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Research Paper

An open randomized controlled study comparing an online text-based scenario and a serious game by Belgian and Swiss pharmacy students

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ABSTRACT

Introduction: To compare online learning tools, looped, branch serious game (SG) and linear text-based scenario (TBS), among a sample of Belgian and Swiss pharmacy students.
Methods: Open randomized controlled study. The lesson was based on the case of a benign cough in a healthy child. A randomized sample of 117 students: only the Swiss students had attended a previous lecture on coughs. Participation rate, pre- and post-experience Likert scales and students' clinical knowledge were measured.
Results: Our primary hypothesis was demonstrated: students favored the SG even if navigation was rated as more complex, and students who performed the SG better understood the aim of pharmacist triage in case of cough. The influence of the SG appeared to be linked to the presence of a previous lecture in the curriculum.
Discussion and conclusion: SG and TBS are effective to teach pharmacist triage. Higher SG complexity should be used to teach the aim of pharmacist triage in the case of a specific disease and could be an alternative to simulated patients. A simpler TBS does not require a previous lecture and a debriefing to be fully effective.

Introduction

Serious games (SG) have proven to be valuable tools for pharmacy education; they aim to actively teach students by forcing them to make decisions in contexts that are close to "real life" situations in a protected environment.[1] According to Zyda,[2] a digital SG can be defined as "a mental contest, played with a computer in accordance with specific rules, that uses entertainment, to further government or corporate training, education, health, public policy, and strategic communication objectives". The Université Libre de Bruxelles (Brussels, Belgium) and the University of Geneva (Switzerland) were interested in integrating these tools in the second year master of the pharmacy students' curricula. In both countries, this corresponds to their fifth and last academic year, which consists of lectures and several months of internship in community and in hospital pharmacies. Students in both universities are trained in

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classrooms with simulated patients (i.e., a method "in which actors play the role of patients"[3]) to be prepared to interact with patients. Pharmacist triage and self-care with non-prescription products (called "pharmacist triage" in this article) are specifically taught and must be practiced during their internship. This is the major role of pharmacists with non-prescription products, whereby they assist patients' self-care and triage patients.[4] However, a step is probably missing between the lectures and the training with simulated patients. We experienced that some students are not fully prepared to conduct the patient interview or engage in clinical reasoning. The use of virtual patients in online training (i.e., "a simulated patient, typically generated by a computer software program, and used to simulate realistic clinical scenarios"[3]) was considered as an option to prepare students to interact with simulated patients. Indeed, as mentioned by Jabbur-Lopes et al.,[3] the use of virtual patients "allow[*s*] students to adopt the role of a health care provider in a safe environment where they can develop clinical and communication skills."

Previous studies have shown that students positively evaluated SGs as a "dynamic virtual patient platform that incorporated a branched-narrative, decision-making teaching model," when they only tested such a learning tool.[5] Text-based online methods that feature virtual patients can also be an option, and they are simpler to develop. However, there are few studies that compare SG with traditional simpler text-based methods.[6,7] Hence, we were interested in comparing an SG with a text-based scenario (TBS) to evaluate whether the development of an SG is worth the effort. In addition, most of the previous studies on such learning tools have been performed outside of Europe.[3,8–10] We sought to compare two online training lessons that simulate a case of pharmacist triage (a linear text-based scenario and the type of looped, branch-learning simulation that is integrated in an SG) with students who follow Belgian and Swiss curricula.

Our primary hypothesis was that students would favor an SG compared to a TBS and show a better understanding of pharmacist triage in case of a cough after the SG. Our secondary hypothesis was that Swiss students would better evaluate the SG and the TBS and show a better understanding of pharmacist triage in case of a cough after the SG and the TBS. Indeed, the SG being non-linear is more complex to realize, and the Swiss students had attended a mandatory two-hour lecture on pharmacist triage in a case of infection of the upper respiratory tract (including cough) three months before the study, while the Belgian students did not have a specific lecture on this topic before the study. Our primary objective was to determine whether participation rate and students' post-experiment statements and knowledge were higher in the SG group compared to the TBS group. Our secondary objective was to determine whether differences were observed between the four subgroups (Belgian students – called "no prior lecture students" - in the TBS and SG groups and Swiss students - called "prior lecture students" - in the TBS and SG groups) by exploring their results related to post-experiment statements and knowledge.

Methods

This study was determined to be exempt from board approval by both institutions, in accordance with Belgian and Swiss laws. This was an open double-center, randomized, parallel-group design study that was conducted in French in two universities: one in Brussels (Belgium) and one in Geneva (Switzerland). It was designed to compare pre- and post-experience knowledge and the statements of: 1. students who performed one of the following online lessons: a looped, branch SG vs. a linear TBS and 2. "no prior lecture students" (Belgian students with no previous lecture on triage in case of infection of the upper respiratory tract) vs. "prior lecture students" (Swiss students with previous lecture on triage in case of infection of the upper respiratory tract). Each student was considered to be eligible (no exclusion criterion) and was invited by e-mail (followed by two reminders) to take part on a voluntary basis. They were informed that the results would be anonymously treated and that no one who was involved in their teaching or exams would have access to their participation status or the results. There were 117 participants from among pharmacy students in the second master year, including Belgian (71 / 60.7%) and Swiss (46 / 39.3%) students. To obtain two comparable groups, the students were randomized (Microsoft Excel™ 2007) according to gender and university stratification. Gender was used for stratification because there were more women in both classrooms and because men are more involved in gaming in Europe.[11]

The TBS, access to lessons and questionnaires were generated by a secured learning management system, Moodle™ 2.6.2+ in Belgium and 2.7.2 in Switzerland. This secured learning management system was chosen because both universities used it to give students access to lectures and documents. The SG was developed using an authoring tool (ITyStudio™ 2.6 - A licence of this software costs $350 / year. Prices are available on the website of the company: https://itystudio.com/pricing/) that allows for the simulation of a community pharmacy scenario in 3D: a patient and a pharmacist interact in a community pharmacy environment (Fig. 1). This software, which is compatible with Moodle™, allows for the choosing of avatars, movements and attitudes. These are part of a variety of clickable options (e.g., pre-formatted emotions such as anger, nervousness, and spite). The voice element had to be recorded. The construction of a scenario was based on a map with loops and branches to show each scene that related to the interactive training experience. This software was chosen because no special competencies in information technologies were required for its use. In the present case, the student who developed the SG had no previous experience with similar software. She spent two days practicing with tutorials before developing the SG. This allowed overcoming one of the main barriers to developing an SG and demonstrated that pharmacists can directly develop scenarios.[6]

During the study, the students in both countries were geographically dispersed for their internship: they did not meet to attend lectures. They were asked to refrain from talking about the study or the online lesson and to refrain from sharing their access to Moodle™. Both arms of the study were conducted outside of faculty computer laboratories (e.g., at the students' homes) to replicate the real conditions of use that are planned for such online training. Links to instructions and tutorials on the secured learning management system were sent by e-mail, and e-mail assistance was offered for technical support. Students had access from January 16th, 2015, to February 1st, 2015, to complete the full track of the study that was determined on Moodle™, which included the following steps: 1. sociodemographic data; 2. pre-experience data; 3. lesson (SG or TBS); 4. clinical knowledge test; 5. post-experience