INSTRUCTIONAL DESIGN AND ASSESSMENT

A Virtual Practice Environment to Develop Communication Skills in Pharmacy Students

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Objective. To develop communication skills in second-year pharmacy students using a virtual practice environment (VPE) and to assess students' and tutors' (instructors') experiences.

Design. A VPE capable of displaying life-sized photographic and video images and representing a pharmacy setting was constructed. Students viewed prescriptions and practiced role-playing with each other and explored the use of nonverbal communication in patient-pharmacist interactions. The VPE experiences were complemented with lectures, reflective journaling, language and learning support, and objective structured clinical examinations (OSCEs).

Assessment. Most students believed the VPE was a useful teaching resource (87%) and agreed that the video component enabled them to contextualize patient problems (73%). While 45% of students questioned the usefulness of watching the role plays between students after they were video recorded, most (90%) identified improvement in their own communication as a result of participating in the tutorials. Most tutors felt comfortable using the technology. Focus group participants found the modified tutorials more engaging and aesthetically positive than in their previous experience.

Conclusion. The VPE provided an effective context for communication skills development classes.

Keywords: communication, counseling, virtual environment, simulation, pharmacy students, video, tutorials

INTRODUCTION

In most pharmacy colleges and schools across Australia, high school graduates are accepted without assessing their communication skills,¹ yet communication is a core competency of the profession.² Pharmacists are required to have sound communication skills, such as empathy, as well as critical-thinking skills,³ which improve the satisfaction and health outcomes of customers. However, pharmacists' communication skills are generally recognized as inadequate⁴⁻⁷ and require remediation prior to becoming licensed as a practicing pharmacist.

Addressing this issue requires investigation of how communication is taught within undergraduate pharmacy curricula locally and globally. The literature indicates that communication has largely been taught to pharmacy students over the last 20 years using classroom methods.⁸⁻¹⁸ Although lectures are the mainstay of theory-based information transfer, they do not reach the interactive heights and depth of engagement (eg, responsiveness, focus, and attentiveness to the content/task) desired for

this topic and model less-than-optimal communication practices. Lectures on communication are often interspersed with audio or visual examples and complemented with tutorials in which (video recorded) role-playing is used.^{9,15,19-23}

Self- and peer-assessment has been introduced so that students can evaluate the effectiveness of their own or their peers' interactions with patients.^{20,24-26} This has been undertaken for formative and summative assessment purposes, in contrast to an objective structured clinical examination (OSCE), which is most commonly used for summative assessment. A component of an OSCE usually involves students communicating with a simulated patient, ie, "someone who has been trained to portray a character in a scripted case scenario and who is able to consistently deliver a similar performance when interacting with different students."²⁷ OSCEs are best suited to knowledge *and* skills assessment and are a source of excellent feedback but are costly, requiring significant time, teaching staff, and space.

Reflective journaling/writing is also used but to a lesser extent.^{9,12,19,28-30} These journals are an excellent adjunct to the process but are not a complete strategy in themselves. Service-learning is a newer initiative that provides real experiences as a "method of community

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engagement used to prepare students to become competent professionals, medication use specialists, and contribute significantly to the health of society in one of more meaningful roles.”²⁸ In one study, students simulated the life of an actual patient with multiple chronic diseases who was coping with a communication barrier¹² and in another study, students were assigned a family to care for.¹³ However, with service-learning activities, it is difficult for teaching staff to observe and provide more than summary feedback.

Multimedia, asynchronous computer-mediated communication and Web-based environments have commonly focused on a single aspect of communication teaching.^{20,30-32} In one study, participants printed a great deal of material that used up time they could have devoted to group activities and learning.³³ Additionally, while 100% of students in 2010 and 86% of students in 2009 agreed or strongly agreed that an online Pharmacy Communication Tool by Griffith University in Australia engaged their interest and enhanced learning, this resource supported the development of only oral and not written communication skills, and was limited to community-based and simple role-play scenarios.³⁴

Mock pharmacies or dispensary teaching spaces are also used by pharmacy colleges and schools to teach communication and other professional skills. These learning spaces provide a contextual active-learning environment that is “safe” for students (and the public) and are recognized as environments in which students should be able to develop expertise, act and reflect, think and feel, take charge of their own learning, and conversationally learn through interactions with others.³⁵ However, one of the challenges of this approach is maintaining a relevant learning space that keeps pace with the context it is designed to reflect. In the case of the mock pharmacy, this includes changes to the physical layout and structure of pharmacies over time, new technologies, new service development, changing public expectations, ethical challenges surrounding patient confidentiality, and more.

Communication teaching within the second year of the Monash University pharmacy curriculum in Victoria, Australia, has, over several years, involved lectures, tutorials in a mock pharmacy (including video-recorded role-playing and tutor and peer assessment), reflective journaling, language and learning support,³⁶ and OSCEs, potentially addressing the limitations of earlier communication teaching programs. However, there are still inherent limitations, including lack of a holistic approach; use of only 1 or 2 delivery methods rather than the integration of several to cater for students’ different learning styles³⁷; lack of attention given to intercultural training, which is essential for meeting the health and pharmaceutical

care demands of Australia’s rapidly growing and multi-ethnic population³⁸; and lack of scaffolding to suit the communication needs of students at various stages of the curricula.³⁹

While the mock pharmacy environment at Monash University allowed students to practice their skills using facilities such as the counter placed next to the dispensary when counseling a patient regarding a prescription, and had been regularly updated to reflect changing treatment guidelines and social and cultural variations in the community, the dispensary itself was underused because medicines used in the tutorials expired; changed in appearance, strength, or form; became irreplaceable for regulatory reasons; or were taken off the Australian market. Further, the curriculum could no longer be effectively delivered in the mock pharmacy because of the physical layout, insufficient space, expanding technology demands, and lack of professional practice resources. Also, when case scenarios were presented to students during the tutorials, they had to imagine patients’ characteristics and could not observe important aspects, such as body language, which help a pharmacist appropriately communicate with a patient.

The limitations of the mock pharmacy environment suggested the need for a flexible alternative space that could be sustained. The need to renovate the physical space presented an opportune point at which to review the educational content to determine which learning activities needed to be modernized, contextualized, and modified to meet the needs and expectations of a new generation of pharmacy students. The overall aim of this study, therefore, was to develop communication skills classes for second-year pharmacy students and evaluate both students’ and tutors’ experiences related to the classes.

DESIGN

A specialized teaching space called a virtual practice environment (VPE) was designed and constructed from April 2008 to February 2009 using technologies that allowed for life-size photographic and video images to be displayed, so that it was capable of representing any pharmacy setting. A video of a real-life community pharmacy in operation on a regular day was recorded and displayed over 3 screens (each were 10m × 3m) as a “backdrop” in the communication and counseling tutorials (Figure 1). This video with realistic background audio was displayed on the screens occupying about 33% of the wall space as students entered the VPE; during the class when they viewed prescriptions and the instructions outlining what they had to do for each activity; and when they practiced role-playing with each other. Barriers to counseling that usually occur in the community

Figure 1. Image of a community pharmacy used as a backdrop in the Communication and Counseling Tutorials.

pharmacy setting, such as noise, were maintained in the video in order to create a truly immersive environment for students.

The VPE also included other technologies, such as cameras to record class role plays. Thus, VPE activities were viewed by students as a group during the class and saved on removable digital storage devices to enable students to view and reflect on their performance later. With every student table in the VPE equipped with a network port and laptop, each group of students (6 groups with 4 students each) was able to access electronic drug information databases to search for information on the medicines presented in the case scenarios and to prepare a presentation on the medicine allocated to their group.

Two identical VPEs were constructed so that class sizes of 24 each (ie, 48 concurrently) could rotate through the 4 tutorials over a 10-week teaching period. The focus of each tutorial included nonverbal communication, antibiotics, asthma medicines, and antihypertensives. For tutorial 1, a series of theatre sports activities was used to explore the role and use of nonverbal communication in patient-pharmacist interactions. Theatre sports activities are a form of improvisational theatre, which uses the format of a competition for dramatic effect. In this activity, opposing teams perform scenes based on audience suggestions that are then rated by the audience or by a panel of judges. To give students a sense that their role plays were being “watched” by a theatre audience, video of a theatre with an audience filing in was used as the backdrop rather than the community pharmacy video. This was in keeping with the fun nature of the tutorial that had a secondary purpose of helping students get to know each other in a relaxed manner while still learning.

Given that the curriculum was unaltered, the case scenarios delivered in the VPE were exactly the same as those used in the previous mock pharmacy environment. Teaching in the VPE, however, required minor modifications to resources, which were completed between December 2008 and February 2009 and focused on enabling students to visualize and contextualize the material: interactions between “Kate, the pharmacist” and the patients, which were recorded using green-screen technology; the addition of images of patients obtained from stock photos or real-life contacts of the research team with their consent; preparation and photographing of handwritten prescriptions for display on screen; and photographing of the prescription medicines so that they could also be shown on screen.

This collection of authentic resources enhanced the realism of the cases in the setting, allowing students to observe patients’ characteristics and familiarize themselves with a legal prescription and its components, as well as the various prescription medicines. The latter 2 features were thought to be of immense value, especially for students who did not work part-time in a pharmacy. Figure 2 shows how all these aspects blended together when a case scenario was presented to students by the tutor.

Following construction of the VPEs and curriculum redevelopment, the tutorials were delivered from February to May 2009 to approximately 200 students enrolled in the Pharmacists as Communicators second-year pharmacy practice unit in the Monash University Bachelor of Pharmacy curriculum. The tutorials, previously delivered in the mock pharmacy and now in the VPEs, were complemented with lectures, reflective journaling, language and learning support, and OSCEs.

Figure 2. Example of how a case was presented to students in the Communication and Counseling Tutorials 2, 3, and 4.

Practicing pharmacists were recruited as tutors and trained in the operation of the VPE and its state-of-the-art technology. During the four 3-hour tutorials, each comprising a series of scenarios requiring communication-centered responses, tutors were required to manually switch displays between the video and the presentations containing instructions for each activity. Evaluation of the study was approved by the Monash University Human Research Ethics Committee.

EVALUATION AND ASSESSMENT

In designing the evaluation of effectiveness of the communication strategy, a range of empirical and qualitative approaches was considered. The course was designed for high-performing students and had excellent pass rates historically. Comparison of student results in the relevant assessments and course over time would provide little useful information for measuring the effectiveness of the strategy for developing communication skills. Whereas final assessment was previously achieved by an examination, it was subsequently undertaken with OSCEs; thus, comparisons of data could not be drawn. Consequently, the approaches adopted have relied on surveys of students' and tutors' perceptions of the classroom experience.

After students completed the set of 4 tutorials, evaluation of their experience was designed and independently conducted in a large group following a lecture in May 2009 using Keepad (LUL Technology Pty., Limited, Sydney, New South Wales), an electronic audience response system. The survey instrument (available from the corresponding author on request) consisted of 15 unpaired questions on students' perceptions of the curriculum that required responses on a Likert scale ranging from strongly disagree (1) to strongly agree (5), along with 4 questions on their demographic characteristics

that required yes/no answers. Students' responses to the survey instrument were analyzed using summary statistics.

Most students were female (63%, $n=68/108$) and under 24 years of age (88%, $n=96/109$). Just over half (51%, $n=54/106$) worked part time in a community or hospital pharmacy, and the majority (70%, $76/108$) spoke a language other than English at home. Most students "agreed" or "strongly agreed" that the VPE was a suitable place for conducting the tutorials (79%, $n=83/105$) and a useful teaching resource compared with other teaching spaces used in their course to date (87%, $n=78/90$). The majority also considered that the videos between Kate, the pharmacist, and the patient enabled them to contextualize the patient's problem (73%, $n=80/110$), and that the photos of patients and the prescription medicines they took also helped with contextualization (65%, $n=66/101$). While 51% ($n=56/109$) of students did not feel like they were in a "real" community pharmacy when watching the videos and 45% ($n=47/104$) questioned the usefulness of watching the video-recorded role plays between students, only 10% ($n=10/99$) found the technology distracting from the learning experience. Most (90%, $n=92/102$) self-identified improvement in their own communication as a result of participation in the tutorials.

Following the survey, the tutorials were not modified in 2010. However, technological difficulties were encountered by tutors when having to switch between video and the presentations that contained instructions for each activity. These difficulties were a distraction from the learning experience, as students had to wait while the technological issues were being resolved, which in some cases took considerable time (ie, up to 20 minutes).

Consequently, in 2011, video and presentation components were integrated into 1 continuous video for each

tutorial session to provide a seamless experience for both students and tutors. The editing and rendering of the video was undertaken by a professional videographer from storyboards provided by the project leaders. Additional video was recorded to link activities in the non-verbal communication, theatre sports tutorial. Font sizes and colors used in the presentation components were also changed to enhance aesthetic appeal. Survey evaluation of the tutor experience was undertaken in May 2011, with third-year pharmacy students invited to experience the “integrated” tutorials and participate in a focus group in October 2011 to provide feedback relative to their prior experience with the second-year tutorials in 2010.

For the tutors’ evaluation, a questionnaire containing up to 12 items regarding their perceptions of the curriculum was e-mailed to 12 tutors in May 2011. Separate questionnaires were sent to evaluate tutorial 1 (theatre sports) and tutorials 2-4 (antibiotics, asthma medicines and antihypertensives, respectively). For the questionnaire on tutorial 1, 2 responses of a maximum of 6 responses were received, and 6 of 10 possible responses for the questionnaire on tutorials 2, 3, and 4 were returned.

Most tutors felt comfortable and competent delivering the material and found the technology not at all or slightly distracting to themselves or to students. All tutors except 1 were completely confident or mostly confident about the proper functioning of the technology and reported that their confidence grew with continued use. Tutors estimated they spent approximately 10 minutes (range 3-25 minutes) managing the technology in each tutorial.

With respect to tutorial 1, both tutors neither agreed nor disagreed that the theatre setting in the video encouraged student engagement. One tutor commented, “The students did find the theatre setting a bit funny but seemed more engaged when we talked about a real pharmacy setting.” With respect to the relative difference and success of tutorials 2-4 in 2010 and 2011, comments from the tutors included, “This was a much smoother presentation than previous years, as we only had to rely on one computer for the tutorial. . .” and “The content of the tutorials were very similar, however in terms of technology, I believe that this year was definitely an improvement.”

With respect to how the delivery of all 4 tutorials could be improved, 3 tutors indicated the need for marker points at the beginning of each role play that would allow easier transition between scenarios. Marker points are otherwise known as chapter markers, which are time stamps within a movie. They make videos more navigable by allowing easy access to index points throughout the movie. Marker points were included in the tutorials; however, they did not include a list of the

times that each section commenced and its corresponding marker, which would have helped tutors easily navigate to those areas.

Finally, for the focus group with third-year pharmacy students, an invitation to participate was placed in a newsletter distributed to all students by the independent Student Activities Officer. Eight students responded to the invitation and participated in the 1-hour focus group that was facilitated by the project leaders. Immediately prior to the focus group, a condensed version of tutorial 1 (theatre sports) and tutorial 3 (asthma medicines) was delivered by an external tutor over 1 hour so that participants could experience the integrated tutorials and compare them to those from the previous year. Focus group participants reported that the integrated tutorials were entertaining and engaging and more realistic than traditional role-play settings.

Focus group participants also felt that the theatre sports tutorial was entertaining and realistic. While they were somewhat distracted by the images of the audience moving into the theatre, most felt this aspect was not important. With respect to the exercise from tutorial 3, participants reported that the transition into the theater sports tutorial worked well, with no need to refer to the previous tutorial to understand the contents. They agreed that, with the integrated format of the tutorials, the technology was not distracting, in contrast to their previous experience.

In terms of areas for further improvement, suggestions received related to the content of the tutorials rather than to the technology. For example, to enhance student participation in role plays, focus group participants recommended that every student be required to take part in 2 role plays over the entire curriculum. They also suggested that every tutorial commence with a theatre sports activity.

DISCUSSION

This study achieved its aim of contextualizing communication skills development classes for second-year pharmacy students and evaluating students’ and tutors’ experiences by means of the redevelopment and delivery of the classes in the VPE. This use of the VPE was evaluated positively by students and tutors as providing a contemporary, flexible, and meaningful context for tutorial classes for students on communication skills development. It was effective in overcoming the limited opportunity for professional contextualization provided by the earlier mock pharmacy, with better human representation using photographic and video images of patients, as well as better representation of legal prescriptions and prescription medicines.

The VPE did not, however, provide students with the opportunity to practice handling real medicines, although when this was possible in the mock pharmacy, it was associated with problems such as the medicines expiring or becoming tattered in appearance and shape from over-handling. Also, while students who were surveyed believed that the VPE was a useful teaching resource, their responses were relative to their limited experiences with other teaching spaces used in the curriculum and not having experienced the mock pharmacy. The immersive technologies of the VPE assisted in creating context by enhancing visual and aural elements of representative pharmacy environments in a manner difficult to achieve in traditional classrooms. The purpose of teaching in the VPE is not to convince students that they are actually in a pharmacy, as perhaps was the case with the mock pharmacy, but to get them to recognize and react to the salient elements that impact professional activity. The immersive videos create an atmosphere that allows students to appreciate the nature and constraints of the pharmacy environment, develop their communication skills in a risk-free and safe manner, and begin the process of professional acculturation. While just over half (51%) of the students who were surveyed acknowledged that they did not feel like they were in a real community pharmacy, there was strong agreement on the survey questions about contextualization, indicating that such an atmosphere was successfully created. Students clearly were willing to suspend their disbelief and to commit to the representation of reality for the purposes of participating in learning activities.

Consistent with experiential learning theory, VPEs provide capacity to capture and feedback on student learning activities to establish representations of different professional contexts and to facilitate action/reflection and reflection/conceptualization. Student acknowledgement of contextualization confirms the effectiveness of the described approach in terms of experiential learning theory and of the VPEs as effective microsystem learning spaces.³⁵ The VPE as a diverse and flexible learning space provided students with the opportunity to learn by experiencing, reflecting, conceptualizing, and acting within a specific professional context. Some students adopted or preferred 1 learning style over others but were equally able to use experiences in this learning space in ways that satisfied their own needs. While the learning-activity design is also a substantial contributing factor, the flexibility of the VPE to support a variety of learning styles, in part, explains why the majority (90%) of surveyed students identified some self-improvement in communication. The ability of pharmacy students to use *all* these learning styles, however, even if uncomfortable to them,

is necessary (and the earlier this happens in the curriculum the better). Doing so helps them develop as a “whole person”³⁵ and prepares them for a career that requires skill in communicating theoretical and scientific knowledge in ways that can be understood by clients.

The VPE provided the capability to record, save, and replay the students’ role plays. Interestingly, fewer than half (45%) of the students who were surveyed felt that playing back the video recordings of the role plays during the class was a useful form of feedback. Although feedback and self-reflection are critical aspects of communication skill development⁴⁰ and are processes that pharmacists need to continuously engage in throughout their professional life, participating with a group requires sharing trust, and watching replays can be an uncomfortable experience. Some students’ lack of comfort with this activity was reflected in their open-ended comments in a separate unit evaluation conducted by the university in 2009, indicating that they would have preferred that the tutor had acted as the patient in the role plays instead of other students. To improve the opportunity for development through reflection, the design of the video review activity has been revisited to reduce student perceptions of uncomfortable exposure to the class. The video cameras for recording activity in the VPE were not used in 2010-2011 because they were too complicated to operate and were perceived by tutors as a distraction to the teaching and learning experience. In resolving this issue, the systems have been reconfigured so that the video recordings are not played back to students but instead are saved by the tutor to students’ removable digital storage devices at the end of the class. Students are able to reflect individually on their performance in their own time and are still provided with feedback from other students in the class as well as from the tutor, who uses a validated rubric⁴¹ to assess their performance. This feedback is important in ensuring that students receive an accurate assessment of their communication skills rather than relying solely on self-evaluation.²⁶ Other focus group recommendations that have been incorporated include that all students should have at least 2 role plays recorded over the entire curriculum and that prescriptions be presented first, before Kate, the pharmacist, appears on screen.

Redeveloping the tutorials to fit the immersive environment of the VPE required a significant investment. A professional videographer/editor was employed to produce and edit the videos, and the specialized audiovisual specifications of the VPE created technical difficulties that required specialized hardware and software to resolve. This aspect warrants investigation by educators in other pharmacy schools who are considering replacing

mock pharmacies with a VPE. An analysis of the cost of the redevelopment relative to the benefits also should be undertaken and would be best conducted as a scoping exercise prior to redevelopment.

Given the positive evaluation of the VPE in providing a meaningful context for communication skills development classes, the addition of further work contexts, such as a hospital ward and outpatient pharmacy, is now being considered. OSCEs used to assess the unit will continue to provide feedback on the communication skills developed by students.

CONCLUSION

The virtual practice environment was an effective innovation that provided a meaningful space and context for communication skills development classes, enhancing the student experience with positive learning outcomes. Several modifications have been made over 2 years to improve the student and tutor experience in the VPE, resulting in seamless delivery of content and a format that was found to be more engaging and aesthetically positive. However, because these modifications required significant time and staff investment, a cost-benefit analysis prior to the redevelopment of such classes is recommended to other educators in pharmacy colleges and schools considering a similar specialized teaching space.

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