark.

Anthony Crider, PhD [00:05:52] Oh, I love that! Planet question mark. In fact, I saw that on more than one person's sheet at more than one table, like, is it a planet, is it not a planet? All right, what were some other pieces that you had in terms of Pluto itself?

Student [00:06:09] Two of us had blue question mark.

Anthony Crider, PhD [00:06:12] Blue question mark. Hmm, that's interesting. There's our introduction to looking at Pluto. We use a concept map to try to figure out what you're thinking. We'll do our lessons on Pluto and we'll do this at the end, after we're done. You will definitely be drawing a different concept by, by the time we're done. We'll definitely have more than just small, cold, and blue?

Paulette S. Reneau, PhD, Assistant Professor, Department of Biological Sciences, Florida A&M University [00:06:38] So I'll be passing out a concept map for you that you, you will need to fill in, okay?

Paulette S. Reneau, PhD [00:06:42] By giving them a partially filled concept map, it gives them a, sort of a blueprint for making and designing a concept map.

Paulette S. Reneau, PhD [00:06:52] Your task will actually be to start looking at how these concepts relate to each other and link to each other in a way that makes sense. Within mitosis, we've got these phases. We've got prophase, metaphase, anaphase, telophase. So when we look at this concept map, we have a basic understanding of what's going on in cell division.

Taylor, Student, Florida A&M University [00:07:15] The more that it connects, I think the more confidence you have about what you learn, that you can put it all together and say, oh, this is, this is what I learned, this makes sense, you know.

Ashley Rhodes, PhD [00:07:23] And I'm going to give you some sample exam questions. These are kind of challenging, but I think you're up for it. I want to see if you can take these exam questions, using your concept map, come up with a pretty quick answer.

Ashley Rhodes, PhD [00:07:33] The more they draw, the better their grade. And whether that's in class, because if the hand is moving, the brain is taking stuff in. I know that that means their mind is actually working and they are able to recall and put the stuff together because it just sticks with them.

Student [00:07:45] When I see a question on an exam, immediately the image from lecture, the image that I drew myself, pops up in my mind and I can see everything in great detail. That is so beyond just helpful because it's not just seeing it, but I've, I've been involved. I've interacted with this flowchart, this process, this timeline.

Ashley Rhodes, PhD [00:08:05] Humans are makers, right? We make. And so if we don't make something with this information, I don't know that it sticks. And so whether that's making a concept map, making a timeline, making a model, making a drawing, all these visual tools come into play to help them make. All we're doing is just channeling the way the human brain has evolved to take in information and use information when we use tools like this.