

Transcript

Episode 136

Deep Elaboration & Other Stories of Teaching Anatomy & Physiology

The A&P Professor Podcast

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Introduction

Kevin Patton (00:01):

Author and lecturer, Helen Keller, who was both blind and deaf once stated, "Blindness separates people from things. Deafness separates people from people."

Aileen Park (00:15):

Welcome to The A&P Professor. A few minutes to focus on teaching human anatomy and physiology with a veteran educator and teaching mentor, your host, Kevin Patton.

Kevin Patton (00:33):

In episode 136, I talk about the effects of tattoos on sweatland hearing diversity, and I spend some time exploring the strategy of deep elaboration.

Tattoos May Impair Sweating

Kevin Patton (00:47):

I ran across an interesting article recently about how tattoos affect our skin. Now, tattoos and skin are something that we think about when we teach and learn A&P. Looking at skin is our first system, usually depending on how our course is organized, and we start thinking about the structure and function of the skin. And since tattoos are a cultural phenomenon that is widespread, a lot of our students have tattoos. A lot of our faculty have tattoos, a lot of the people around us have tattoos. So we think about that. We think about, "Okay. How do these dyes get through the skin? What layers are involved?" It turns out that the dyes generally go mostly into the dermis and from the dermis they can move around a little bit. So tattoos change over time.

(01:40):

So those are the kinds of things we think about, and those are the kinds of things that come up in discussion in a way that engages students. It really gets them interested in learning more about anatomy and physiology because here's something that applies to their life that they can apply to these new concepts that they're learning. It's not just dry information. Who cares about layers of the skin? Well, once you start applying it to things like tattoos and other applications, then it becomes alive. Alive in an intellectual sense so that students really get pulled in. And this article that I ran across talks about the fact that tattoos may negatively impact the sweat glands. When a tattoo is applied. And there are many different ways to apply a tattoo, and I'm including in that also

temporary tattoos, which really don't go down into the dermis, so we have to distinguish that. But the typical deep tattoo that's applied with a needle, there's somewhere around 3000 punctures per minute that are going through the outer layers, the superficial layers of the skin to get that dye down into the deeper layers.

(02:58):

So when you have that mechanical stress and potential for damage, well maybe you're going to get some damage. And there's new research that shows that sweating is impaired. And the implication is that sweat glands are damaged in some way when that tattooing process happens. Now, this is a preliminary study, so further study may show that was a little bit off. That's not really what's happening there. There's really no damage going on, but it seems pretty clear that something's going on and we need to know more about that because it does show, I mean, this preliminary study does show that sweating does decrease in an area of significant tattooing. So theoretically, someone who has many tattoos over their body may have a greater effect of this.

(03:55):

In the reduction of sweat in general for any reason is, and we're going to do a little "WORD DISSECTION" here, is called anhidrosis. Some people pronounce that anhidrosis, but anhidrosis, if we break it apart, an means as we know, not or without or lacking or lacking in. So that's an part. Hidros is sweat. That's from a Greek word, which means sweat. And then osis at the end means a condition. So it's a condition of reduced sweating. And in some cases that can really have an impact on our ability to maintain body temperature as you can imagine. And theoretically, it could lead to a severe condition such as heat exhaustion or heat stroke. And we know that heat stroke in some cases is fatal.

(04:51):

Now, I'm not saying the tattooing is going to kill anybody, but well, I don't know, maybe it feels like it might kill somebody when the tattoos are being applied. But the thing is that it may have a health impact, and we don't know what the health impact is yet. We're just seeing the first glimmer of that. As I say, lots more study needs to be done with that. But I have a link to the research article and a summary article and some other information in the show notes and at the episode page. So check it out and maybe introduce it as a little story or a point of discussion when you're introducing skin in your class.

Sponsored by AAA

Kevin Patton (05:37):

The American Association for Anatomy, often referred to as AAA helps support a professional searchable transcript and a captioned audiogram of this episode. And every episode of this podcast. One of my favorite resources from AAA is their journal for teaching and learning, Anatomy and physiology called Anatomical Sciences Education, otherwise known as ASE. And one of my favorite parts of ASE is the early view. If you go to Anatomical Sciences Education, and I'll have a link in the show notes, just go to the early view part of that main webpage, and you're going to see a long list of early views of recently accepted articles. And that's always fun to browse through and feel like you're ahead of the game. Well, you don't feel like you're ahead of the game, you will be ahead of the game. So once again, Early View at Anatomical Sciences Education.

Aural Diversity. It's a Thing.

Kevin Patton (06:42):

There was a segment on our local public radio not long ago that I found very interesting in a couple of different ways, and I just want to share a couple of things about what they were talking about. And I'll give you the link in the show notes and at the episode page, but it was about something called aural diversity. And when I say aural, I mean A-U-R-A-L, which means pertaining to hearing. And diversity is something that always piques my interest because as all of us are right now in teaching and especially in teaching A&P, we're thinking about the diversity of our students and we're thinking about the variations of the human body and how it functions. So we think about cultural diversity, we think about neurodiversity, we think about diversity of structure and function in the human body. And what we want to do as a group, I think, and certainly me as an individual, I want to be able to reach all the variety, all the different diverse students I have in the universe of students that I am dealing with to help them succeed.

(07:50):

And the more I know about that diversity and the kinds of variations that my students have, the better able I am to give them what they need to succeed. So the diversity part intrigued me, but also the aural part because I'm one of those folks that have a hearing impairment, and I've mentioned that a number of times in this podcast and my blog in other places. And even though my chart says it's a moderate hearing impairment, I feel like it's fairly profound. I mean, it's not as profound as it could be. I realize that a lot of people struggle with even more challenges than I do, but it does affect nearly every aspect of my communication with other people, especially in an aural sense that is

communicating through sound. And that's something that I find as a society, we say that we have a conscious awareness of, but we end up not really paying attention to it.

(08:50):

And if we're not paying attention to it, we really don't help the people that need help or provide them a context in which they can help themselves. So that's what I want to call your attention to. In the article that supports this radio segment that I have linked in the show notes. And at the episode page, there is a chart showing different kinds of aural diversity built by people who study aural diversity. And wow, is it complex? There are all kinds of things that affect our hearing and affect our hearing in different ways and to different degrees. And we're all out there, all these different diverse kinds of hearing we're out there and we're in your classroom and there are at least several of us in every one of your classes. There are a bunch of us at the teachers meetings.

(09:39):

I'm getting ready to go to the next HAPS conference. And I could name names, I'm not going to, but there's me first on the list. First in my mind and nobody else's list but on my list, I'm first, but I could name a whole bunch of other people that have hearing issues. And it's interesting when I bring this up in conversations a lot with my peers, people will tell me, "Yeah, I have that issue too. Where did you get your hearing aids? What brand?" And the statistics shows there are a lot of people in this group of people that have hearing issues, and many of us who don't have hearing issues right now are going to develop them possibly later in life. That's not at all uncommon for that to happen.

(10:30):

So what are some things we can do? Well, there's one strategy that I've mentioned before in a slightly different context, and that is when I was talking about dealing with our peers and our students that wearing masks during the pandemic. And I said, people like me have an even harder time getting along and understanding what's going on because now we can't read lips to serve as an adjunct to our broken listening. And I rely on that pretty heavily, reading lips. So what I was talking about then was if you're speaking to someone in and you're wearing a mask and they ask you to repeat, don't just repeat it again. Because when you repeat something with or without a mask that someone didn't hear, you repeat it the same way. Odds are they're not going to hear it again because whatever it was about the way you said it is going to happen again. And they're going to hear the same parts again, and they're going to ask you to repeat it and repeat it and repeat it. So what we need to do is three things I recommend.

(11:29):

One is when you repeat it, don't repeat it the same way, repeat it louder. Second thing is repeat it more slowly. That does help with distinguishing the different words and word parts. And then the third thing is to announce more clearly. Maybe even exaggerate the pronunciation or the announcement a little bit. So three things. One is repeat it louder. Second one is repeat it slower. Third thing is repeat it with exaggerated announcement. And odds are that'll do it, and you won't have to keep repeating it. But here's something else that I want to share with you. If I still can't hear it because you really haven't done that or you haven't done it sufficiently enough for me to hear it the second time, I will ask you a third time to repeat it a third time. Pardon me? Can you repeat that? So hopefully you'll do that and maybe you'll remember like, "Yeah, okay. I get it. I need to do it even louder this time or enunciate even more exaggerated way this time," but maybe not.

(12:47):

So I ask you again and again, and I've learned that if I don't keep asking, I'm just never going to hear it. You can consider me rude if you want, but I'm going to keep asking if I can't hear it. And that does annoy people. I know it annoys people and that makes me feel bad. That is a common experience among people with hearing impairments is they feel bad because they feel like they're annoying people when they're just trying to understand them. And we're just asking for some help. A lot of times what'll end up happening after a few tries of asking somebody, they'll say, "Nevermind, it's not that important." Or they'll just go on to something else. And what that does is it dismisses me as a listener and it really has a greater effect on me than I'd like it to have.

(13:40):

And I found that that's generally true when that happens, I'm not the only one who feels that way. What it feels like is you're telling me that I'm not important enough to spend that extra little effort with, I'm not important enough to get your idea across to me. I'm not important enough to continue that conversation with, at least in that way or in that part of the conversation. It's not important for me to understand what it is that you're saying. That's not good. If that's a peer or if that's a student. We've just broken down what the whole purpose of having that communication. So I just want to call our attention to it and make it us conscious of that.

(14:25):

And the last thing that I want to mention is just this general idea of thinking about hearing diversity, aural diversity among our students when we do everything. So when we record videos or audios or we're presenting in a classroom, make it loud, make it louder than you think it needs to be, especially for recorded things. If it's really loud,

you can, and this varies with the medium you're in and the devices you're using and so on. But generally speaking, if something is really loud in a video or audio recording, you can almost infinitely dial down the volume to something comfortable. But if it's not very loud in the recording, there's a ceiling at which the turning up the volume just isn't going to do any good anymore, there is a maximum volume there. And if that maximum volume isn't enough for the listener to clearly hear what you're saying, then that medium or media, I should say, that media is useless to them, useless to those students.

(15:40):

And you might say, "Well, I provide captions or I provide a transcript," but do you? Do you provide a transcript or caption that is useful, or do you just let the automatic captioning do its thing? If you're doing automatic captioning or automatic transcription in anatomy physiology, you're not helping much. I'm just telling you, you're not helping much because a lot of those words, words like carbaminohemoglobin... Well, not carbaminohemoglobin, I think that's programmed into any decent automatic transcriber. But there are lots of other terms that get translated or transcribed into some ordinary English phrase that is different than what you intend. And if you don't go back and change that, or you make the extra effort or your institution makes the extra effort of having professionals go through that and make sure that every term is correct and it makes sense, then it's a lot of gibberish. It's not really going to be helping your students very much.

(16:44):

So yeah, you've satisfied some requirement somewhere that you've provided a transcript, but if it's a useless transcript, are you really helping your students? Isn't that almost worse than not providing the transcript. To me as a listener, it feels worse. I use captions on almost everything I watch as far as streaming and television and things like that, because I need that. Sometimes I can't do without it at all. I mean, especially if it's funny sound design in the program that's being streamed, or if there's some difficult accents or unfamiliar accents or something like that, or loud background noise, then I really need those captions.

(17:27):

And if the person is using terminology or phrasing that I'm not familiar with, then I especially need them for that reason too. And you can tell the difference between those that are professionally and carefully done. Those are very helpful, and it's a joy to listen to or watch and listen that programming. But for those that are just generated automatically, it is very frustrating and I often will just turn it off and not go back to it again because it is so frustrating. I don't want to be that teacher. So I am always very careful because I'm very conscious of that. Now, there are probably lots of other things

that I need to be conscious of, other kinds of diversity that I need to be conscious of, and I haven't awakened to that yet. So help me if you have some ideas for things I might be missing. But here's something that you might be missing that I want to share with you.

(18:27):

Wait, wait, wait, before I wrap up, there's one thing that was the point of this public radio segment that I was referring to that I forgot to mention that I think is really intriguing and that is there are scientists who study aural diversity and some of them are working on simulators that simulate what different sound media might sound like to people with different kinds of hearing problems or hearing issues or differences in hearing. They especially focus on one PhD student who's developing one particular simulator. So I think that's a great and a very logical way to approach this issue of hearing or aural diversity so that we can simulate a person with typical hearing can understand the kinds of issues that people with hearing challenges have, what things that sound okay to you, what it sounds like to someone who's having a hard time with it. So you might want to check into that, follow some of those links and listen to some of those things so you can understand what it's like.

(19:43):

Wait, wait, wait, wait. One more time. Sorry about that. But something else that I forgot to mention that I think is very important is I'm asking you to make your educational media loud enough and clear enough for the maximum number of students to benefit from it. But how do you do that? What is some practical solution? And the one that I use that I highly recommend is called Auphonic. It's A-U-P-H-O-N-I-C or auphonic.com. If you go there, there is a free tier that I think you get two hours of processing per month, but the higher tiers are not that expensive and your institution may have access to that or may be willing to pay for your access if you need more hours per month of processing.

(20:36):

But I use this for the podcast and I use it for my educational media as well. And all you do is upload your media file, whether it's a video file or a sound file, and you put it in there. And there's all kinds of little choices that you can make in the form. But one of them is the loudness, and specifically it's what in audio engineering they call LUFS, L-U-F-S and I don't want to get into what that means mainly because I don't know what it means. I mean, I know in general it means an even amount of loudness, not just volume, but it's like the average loudness so that you don't have loud parts and soft parts because boy, that drives you insane when you're hearing impaired in some parts you can hear in other parts you can't, but it can raise up or lower down the average volume of the whole media file. And I set mine at negative 14 LUFS, L-U-F-S.

(21:40):

And if you do that, that works really, really well. It's a little bit louder than some other kinds of media, but it works really great for any media because as I said, you can always turn it down a little bit. So all you do is you upload it, set the LUFs to negative 14 and it'll just crunch in the background. The other thing it does if you check the little box is it'll remove background noise. Well, what I mean by that is noise, noise, not necessarily background music or anything like that, but if there is noise in the background, it will remove all or most of that. And that can be really frustrating for someone with certain kinds of hearing issues as well. Okay, I promise. Very last thing that I'm going to add on the end.

Sponsored by HAPI

Kevin Patton (22:36):

I'm recording this during the first week of the trimester teaching my course in the Master of Science & Human Anatomy and Physiology instruction program, the degree at Northeast College of Health Sciences. And this is an exciting time of the year for me to meet a new cohort of students of many different backgrounds. Some of them have been teaching for a while, some of them are just starting their teaching of human anatomy and physiology. Some are getting ready to teach in the future, and they're all working together and working with me as their mentor to learn the best practices for teaching human anatomy and physiology.

(23:16):

In this course, we're focusing on how to teach the nervous system, which is always a challenge. And we're also at the same time reviewing the important concepts of neurobiology. So it's a combination of a science course and a teaching course. So here's the science. How can we teach that science? How can we get it through to our students? How can we help them succeed in learning it? You want to be part of that? I think you would find it to be very interesting and challenging no matter what your experience is in teaching A&P, you can check it out at northeastcollege.edu/hapi or click the link in the show notes or the episode page.

Deep Elaboration

Kevin Patton (24:03):

My friend Heather Armbruster, who's a regular listener to this podcast recently sent me a training video from Landmark College, and it's about an approach called Deep Elaboration. Now, Landmark College is one of the only accredited colleges in the United States that's designed exclusively for students who learn differently, including students with learning disabilities such as dyslexia, attention deficit hyperactivity disorder, or ADHD and students on the autism spectrum. Now, both Heather and I, like probably you have a strong interest in learning all we can about how to help these challenge students. So that's why she sent it to me and I thought it was intriguing and very helpful to me. So I'm sharing it with you. Now I'd first heard about Landmark College a number of years ago when I found out that a friend of mine taught there and he explained their unique mission to me.

(25:09):

But Heather's communication to me about this training on the deep elaboration approach also alerted me to the Landmark College Institute for Research and Training, otherwise known as LCIRT, which has a whole array of professional development programs. I have a link to it in the show notes and at the episode page. So guess where you're going to be seeing me poking around for a while? Lots of training there for helping challenge students. I'm always interested in strategies to use with neurodiverse learners because, well, it's my view that we're all neurodiverse. I don't think there really is a normal or an average for how we think and learn and remember and apply. So it's no surprise to me that when I apply strategies that have been shown to work with Neurodiverse students, I find that these strategies also work well for all of my students or nearly all of them, no matter where they are in terms of their style or ability or quirks in thinking.

(26:28):

What we want to do as instructors and at really as learners is that we want to make memories stronger. There isn't anything we can do with the concepts of anatomy and physiology unless we can remember them and remember them when we need them. So they have to be strong memories and easily accessed. So what makes a memory stronger? Well, a strong memory is one that is durable and it's flexible, and it's going to involve some desirable difficulty to get that durability and flexibility to, I don't know, we have to throw up some roadblocks and overcome them so that we can really retrieve that information under many different circumstances. If we just take a moment to try and remember it's going to stay in our short-term memory for a brief time, and it's never going to get into our long-term memory, but even when it's in our long-term memory, we need to strengthen it.

(27:32):

So again, it's available when we need it to be available. So again, an aspect of a strong memory is that long-term retention and the ability to retrieve it when we need to retrieve it, and it's also the ability to apply those retrieved memories in diverse situations. So it's not a strong memory if we can't get it out in a way that's actually going to help us and be applicable. So this idea of deep elaboration, what is that? Well, it's been sometimes described as an act of adding more information to existing information to create a more complex emergent whole, a way we can do that, do deep elaboration. How does that work in a practical sense? Well, we ask questions that help ourselves and help students build deep explanations of the core concepts behind whatever it is that we're learning.

(28:39):

And what do we mean by deep when we talk about deep elaboration? Well, means not shallow. That's what deep means. And not shallow elaboration, but deep elaboration. That is we're not just looking at the simple facts, the rote definitions of things. I mean, we need to start there, of course, but when we do deep elaboration, we go deeper than that. That shallow level of simple facts, and we go to the underlying principles and causes. If something is underlying, it must be deep. And I mean by definition, that's the case. So yeah, what is behind those simple facts? What are those underlying principles? What are those core concepts that are behind it? So a way of looking at that would be the why questions. This is so. Well, why is that so? Why does that happen that way? Why is that structure built that way? And I don't mean why in a teleological sense, which is what is the end purpose of it? Because that's usually not very useful in science and certainly not in Anatomy and physiology.

(29:58):

What we're more concerned about are the mechanisms, a mechanistic approach rather than a teleological approach. We're not so interested, or we don't really find the most satisfying explanations in what is the purpose or reason, because there really is no reason. Things do what they do just because they do them, the circumstances that they're in. Enzymes don't break down nutrients because we need nutrients to survive. Enzymes break down nutrients because well, they have the right shape and the right temperature and the right pH, and that's what they do under those circumstances. They're not thinking ahead. They're not trying to benefit us in any way. They're just doing their own thing. So that's a mechanistic approach.

(30:42):

So when I talk about why questions, I'm talking about the mechanisms. Why does this thing happen? Why does the enzyme connect with the substrate? Well, it does that because it has a complimentary shape. It may have complimentary other characteristics such as charges and so on, and the pH is going to affect the shape, the temperature's going to affect the shape and make it more or less able to fit onto its substrate and straight and facilitate whatever chemical reaction that it's going to be facilitating. So what we're doing when we do that is we're trying to find the logic behind why things are so, why are they built that way? Why are they functioning that way? Why do they function differently under different circumstances? So if we ask ourselves and ask our students those questions, then students are going to learn better. They're going to remember better because they know the why behind it. They know why it is so not just that it's so. So it's not simple rote memorization anymore. Now it's thinking more about it.

(32:00):

So what this approach of deep elaboration is asking us to do as either a teacher or a learner, is to stop and look at those simple facts and do that practice of deeper elaboration and think it through and think about how is this happening? Why is this happening? And then when we do that, we're going to remember that fact much better. And not only that, when we do remember it, then we're going to be able to apply it better because we know the ins and outs of it, we know some deep things about it. So in a practical sense, how do we do that? I mean, I think just that simple asking questions about thinking up questions to ask, why questions to ask, and if we do that collaboratively so that maybe we can get our students started with some why questions, why do you suppose the enzyme does what it does in this interaction so we can get it started, but then really promote this among our students and get a discussion going and get them to collaborate with each other and with us on asking more questions.

(33:12):

Well, why does shape affect how it interacts with a substrate? And then that gets us into the idea of complementarity of shape and how things work. And then we can start to think about, well, why does it break apart? And we can start to think about the dynamic aspects of enzymes that they're actually moving and pulling and pushing and so on the substrate, so we can really get very deep. I mean, some people do their PhD on this and never reach the end of the depth of those questions, and we don't need to go that far. But if we go a few layers into it, then when the student remembers something about enzymes, they're not just remembering the rote definition of enzymes and enzyme action. They're thinking about all these things that affect enzymes and why they affect the enzymes. But there are some other practical strategies that we can think about to apply this. I'll be right back with some more ideas about how to apply deep elaboration in our course.

Sponsored by HAPS

Kevin Patton (34:22):

Marketing support for this podcast is provided by HAPS, the Human Anatomy & Physiology Society, and I'm getting ready right now as I record this to go to the upcoming HAPS annual Conference in Albuquerque, New Mexico. I'm really looking forward to this one because I missed the last one. That was the first and only HAPS conference I've missed in over three decades. So yeah, I'm anxious to get back because it's a great conference. If you've never been, I think it's hard to imagine how great it is. And if you're going there, please find me and chat with me a little bit. I'd like to hear some feedback of your experience with this podcast, but I'd also like to just chat with you about teaching A&P. That's what we're all there for. So say hello. Introduce yourself at the upcoming HAPS conference. If you want to know more about the conference or any other aspect of HAPS, just go to theAPprofessor.org/haps.

Deeper Elaboration

Kevin Patton (35:29):

Thinking about the how-to aspect of this deep elaboration, perhaps one thing that we can do is promote among our students what is sometimes called a think aloud process when they're reading their textbook or other material, when they're reviewing that material and when they're studying their material. And that could be their textbook, it could be videos, could be audio, could be their notes, could be activities that they've done and notes they've taken from activities, any of the resources they're using for studying. If they do a think aloud process where they tell themselves or you tell them to stop and think about why enzymes are doing what they're doing and talk it out. That's the think aloud part is that don't just think about that, but actually say it out loud and maybe even I suggest writing it down a little bit or drawing a picture of it where by explaining it out loud or writing it down or drawing a picture, you have to know the ins and outs of it.

(36:40):

When you're thinking about something, it's so easy to fool ourselves and think, oh yeah, I know what's going on there, and then just move on. But it's a challenge to actually say it in words or to write it in words or to draw it in pictures, even if they're just simple stick pictures. At some point we're going to have to stop because there's some aspect we don't yet understand and we need to ask more questions. By doing that extra step of doing something concrete like saying it out loud or writing it out or drawing it, is going

to force us to face where our weakness is in doing that. What we're doing then is self explanation. We're creating an explanation for ourselves.

(37:24):

And as we do that, if we can look for connections that is connections with other concepts that we've learned about, that's really going to help a lot. That's going to help us answer those why questions, not only for that particular idea that we're thinking about or that fact or concept that we're thinking about, but it's going to help us in the future because we're going to practice making those connections, but it's going to connect a new thing to our framework of knowledge. By doing that particular exercise right then and there, we've now just added to our conceptual framework, and now the next time we're looking at maybe a different concept, we already have this conceptual framework that we can call upon, say, "Well, is there anything there that we can connect with? Look, yes, there is."

(38:17):

We've learned about the fact that shape is important in biochemistry, and here it is again, shape is important in biochemistry. And then once we learn about enzymes, boy, there's all kinds of connections to other things, isn't there in both anatomy and physiology. So we're setting ourselves up for making future connections, and we already know some practical strategies that we and our students can use to get that accomplished. Besides the think aloud thing, and actually really an application of it is concept mapping. What are we doing when we do concept mapping? We're drawing a picture of that explanation that we're telling ourselves, that we're making up for ourselves, that we're constructing for ourselves. And not only concept mapping, but running concept lists. And if you're not familiar with the idea of running concept lists, that's something that I've talked about a number of times in past episodes and in my blog and website and all over the place, it's a favorite strategy of mine. So I'll have some links in the show notes and episode page where you can go back and either refresh yourself on that or see it for the first time.

(39:25):

Running concept lists are basically the idea that we keep a notebook and each page has on it, some concept that we've seen come up before. Usually a core concept such as complementarity of shape or the action of enzymes really is a core concept too. So some of those big ideas in anatomy and physiology that just keep coming up again and again and again. Another example would be ATP breaking apart to release energy. ATP being built in order to temporarily store and transfer energy. So you have a ATP page in your notebook, and so you have a running list there. Every time ATP comes up in a story or an explanation, you write it down. And pretty soon you're going to have pages and

pages of ways that ATP does its job in different areas and in different circumstances within human anatomy and physiology.

(40:24):

So you might have a concept list about sodium. How often does sodium come up and play a role in various processes in the body? So yeah, we're going to have a sodium page in our concept list. So I don't want to spend too much time on concept lists, but concept lists or running concept lists, as I usually call them, like concept mapping, are a way to physically do something with that think aloud process. Another thing that we want to do when we're trying to learn how to do deep elaboration, doing it with our students or having them do it among themselves, is asking deep questions. And what I mean by that is questions that intentionally take us deeper than the simple facts. So you can ask all kinds of questions about a fact or an object or AAA structure in the body that don't take us deep at all. I mean, they're just simple questions about simple things.

(41:22):

We want to learn how to ask questions that really get to the why, get to that logic behind why things are the way that they are. Why they're acting the way they are, why they're built the way they are. So that is sometimes called elaborative interrogation, where we ask why this? Why not that? Why is it built this way and why not this other way? Or what if it was built this other way, what would happen then? So that elaborative interrogation is really getting us closer and closer to how it works, how it's built, what are the deep underlying core concepts behind what at first glance seems to be a simple fact. And when we do elaborative interrogation, one of the things we're doing is we're looking for evidence. So why this? And then we come up with an answer. Well, how do we know that? How do we know that that's the why? How do we know that that's the mechanism?

(42:24):

So we always want to have evidence. Is there somewhere that where that's been shown to be the case through scientific investigation? Okay. There's evidence that temperature affects the shape of enzymes, which in turn affects the function of enzymes. Changes in pH affects the shape of enzymes and therefore affects the function of enzymes. So that evidence then is something that we always want to look for. And what does that do that trains our brain to really think in a very scientific way. And that scientific thinking is always going to help us learn more facts and learn them better and learn them more deeply. We want to ask questions that challenge prior assumptions or prior beliefs.

(43:13):

And for me, that's one of the fun things about science is when we take some of these things that we've learned about certain scientific principles or certain scientific facts, and we see some investigator challenge that and say, "You know what? Maybe that's not really the case." Maybe it works some other way, or maybe most people don't have that structure. Maybe we've seen that once or twice and just figured everybody must have that inside their body. And now we're looking to see, no, that's actually uncommon. That's an oddity. It's not something that is part of the usual experience of humans or the usual structure of humans. So we need to build that into our mindset as well. So that's part of deep elaboration.

(44:02):

Now, one key thing that I've hinted at already, but actually I think I stated it directly, so forget the hint part. It was a direct statement that none of this works until the students have a basic preliminary understanding of those concepts. So you have to start somewhere before deep elaboration. You can't start with deep elaboration. Students need to know something no matter how basic or simple it is, you need to start with that. And then once they have that, then they can do the deep elaboration that's going to get them further along.

(44:43):

So some other practical strategies that we can use is some of you're familiar. Maybe you regularly use think, pair, share, where you have students, think about this, ask these questions, and then get together in pairs or maybe threes and discuss this with each other, and then come up with what the answers are, what the explanations are, what some of these deep insights are, and then share that with a larger group. Another practical way of doing it is to go through note revision. And boy, there's lots of different ways to do that, so I don't want to spend a lot of time with that. But take their notes and then go through and then ask those deeper questions, do the deep elaboration and expand your notes by adding more notes. And that could include and should include I think some pictures, maybe some concept maps, maybe some little cartoons, maybe some simple diagrams, maybe add to your running concept lists. That would be a way of doing note revision.

(45:50):

There are multiple strategies that have already been developed that can be applied to this deep elaboration. Now, you and I are already using some of these techniques. I mean, don't all of us do at least some of this stuff, ask these kinds of questions. What this training from Landmark College did for me was to well go deeper to see more clearly why some of those techniques have been working for my students. In other

words, it triggered me to do some deep elaboration of those cases when I have am already doing deep elaboration. I just wasn't calling it that or thinking about it in those exact terms with that exact phrase. By being more conscious of that and thinking more clearly about that, it gives me a clear view of where I want to go to enhance the deep elaboration approach so I can help all my students.

(46:55):

So what I'm encouraging us to do is think about the deep elaboration approach and consider making it part of our usual mode of operation. I know that going forward, I'm going to be thinking about that more. And by thinking about it more, I'm going to be doing it more and finding more and better ways to encourage my students to do that deep elaboration. Because there is evidence that there have been investigations that show that challenged students, students on the autism spectrum, students with dyslexia, have other learning challenges, they benefit. All our students benefit from this deep elaboration. Even if I don't understand all the ins and outs of how it benefits them, I know that it helps me. I know that it helps any one of my students, so I'm going to focus on it.

Staying Connected

Kevin Patton (47:50):

In this episode, we looked at several different topics. We started with looking at how tattoos can perhaps damage sweat glands and therefore interrupt our ability, or at least potentially interrupt our ability to maintain temperature homeostasis in our body by reducing our ability to sweat. That would be especially true in someone who has a lot of surface area of their body that has been tattooed in the traditional way. We also talked about aural diversity and how that might impact how we serve our students, and the fact that there's quite a bit of diversity. And I give you a few tips on some very practical things we can do to increase the efficiency and kindness of our communication with our students, especially those with hearing challenges.

(48:47):

And then we went on to talk about deep elaboration, which is some training looked at from Landmark College who has a whole diverse set of training that you, I encourage you to take a look at it. I'm certainly going to be doing more of it. Deep elaboration is when we take simple facts and either with our students or maybe train our students to do this collaboratively, and that is ask questions. To elaborate and go deeper by elaborating and ask those why questions that are going to show us why things are so, rather than just rote memorization of this is this way and that's that way, but why does it work that way? Why is it built that way? And then we went into some practical

strategies. How do we do that in the classroom? How do we get our students to do it? How can they do that on their own? What are some ways of doing that? Quite a diverse array of things in this episode.

(49:47):

And as always, I have lots of links for you to go dive deeper, to do some deep elaboration on your own. And those are in the show notes in wherever you're listening to audio right now. And if they're not there or you can't access them easily, you can always go to the episode page. And that would be at theAPprofessor.org/136. And 136, of course is the episode number here. But I do want to mention that lately that hasn't been working too good to use that particular URL because I have to set that up to the website. And as I've mentioned in a previous podcast, my website has been having serious hiccups. It's like, I hope it's not terminal hiccups because we need that website, don't we? But I have a whole team of people working on it, but they just keep running into one issue after another. And I think we've all had that a IT experience or educational technology experience, haven't we? Where we think we're fixing one little thing and then all kinds of stuff unravel.

(50:53):

So by the time you hear this, hopefully the website's back-up and running and there's no problem, but maybe not. So just switch to a different audio platform for listening to podcasts. One that I often recommend is listennotes.com. It's all one word .com, and search for The A&P Professor podcast and then find episode 136 or any of the other episodes that you're having difficulty finding on the website if it's still hiccuping a lot or coughing or wheezing or whatever the problem is today. And oh my gosh, it's just one thing after another.

(51:31):

And another thing I want to mention is once you get there, you can claim your digital credential for listening to this episode. It's a digital credential for professional development, and you're always encouraged to call in with your questions, comments, ideas, jokes, whatever you got. Send it to the podcast hotline, and that's at 1-833-LION-DEN or 1-833-546-6336. Or send a recording or written message to podcast@theAPprofessor.org. It was just such feedback that I got from my friend Heather Armbruster, who told us about or told me about the training at Landmark College that got us talking about deep elaboration.

(52:16):

If you can send in your ideas or your questions, and it's always a lot of fun, if you do that in an audio file, maybe run it through our auphonic.com and see how that goes. And remember, you can do it free, so why not try it, play around with it and see how it works for you. But if you send that in, that's always fun for all the listeners when they can actually hear your voice when you're asking a question or sharing a tip or telling a story. I mean, if you got a great story to tell, maybe an inspirational story or a funny story about teaching A&P, we'd love to hear it, and I'm ready for the next one. How about you? I'll see you down the road.

Aileen Park (53:01):

The A&P Professor is hosted by Dr. Kevin Patton, an award-winning professor and textbook author in human anatomy and physiology.

Kevin Patton (53:15):

This episode is freshest of consumed by the date on the carton.