Improving Nurse Education with VR

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ABSTRACT

The challenge that our team sought to resolve is the fact that nurses and other medical practitioners often have to face heavy fees and hurdles in order to gain hands-on experience and education in the classroom through standardized patients. These paid actors can be expensive and limited, and as a result, we decided to develop an educational video game that focused on promoting healthy practices in the medical field such as being there emotionally for your patients and helping patients prepare themselves for surgery. We decided to do this by developing a visual novel in Unity and including a quiz activity in order to test the knowledge of our players while also providing them instant feedback to help them correct their mistakes and improve their expertise. We aimed to develop and flesh out our game by using our backgrounds in programming in Visual Studio to create features that improved the medical knowledge of our players. Our project was different from past projects because we aimed to include dialogue and an overarching storyline that promoted empathy in medical practitioners, allowing them to emotionally support their patients better in the future.

INTRODUCTION

Currently, standardized patients are one of the current main forms of diagnostic practice that medical students have available to them. Standardized patients are paid actors to act as patients, and while they do show promising results with students scoring high on exams, they do not provide a realistic experience in the field. This is mainly because they cannot exhibit real physical abnormalities such as cysts and diseases that can only be treated through surgery. On the other hand, virtual patients are a form of computer program that can emulate a real patient but digitally. Therefore, they are able to exhibit all types of physical abnormalities that standardized patients cannot. Also, since virtual patients are digital, they are much more accessible and cheap for the students. Furthermore, studies show medical students may actually perform after practicing with VPs rather than SPs. Specifically, a study on sleep apnea showed that students who practiced on VPs correctly diagnosed obstructive sleep apnea about 60% more than students who practiced on SPs (Wendling 2011). On the other hand, current VPs are limited in their abilities to teach their students to empathize with patients because they are digital, but also because many VPs base their 3D models off of the average human, which ends up leading to incorrect expectations of the real world, and can additionally be a detriment to immersion. Another drawback of VPs is that current VPs are lacking in detailed, individualized feedback, which can harm a medical student's perspective on their progress (Seifert 2020). This means that new VPs today should focus on more accurately depicting the real world so that students can learn how to empathize with their patients, and that new VPs should also work on providing better feedback for their students.

OUR APPROACH

Our approach for solving our grand challenge was to create a virtual patient simulation in the form of a visual novel using the Unity game engine along with C# for coding. After a short introduction, the student will be able to select a medical scenario and proceed into the game. Images will be shown as visual aid to indicate what is going on in that particular scenario and quiz questions will be in a multiple choice format. One specific scenario that we decided to implement was one that focused on an appendectomy. This scenario allowed the student to have a dialogue with the virtual patient and learn more about their problem. This virtual patient explained the symptoms that she felt, including a pain moving from the upper abdomen to lower-right abdomen. The quiz question that would appear following this asked the student what tests should be run to help diagnose this patient's condition. The scenario then sped up to the day of the surgery for the appendectomy, and as the patient is in distress due to hunger(from a prescribed 8 hour fast) and fear, the player is tasked with deciding which of four options shouldn't occur prior to the surgery, with the correct response being having a long and emotional discussion with family members. As the scenario progressed to the surgery itself, the student is tasked with deciding which kind of anesthesia would be best for the procedure. Lastly, to conclude the scenario, the student is explained through more dialogue with the patient after the surgery that the procedure only took an hour and that the patient would be free to go after 24 hours. Along with that, the pain is already fading away. The student is tasked with finding out what condition the patient had, with the correct answer being appendicitis. As this question finishes off the scenario, students are shown a screen with their final scores however, students were also able to get instant feedback for every question they encounter. After the simulation, students are able to receive a letter grade based on their performance and get a bird's eye view of all the questions they've come across. We believe our selection of art and music assets that we have gathered has made a huge difference compared to the previous versions, especially in making the environment more friendly and realistic.

Figure 1:Welcome text appears after a student starts the game

Figure 2: Affirmation of a user's correct answer to a quiz question

Figure 3: Nurse should be reliable for patient care

THINGS WE LEARNED

We learned a lot throughout this project. A big thing that we have learned is that nurses that are training in the medical field do not get a risk-free environment when they are training. All their hands on learning is with people's lives in their hands and that can be extremely stressful and may influence the learning aspect. We also learned that there are so many little details that nurses must be aware of when they are checking a patient or preparing that patient for surgery and that it is easy to miss a few things. It is much easier for a nurse to learn the details without having the stress of a real patient right there. Another thing we learned is how many different signs there are to look out for when you are a nurse for a patient. The signs differ based on the condition of the patient so therefore it can be hard to remember which one is correlated to which condition on the spot every time. This way if you have a virtual patient, you don't have the true stress but also you get to learn a lot more signs based on a lot more conditions instead of being there and perhaps only working with 2 different conditions. As you can see, we learned a lot about nursing and the training that nurses get, and we took all that information and used it to help us train nurses in a better way.

CONCLUSION

•Virtual patients are available for repeated practice(Kleinsmith, 2015)
•Virtual patients can be programmed for more cases than a standardized patient can(Kleinsmith, 2015)
•Virtual patients offer an opportunity to practice communication with patients(Kleinsmith, 2015)

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CITATIONS

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