Qualifier Question

For my project, this is the qualifier question that I was given:

Your project is focused around using VR/3D animation to show how an organ changes states. Compare and contrast the benefits of using VR for coaching people relating to organ functions, to traditional instructions. What are the measured benefits of using technology to teach? What is lost from the use of technology as opposed to humans?
Is human-less instruction the ideal?

My group decided that instead of using VR, we would end up using Unity to run the graphics and use Visual Studio to write out the logic in C#. As we were researching what benefits a graphical representation can bring versus traditional instructions, studies have shown that humans remember things visually than just by reading something once. Healthcare is a growing field in this day and age and people should be aware of how organs function when certain factors are tweaked such as pharmacological factors, dietary factors and environmental factors. Using 3D animation to show how these organs would change over time would better educate the person on what to avoid, bettering that organ's condition and also be actively involved in his or her healthcare.

'Traditional instructions' used to educate people in organ functions are mostly static, like image guides as well as documents with a huge amount of information, but it does not show how organs change in a dynamic manner. An example of an image of the digestive system is shown below:
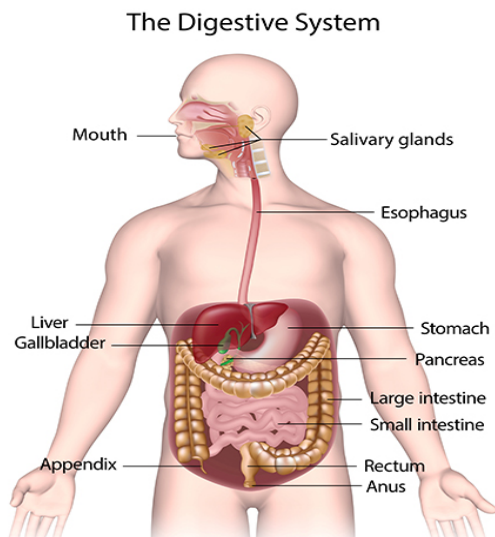

Figure 1. The Digestive System & How it Works. Adapted from National Institute of Health. Retrieved from https://www.niddk.nih.gov/health-information/digestive-diseases/digestive-system-how-it-works. Copyright 2017.

This image, provided by the National Institute of Health, shows each organ that is involved in the digestive system and it provides an explanation such as this: "Bacteria in your GI tract, also called gut flora or microbiome, help with digestion. Parts of your nervous and circulatory systems also help. Working together, nerves, hormones, bacteria, blood, and the organs of your digestive system digest the foods and liquids you eat or drink each day" (NIH 2017). Although this provides instructions on how the food is digested, it does not show it in a dynamic manner, and graphics could be used to better enhance this learning experience. And by eating certain foods, the graphics can change by showing how the stomach's condition will change. Not only does this make it more interactive to the user, but also better facilitates the learning process for the user. Educational theorist John Dewey had established that experiential learning provides the best learning, and VR/graphical simulations can be used to provide that for people (Reynard 2017).

One of the measured benefits for using this technology involves retaining information for a longer period of time. This involves making associations between different factors and how organs change. For example, if someone wanted to know how his or her lungs would change over time by the effects of smoking, this dynamic graphical representation would show how smoking a certain amount would lead to certain lung diseases, and this could be one step in helping a smoker become a non-smoker since the smoker can remember the change of the organ's state as more cigarettes are smoked. Although smokers are aware that smoking is bad for the lungs, it is hard to quit that habit, but when the person sees how the lungs change graphically, that would facilitate in building that connection that more smoking leads to bad lungs and this would help the smoker imagine what is happening to his or her lungs. This is one of many examples that could provide benefits not only in learning how organ states change, but also provide health benefits as the person becomes more educated. Although Oculus has developed an organ simulator called '3D Organon VR Anatomy', it does a great job in educating people about human anatomy but does not show how the organs change over time.

Since time a factor that is limited when a teacher is teaching a student, this technology would allow the person to learn at his or her own pace and in a more interactive manner. If this technology was used in classrooms, it should be used for students to learn at their own pace and then the teacher can go around and answer any questions that the student might have. This can also be used in hospitals for the doctor to educate the patient on how his or her organs can be effected if they follow a certain diet or perform some kind of behavior. Nothing is really lost other than having the instructor teach everything the whole way through. The student would be involved in his or her learning by seeing how organs change and this technology would be user-friendly, providing little to no training and it would be self-guided. The ideal situation would be to have people go through these simulations and then ask their healthcare provider or instructor if they have any questions. It would be like flipping the classroom, where you have people learn through interactive means and the teacher can go around and see if any student has any questions. This way of learning has been used by Khan Academy, and Khan Academy is used in some schools in California as the main way of teaching students while the teacher walks around the classroom to see if the student has any trouble (Schwartz 2014). The students would learn certain topics by a deadline and it also encouraged them to be

independent learners since most learning involves applying oneself to that topic. In hospitals, doctors can use this to better educate their patients and provide them feedback. This technology could be in the hands of people, hospitals and schools that way everyone has access to this since it is run through a computer simulation. Throughout the educational field, graphics have been shown as tables or pictures in books but since technology is now being used in more classrooms, dynamic graphics can be used as one of the ways to teach students how something works. Having every organ simulated in this technology would be ideal, but since there are time constraints we may only be able to do a few and test them out.

References

1. Reynard, R. (2017, April 26). The Impact of Virtual Reality on Learning. Retrieved February 18, 2018, from https://campustechnology.com/Articles/2017/04/26/The-Impact-of-Virtual-Reality-on-Learning.aspx?Page=3
2. NIH. (2017, December 01). Your Digestive System & How it Works. Retrieved February 18, 2018, from https://www.niddk.nih.gov/health-information/digestive-diseases/digestive-system-how-it-works
3. Schwartz, K. (2014, May 6). How Are Teachers and Students Using Khan Academy? Retrieved February 18, 2018, from https://ww2.kqed.org/mindshift/2014/05/06/how-are-teachers-and-students-using-khan-academy/