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# Efficacy and Usability in the Design of a Pharmacy Education Game

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**Abstract.** This study introduces a puzzle game called the ‘Virtual Dispensary’ that was developed to assist in teaching dispensing skills to first year pharmacy students. We describe the key game elements and reports on initial findings from a study of the usability and effectiveness of the game.

**Keywords.** Engagement. Gamification. Pharmacy. Usability. Efficacy.

## 1 Introduction

Throughout history, games have been used to educate, train, inform and distract [1]. As of 2014 there is a groundswell of enthusiasm surrounding the ‘engaging’ nature of computer games and the potential to leverage this engagement for more ‘effective’ education [2]. This motivates a number of research questions around serious games about what is engagement, how to measure effectiveness and the role of usability in ensuring games meet their serious intention.

The game described in this study, the Virtual Dispensary, was developed to assist teaching dispensing skills to first year Pharmacy students. We take an iterative approach to creating the Virtual Dispensary, developing and evaluating game prototypes to ensure we meet the expected educational directions of the serious game and also ensuring that key usability issues that might detract from engagement are identified early in the development process. We report here on some of the key design elements integrated into the game and report on a first usability trial with a representative sample of students. Both the novel domain and the issues uncovered should be of interest to all designers of serious games.

## 2 The Virtual Dispensary

The online Virtual Dispensary provides pharmacy students with an exploratory space that allows the students to practice typical forensic skills related to prescribing medi-

cations. A single play session of the game requires the student to solve a quiz that requires navigating and interaction with elements in a virtual pharmacy. The structure and gameplay of the Virtual Dispensary prototype places the game within the 'puzzle game' genre, as it consists of conceptual reasoning challenges requiring extrinsic knowledge for successful completion [3].

The game world itself is based on a virtual tour created from sixteen, 360° panoramic photographs of a community pharmacy. The functionality of the community pharmacy tour allows students to navigate about the pharmacy and zoom in to examine products in detail. The tour also provides information about the key locations of the pharmacy by way of auditory descriptions and information pop-ups. Players have the task of identifying and verifying prescriptions, which includes checking medication packaging and labels on interactive 3D models situated at typical locations.

### **3 Usability Study**

The subjects for the study were 10 students currently studying the Masters of Pharmacy program at the University of Newcastle. There were six males, and four females. Four of the subjects were under the age of 23, four were between the ages of 24-34 and two were older than 35. Most subjects (n=9) completed the game in less than 30 minutes while one subject played for slightly longer. After completing the game, subjects completed an anonymous survey, containing eleven Likert-scale questions designed to measure the perceived effectiveness and usability (Table 1) of the Virtual Dispensary. Students could also respond to two open questions to identify the features of the Virtual Dispensary they enjoyed the most and to suggest possible improvements.

In terms of effectiveness, all 10 subjects agreed that the Virtual Dispensary provided an effective way of learning about dispensing. For the two questions related to confidence, 12 of the twenty responses agreed that the game improved their confidence about dispensing while five disagreed. Seven of the subjects formed no opinion about whether or not the application stimulated their interest to learn.

When asked to identify the best thing about the Virtual Dispensary, four noted the scripting examples with checking. Three subjects highlighted the realism of the pharmacy environment and three suggesting the interactive products and packing as key elements. A range of improvements were suggested, these focused on providing more content, in particular three subjects requested increasing the number of products and scripts available. Another four subjects wanted more product information to be integrated into the game. Other subjects suggested integrating even more elements of pharmacy practice, such as patient counselling into the game.

According to the feedback, the application of interactive and game elements was perceived to be a fun and effective learning technique, however this is no indication of the effectiveness in terms of learning outcomes. There were some interesting feedback elements, namely that the majority of respondents indicated that the game functions were well integrated. Further development that provides more product infor-

mation and interactive components is the next goal of this research followed by better measure of effectiveness using pre and post testing of student knowledge [4].

**Table 1.** Perceived Effectiveness and Usability Questions and Responses (n=10)

Effectiveness Questions	strongly disagree	disagree	no opinion	agree	strongly agree
Using this type of technology is an effective way of learning about dispensing				5	5
I feel I have gained confidence from learning more about dispensing before my next placement		2	3	4	1
I feel I have gained confidence from learning more about dispensing before my dispensing exam		3		6	1
The Virtual Dispensary Application stimulated my interest to learn		1	7	2	
Usability Questions	strongly disagree	disagree	no opinion	agree	strongly agree
I thought the application was easy to use		1	2	4	3
I thought the application was fun to use			1	7	2
I thought the application was realistic				7	3
I found the different functions in this application were well integrated	1		4	3	2
I imagine that people would learn to use this application very quickly		2		4	4
I thought there was too much inconsistency in the application	1	4	5		
I need more instructions on how to use the application before I am confident to use it effectively	1	3	3	3	

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