Goal: Using a virtual patient system, assess if the interview and examination questions being asked affect the student’s final performance in decisions making.

We present DDS Detective, a single player networked "serious game" simulation that allows students (users) to interact with a set of standardized virtual patients and develop or improve competences in making clinical decisions. DDS Detective game play mimics real-world patient-doctor interaction during interviews to provide a real-world like experience to help players learn to ask the right questions and make logical decisions.

Background

We have built the DDS Detective game play and interaction to better teach dental students and postgraduate residents interview skills for diagnostic elaboration, incorporating lessons learned from our previous work, where we have used an autonomous virtual patient (AVP) system we created to examine and identify differences between novices and experts in dentistry with cases of Orofacial Pain and Oral Medicine (OFFOM). The actual version of the system started in September 2012, and as for march 2018, there are 846 registered users (8 administrative or guests) that have experienced this didactic tool.

Methods

Subjects were both 4th year DDS students on rotation and postgraduate Orofacial Pain and Oral Medicine residents. Cases used were derived from patients attending this clinic. Users interacted with their virtual patients in four ways: guest mode, training mode, test mode, and retest mode. We examined only test mode encounters from 2016 to 2017 (n=1703). The users decisions scores ranged from 0 to 1.0 (percentage of maximum possible points). Questions were selected by the user from a predefined list. Questions were scored as neutral (2 points) or highly relevant (5 points) producing a questions_score per encounter.

For the analysis we separated the test mode encounters into two subsets based on the value of the decisions_score:

Group 1 (best): decisions_score ≥ 0.75, n = 270

Group 2 (poor): decisions_score ≤ 0.25, n = 54

Results

Spearman correlation analysis comparing questions score and decisions score results in scores of 0.016 for group 1 (p=0.797) and -0.168 for group 2 (p=0.230). The assumption that better performing students are asking better questions is not proven by our data.

Conclusions & Future Work

The purpose of the DDS Detective or Virtual Patient System is to teach the students how to ask the right questions and make logical decisions during a patient’s encounter. Our actual data shows no relation between the quality of the questions and the final student’s performance. To complement this study we have formulated a model considering the previous knowledge of the student, which could influence the way he uses the virtual patient encounter data to make clinical decisions.

We propose the Goldilocks model of student performance that controls for student knowledge. The model characterizes outcomes based on questions and decisions while considering expertise, efficiency and completion of the cases. We plan to include a 50 item MCQ test to measure the student’s knowledge.

To test the proposed model, we need to first establish a passing score for all trials of a case (we have it arbitrarily set at 50% now, but we can change it) so for "too many questions" and we can divide the students into 2 groups (fail and pass). Then we will identify the top 10 questions asked by the passing group, and find the mean number of questions of the passing group (plus 1 s.d.) to find the cutoff "too few questions". Finally, we need to write and collect MCQ data on a logic test and collect new student data.

The assumption that better performing students (users) are asking better questions of their patients is not proven by our data. These data showed no actual correlation between questions scores (gathered information) and performance (diagnostic decisions) for the groups considered, suggesting that knowing the meaning of the answers gathered is the most likely explanation for the group differences.