Hello, science teaching friends!

This month’s review will be my first for a YouTube channel. For a while, students didn’t seem interested in YouTube anymore, but my market research (talking to my 16- and 12-year-old) tells me that it is “cool” again, so it seems like a great time to introduce this resource into the column. I discovered the Ninja Nerds while taking a masters-level neuroscience class for my PhD (in science education, but I needed some prereqs), and their explanations of the anatomy of the nervous system blew me away!

The Ninja Nerds are three advanced medical students, who got a little tired and bored with long-winded explanations from science lectures and textbooks, and wanted to combine their teaching, drawing, and entertaining talents to help make these things easier for all. Zach Murphy, the Ninja Nerd you will see on-screen, is a physicians assistant, Kristin Popovice, the whiteboard artist, is a registered nurse and former high school science teacher, and Rob Beach, a physical therapist, is behind all of the video and editing done for the team. They put out one or two videos per week, and have been at this since 2017, so there is a lot of content available.

While there are many content-specific options with Ninja Nerd, I think the best way to use this in your classroom is through integration into your PBL units. One reason for this is that while Ninja Nerd is an excellent video-based lecture for medical students, the videos tend to be longer than what we know are the best practices for high school students of right around 10 minutes per topic. If you did want to focus on a single topic, there are many software packages available (such as EdPuzzle) that you could use to select just a few minutes from a Ninja Nerd lesson, add comprehension questions, and push through your classroom management system.

That can be a lot of work, so instead, using Ninja Nerd as a reference for class projects on body systems, diseases, diagnostic tests, etc., is a wonderful idea. Students who have a great deal of interest in cerebral palsy, for instance, will be more likely to sit through and get something out of more than an hour-long video on the topic than an entire class. The students, who always end up being more creative in developing lessons than I was, could make this a good reference base for their class project, editing the video down for class presentations, or just drawing on the information as a starting point before tackling primary sources on the subject. PBL units on diseases, body

chemistry to anatomy to nursing, and beyond.

If you happen to teach anatomy and physiology, or any other medical-adjacent high school science subject, you are in luck because virtually all of the Ninja Nerd videos could be used in your classroom. Whether you want to try the “flipping” method and replace a lecture with an at-home video watch, need something for the student who missed class the day you introduced the immune system, or just have a student that is way more interested in cardiovascular diseases than you have time to “uncover” in class, Ninja Nerd is perfect for these subjects. If you teach chemistry, there is an entire series of videos on general chemistry.

One of my favorites is Acids and Bases, which goes through the three ways to define acids and bases, which I wish I had been exposed to before I tried (and failed for years) to teach this myself. A few of the chemistry videos are better for AP Chemistry, but most are perfect for general chemistry students. For biology teachers, there are some great videos on cell processes (membrane transport, transcription, translation, etc.) and general concepts in virtually all body systems. Even physics can get in on the fun since ECGs, movement, and blood pressure all depend on physics concepts.
systems, cell mechanisms, genetics, etc. could all begin by sending students to Ninja Nerd before moving on to the much more difficult primary-source or textbook explanations.

Another great way to use these is one of my all-time teaching toolbox go-tos is to “re-make this resource for middle school students!” Research, and years of teaching experience, let us know that if a student can re-teach learned material, then they know it. Having a second challenge makes this more palatable for students as having a purpose for this (other than just a class project grade, which grows less and less motivating by the year, it seems) gives them more reason to work.

The challenge of taking an hour-long Ninja Nerd video on DNA transcription or interpreting an ECG into a 15-minute mini-lesson for middle schoolers can get your student’s synthesis and creative juices flowing. (Bonus points if you can find a middle school teacher who will show the video in their classroom, and double bonus points if you can find a way for your students to see the younger kids’ reactions.) This may sound too simple of an idea to work, but try it and see how it works for you. When I moved my classroom to PBL, these were some of the best projects, especially in classes where rote memorization took too much of a primary role (like anatomy), that I even got bored with the content.

Like any item in your toolbox, though, don’t overuse it. Once or twice a semester is likely all you’ll be able to do with this one, but for certain topics (Punnett Squares, I am looking at you), it can turn something that you never thought you could genuinely make fun into a memorable unit that you will look forward to teaching!

As with all things web-based, a word of caution, YouTube, as I am sure you all know, can be a very dark rabbit hole that we don’t want our kids (or ourselves) going down. And while the Ninja Nerds are definitely what I would consider “safe for all ages,” the reality is that YouTubers make their money through ads, and no matter what you do, or how hard you try, sometimes those ads can be incredibly inappropriate for the content you are attempting to show, so proceed with caution. (I am sure you, too, have cued up a great YouTube video you previewed, wrote a lesson plan around, vetted, and then started in your classroom only to have an ad for male reproductive devices play right before your awesome video on cells. These are the days we hope our administrators don’t walk in and that our kids aren’t really paying attention.) One way to deal with this, especially if you are a Google school or system, is to put the video in your Google Classroom feed, which, according to Google, should remove the ads. You can also try downloading a video and linking it through other classroom apps; this has worked for me about 95% of the time.

As for equity and access, Ninja Nerd offers closed captioning on all of their videos, perfect for students with a hearing difference or just for students who struggle with processing verbal information in general. Because it is YouTube, they will also offer auto-translate. The translation is by no means perfect, and, before offering this resource, you should always talk to your students or ELL specialists about the level of native-language reading capabilities your students have. Other accommodations may be better than just translation, especially in science, where we are asking students to both translate into the native language and learn new terms in both the native language and English simultaneously, which can have a very high cognitive load.

One of my other favorite features of YouTube is the ability to slow down videos; while 0.5 speed is usually too slow and more annoying than helpful, I find that 0.75 is just about right for many students. You’d be surprised by the number of students who don’t know how to use these tools on YouTube, so find a student who does and have them demonstrate on your interactive board before giving the assignment.

I hope you find this resource and the other suggestions helpful, and, if you have time, or interested students, the Ninja Nerd videos on Covid-19 are excellent and helped propel the Ninja Nerds to new heights in 2020. Happy Ninja Nerding!!

Questions/comments/something you love with your students you would like to see reviewed? Contact me at holly.amerman@gmail.com.

ONLINE CONNECTIONS
Ninja Nerd YouTube Channel- https://www.youtube.com/c/NinjaNerdScience
Ninja Nerd Website- https://www.ninjanerd.org/

Test Tubes
- DCIs: 5 of 5 (Too many to list)
- CCs: 3 of 5 (patterns, cause and effect, structure and function)
- SEPs: 5 of 5 (asking questions and defining problems, engaging in argument from evidence, constructing explanations and designing solutions, obtaining, evaluating, and communicating information)
- Ease of Use for Teachers: 4 of 5
- Interest to Students: 4 of 5

www.nsta.org/highschool