Gamification of Pharmacy Practices: Learning How to Manage Patients the Fun Way

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EXTENDED ABSTRACT

Introduction
The Generation Y students who come into the pharmacy course are not only technology-savvy, but also digitally focused. In fact, these students are also coined as “Generation Cs” due to their “connectedness” with digital technologies (Fox, 2012). A constant challenge exists for our educators to find innovative approaches to sustain their interest in the modules, as well as encourage peer learning, and improve their practice skills. Additionally, the large student numbers (150-175 per cohort) make it a challenge for academic staff to monitor and instruct students on a one-on-one basis. Students’ level of understanding of the lecture content and their competency skills cannot be evaluated satisfactorily. As our students progress through the four years of study, they face the challenge of being able to integrate and apply what they have learnt in these modules to real-life practices. For pharmacy, this is especially important since the lack of these skills can impact patient safety. Game-based learning can provide a more interactive and engaging session as students participate both as a player and work collaboratively to solve various game challenges. Furthermore, virtual patient encounters can enable them to be more self-aware of their strengths and weaknesses, as well as improve their health communication skills.

The undergraduate pharmacy curriculum at our institution will soon be redesigned into a thematic structure which will run longitudinally throughout the 4-year candidature. Besides traditional lectures and tutorials, the pharmacy practice modules have a practical component whereby students are trained to read prescriptions, identify drug-related problems, prepare extemporaneous (i.e. non-commercially available) preparations, dispense medications and counsel patients. Currently, these skills are taught by role-playing and video-taping of sessions. This study describes a novel approach of applying gamification to medication dispensing and patient counseling for pharmacy education. We want to harness the capabilities of 2 upcoming technologies—virtual environments and serious games—for the training of our students, so that they can practice their dispensing and counseling skills anytime and anywhere.

Methodology
A role-playing strategy game simulating various patient encounters will be developed for a whole module. Students will play the game as pharmacist avatars in a futuristic world environment to “save the world”. Throughout the gameplay, students will have to complete a certain number of mini-tasks and “big boss” encounters in which they have to assess patients (automated avatars) through visual and audio cues, as well as dispense medications and counsel them. The patient avatars will then react dynamically to the student pharmacists’ actions.
Gamification Pedagogies

A game simulation, commonly known as a gamesim, is a hybrid which combines the pedagogic value of simulations with the motivational attributes of games (de Freitas and Levene, 2004). Here, we utilize de Freitas’s 4-dimensional (4D) framework for our gamesim as it seems to be the most comprehensive and applicable to our needs (de Freitas and Oliver, 2006) (see Table 1). Context, the first dimension, considers the macro-level and micro-level aspects so as to facilitate learner support. The second dimension focuses on the attributes of the learner and learner group, including background, styles and preferences, so that the gamesim effectively support formal and informal learning processes. Diegesis forms the core of the third dimension to enhance students’ learning during gameplay in the “story world”, as well as enable appreciation of the subject and critical reflection outside gameplay. Tasks and challenges will be designed to suit the knowledge and skills of the student players so that flow experience—the psychological state of being completely absorbed/involved in gameplay—is possible (Csikszentmihalyi, 2008; Kiili, 2006). The last dimension focuses on the pedagogic approaches to support learning practices. Construction of the case scenarios will follow a problem-based learning approach (Azer et al., 2012). The gamesim will also be developed such that students are able to integrate and apply their knowledge and experiences gained during gameplay to new situations in actual practices (Kolb, 1984). Mini-tasks, “big boss” encounters, rewards, feedback and the environments afforded through gameplay will be based on Kaptelinin’s activity theory and Bronfenbrenner’s ecological systems theory so as to maximize students’ interactions and experiences (Kaptelinin and Nardi, 2006; Paquette and Ryan, 2001).

Table 1: Four-dimensional framework applied to the development of the gamesim.

<table>
<thead>
<tr>
<th>Context</th>
<th>Learner specification</th>
<th>Mode of representation (Tools for use)</th>
<th>Pedagogic considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of learning:</td>
<td>Learner/ learner group:</td>
<td>Level of fidelity:</td>
<td>Pedagogic approaches:</td>
</tr>
<tr>
<td>• University and home</td>
<td>• Pharmacy undergrads (Years 1-2)</td>
<td>• High level of fidelity based on use of 3D avatars, virtual patients and virtual pharmacy</td>
<td>• Problem-based Learning</td>
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<td>Level of resources needed:</td>
<td>Learner background:</td>
<td>Level of realism:</td>
<td>• Experiential Learning</td>
</tr>
<tr>
<td>• Low to medium level of resources (Leap Motion at home, gamesim setup with Kinect and Leap Motion in school)</td>
<td>• Students from pre-university and polytechnic/vocational institutes (little/ no pharmacy knowledge)</td>
<td>• Medium to high level of realism in a virtual world whereby students have to dispense and counsel patient avatars on various medications and preparations</td>
<td>• Activity Theory</td>
</tr>
<tr>
<td>Technical support needed:</td>
<td>Learning styles/ preferences:</td>
<td>Level of immersion:</td>
<td>• Ecological Systems Theory</td>
</tr>
<tr>
<td>• Significant supported needed (students need training on how to navigate virtual world)</td>
<td>• Caters towards two learning styles (gesture-based and voice-based)</td>
<td>• Medium when playing individually as the pharmacist</td>
<td></td>
</tr>
<tr>
<td>Link between context and practice:</td>
<td>Collaboration:</td>
<td>Link between gamesim and reflection:</td>
<td>Briefing and debriefing:</td>
</tr>
<tr>
<td>• Health issues and patient encounters in the gamesim will be representative of actual practice settings</td>
<td>• Students work singly and in groups of 9-10</td>
<td>• Made through briefing/ debriefing</td>
<td>• Pre-class preparation and post-activity reflection to reinforce learning outcomes</td>
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<td></td>
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<td>• Pre-game and post-game surveys</td>
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<td></td>
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<td>• Focus groups</td>
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<td>• Reflection journals</td>
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**Evaluation of Learning Outcomes and Student Experiences**

Students’ interest levels, extent of interactivity, peer collaboration, reflections on learning and experiences with the gamesim will be assessed through pre-game and post-game surveys, focus groups, reflection journals and briefings/debriefings. The role of debriefing is critical as it is able to support the learning objectives of the lesson and module (de Freitas and Oliver, 2006). Furthermore, the use of reflection journals has shown to promote the psychosocial competencies of students, and correlate to their academic performances (Lew and Schmidt, 2011; Shek and Wu, 2012). Objective assessments captured during gameplay will be used to evaluate students’ knowledge and skills in communication, dispensing and counseling, as well as their ability to make sound therapeutic decisions.

**Conclusion**

We have described a novel approach of educating pharmacy students through gamification of our pharmacy practice modules in line with a new thematic curriculum that will be developed. This platform is intended to supplement our current teaching methods (i.e. lectures, tutorials and practicals) in anticipation of the increasing student cohort size in the near future. If successful, a library of case scenarios will be created so that it can be scalable towards students at the higher years of the undergraduate pharmacy course, as well as those doing postgraduate studies at our institution.

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**References**


