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Developing a Mobile Application: Improving Health Care Students' Ability to Communicate

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DEVELOPING A MOBILE APPLICATION:
Improving Health Care Students' Ability to Communicate

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ABSTRACT

The purpose of this project was to develop, pilot, assess, and describe a new interdisciplinary, game-based phone application. The application is intended to help health care students better communicate medication and medical terminology to their patients and to other health care providers and insurance companies. This IRB-approved project called "Pharm-Phrase" was developed using an application-development software program. The pilot involved multiple groups of competing teams composed of volunteer pharmacy students in their first professional years who were randomly assigned into teams of three to five. The PharmPhrase user explains a randomly generated medical term to team members based on assumptions of medical literacy within the team. If team members do not understand or identify the term, the user must rephrase their explanation in order to win the play. Teams rotate and play until time is up. The application is intended to be an active learning teaching tool to help move students' conceptual knowledge to application in order to better serve the public. Pilot results with pharmacy students demonstrated increased perception of knowledge and an increased ability to adapt communication style to their patients' needs.

KEYWORDS

health care, communication, mobile application, PharmPhrase

BACKGROUND

Health care providers communicate with a variety of individuals who have differing levels of health literacy, including providers in other disciplines, insurance representatives, hospital administrators and staff, patients and their caregivers, and many others (hereafter referred to collectively as "clients"). The ability to quickly adjust language and communication style based on the client's medical literacy is an imperative skill for pharmacists. Effectiveness requires years of practice in multiple settings with various groups of individuals. Ideally, practice opportunities for health care students are provided in a nonthreatening environment, allowing for mistakes without embarrassment or the potential for client harm. Serious gaming, an active learning strategy, is recognized

as one way to provide such experience while emphasizing the importance of the topic (Cain & Piascik, 2015; Devraj, Butler, Gupchup, & Poirier, 2010; Ritterfield, Cody, & Corderer, 2009). We completed a literature search that revealed no reports of an interdisciplinary, game-based, active-learning tool intended to improve health care students' communication skills with various clients.

Pharmacy students receive didactic lectures on patient-centered communication techniques, participate in labs involving simulated patients and health care provider scenarios, and engage in activities requiring unique communication skills while on experiential rotations. These are critical experiences that help us learn how to effectively apply foundational knowledge, but our training could be enhanced by practice opportunities that focus on rapid

assessment of clients' medical literacy. This was our motivation for the creation of our teaching and learning tool.

Our goal is to create a tool that ultimately enhances communication between health care providers and their clients in order to improve public health and services. The specific project objectives were to:

1. develop and pilot an active-learning gaming application for student learning;

2. provide opportunities for students to learn and apply new medical terminology in various contexts that require adjustment of communication language and style; and

3. evaluate the application's perceived effectiveness as a teaching and learning tool.

METHODOLOGY

Our research project received expedited approval from the Purdue Institutional Review Board (IRB). We chose to pilot our application with a convenience sample of differing levels of pharmacy students recruited through email. We searched for volunteers with differences in knowledge and skill levels to ensure diversity of teams. The game was not linked to learning content in any particular course, and it utilized common medical terminology learned in most health care disciplines. Volunteers were asked to attend one of three scheduled opportunities held over a weeklong period. Since the application was only available for download on Android devices, the recruitment email asked those who owned an Android device and who were willing to download the application for use during the game to bring the device to the event. Extra Android devices were available to ensure that at least one person per team had access to the application. The application did not collect personal identifiers and could be deleted or retained for use as a study aid. The benefits and risks to the game, as well as instructions, were explained to those in attendance. Those who agreed to play following the introduction were asked to sign a consent form prior to participation.

Students were placed into groups with varying numbers of participants. Each group was further divided into two opposing teams. Groups were asked to sit in a circle, alternating team members so that each participant sat between opposing team members (Figure 1). The application is similar to the game Catch Phrase, in some respects. In our game, PharmPhrase, participants first choose a medical category. Once the user presses "go" on the application, a medical term is presented on the screen, and the user begins to explain the term. The

Figure 1. A group of pharmacy students in the pilot testing of PharmPhrase.

user was instructed not to use descriptions such as "this term rhymes with" or "we learned this term last week," as this would result in loss of points. Instead, they were required to use their own knowledge and communication skills to help their team members understand and determine the correct medical term or phrase. (See Figure 2.)

While one team plays, an opposing team member in the group keeps score, recording the number of correct and incorrect responses and how many terms are skipped and why. Reasons for skips included: (1) user didn't know the term or how to explain it, (2) team members did not know the term or understand the explanation, or (3) the term was a repeat (a limitation of the application). When a team correctly identifies the term, they pass the phone to the person on their right from the opposing team. That person can then continue play with the next term or choose to skip it if they prefer. The game continues for each team until the application indicates that time is up for that round. The timer is not shown to participants, but the screen turns yellow as a warning when the round is drawing to a close, and then turns red when there are only three seconds left. The phone then vibrates and states, "Time's Up."

After the students used the application for several rounds, they were asked to complete a retrospective pre- and postquestionnaire. This assessment method was selected based on its utility in promoting student reflection on their perceived skills. Participants were asked to rank their agreement with several statements using a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). These statements required students to reflect on the importance of assessing health literacy during conversations, their familiarity with medical terms, and their ability to assess and then adjust their communication as needed. Other

Figure 2. PharmPhrase screens.

information collected included student perceptions on the utility of the application as a study aid, its ease of use, and whether the app was fun and engaging. They were asked to describe specific aspects of the application that they liked and disliked. The demographic questions were analyzed using descriptive statistics, and the results of the scaled items were analyzed using a paired t-test (IBM Statistical Software Version 24).

RESULTS

Thirty-one pharmacy students volunteered for this pilot. The majority of the participants (90%) were female, and most were aged 18–21 years (77%). Of these 31 students, 67% were enrolled in the first-year pharmacy class, with the remainder of students distributed fairly equally between the other three years of the professional pharmacy program. Table 1 shows differences in the students' perceptions of their communication abilities before and after using the application. Table 2 describes student feedback on the utility of PharmPhrase.

REFLECTION AND IMPACT

The initial pilot results imply that the pharmacy curriculum provides students with a solid understanding of the importance in assessing a person's health literacy prior to medical communications. Interestingly, although they recognized the importance, they were more likely to realize that there was room for improvement in their actions

Table 1. Student self-perceptions on health literacy and communication.

Statements ($n = 31$)	Mean Score (SD) Before Using the Application	Mean Score (SD) After Using the Application	P-Value
I understand the importance of assessing a person's health literacy during communication.	3.94 (.77)	3.97 (.75)	0.813
I consider the health literacy level of my audience prior to medical communications.	3.52 (.63)	4.06 (.77)	0.001
I can explain the medical terms/phrases used in this game.	3.55 (1.06)	4.10 (.79)	0.03
I clarify my responses when not understood.	3.87 (.81)	4.19 (.91)	0.016

*Rating scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Table 2. Student feedback on the utility of PharmPhrase.

Statements (*n* = 31)	Mean Score (SD) After Using the Application
PharmPhrase makes learning medical terms easier.	3.90 (.87)
PharmPhrase will help me retain medical definitions.	3.97 (.88)
PharmPhrase is fun and engaging.	4.39 (.56)
PharmPhrase is easy to use.	4.32 (.75)
I would use PharmPhrase as a study tool.	4.00 (.68)
I would recommend Pharm-Phrase to my peers.	4.03 (.75)

*Rating scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

and knowledge after using the app. In addition, they were significantly more likely to consider the health literacy of their audience prior to a medical communication, felt more prepared to explain certain terminology, and were more likely to rephrase or clarify their explanations when they believed they were not understood. Additionally, the students generally agreed that the app made learning easier, was fun and engaging through its competitive design, and would help them retain medication information learned during the game. They were also likely to use it as a study tool and recommend it to friends.

This project originated through a perceived need and resulted in a tangible product. The ultimate goal was to improve patient care by enhancing health care students' knowledge of medical terms and improving their communication techniques. We noticed some patterns related to the academic level of the student participants. For instance, the introductory pharmacy students were more likely to simply regurgitate any information they knew about the term or phrase without even attempting to adjust their language or style based on their audience. In contrast, the advanced pharmacy students seemed more aware of their audience's differences and more skillful in adjusting communication style, but not necessarily the language they used. For instance, they found it difficult to avoid the use of medical acronyms and technical terms during their communications. We hypothesize that these issues are not unique to pharmacy students.

Any health care provider may assume that health care providers from other disciplines generally understand all medical terminology, but the truth is that each discipline tends to use unique terminology and acronyms. A health care provider in one discipline may feel uncomfortable halting a conversation with another to clarify the meaning of an unfamiliar term, leading to miscommunications. Unfortunately, their mutual patient may negatively impacted by this.

As pharmacists, communicating on a daily basis with multiple entities, including patients, family and caregivers, doctors and nurses, insurance companies, and community pharmacy and hospital administrators requires us to quickly assess and adapt our communication techniques to effectively relay important health care information. We view any tool that draws attention to the importance of this issue and helps improve communication skills as a professional success. We believe this app will help move students from conceptual understanding and basic knowledge to application and synthesis. As advanced pharmacy students nearing graduation, we found value in working with our peers to impact their professional skills. We also benefited by learning how to conduct a research project. Most importantly, we learned that students can make a difference by calling attention to needs in their curriculum and volunteering to address them through service and research. We believe our project was a service to the public by facilitating good health care communication.

There were challenges and limitations to our project. Currently the app is only available for use on Android devices, which limits its utility for some students outside of the classroom setting. Additionally, our pilot study involved only a small sample of pharmacy students. Although there was variability among knowledge and skill levels of participants, the application should be further tested with a larger and more variable sample of students. Younger students who had yet to learn about particular disease states such as cardiology and oncology were at times frustrated when asked to describe or determine terms they had yet to encounter in the curriculum. We created this app with the intention that it would be useful in other health care disciplines, and it should be tested for applicability. When combining disciplines, it likely will be of greater use in learning new terminology, but more challenging when explaining terms. Lastly, teams were rewarded for successes and penalized when players used inappropriate communication

techniques, but there was no in-depth evaluation or feedback provided to individual students.

CONCLUSION

Based on our pilot results, we believe PharmPhrase could help health care students in any discipline to improve their communication skills, which was our objective. There may be multiple uses for this application, including laboratory exercises, student organization activities, preparation for disease state competitions, interdisciplinary teamwork, and as a personal study tool. It is simple to use, customizable to a specific course, and has no time constraints.

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REFERENCES

Cain, J., & Piascik, P. (2015). Are serious games a good strategy for pharmacy education? *American Journal of Pharmaceutical Education, 79*(4), Article 47. https://doi.org/10.5688/ajpe79447

Devraj, R., Butler, L. M., Gupchup, G. V., & Poirier, T. I. (2010). Active-learning strategies to develop health literacy knowledge and skills. *American Journal of Pharmaceutical Education, 74*(8), Article 137. https://doi.org/10.5688/aj7408137

Ritterfeld, U., Cody, M., & Vorderer, P. (2009). *Serious games: Mechanisms and effects.* New York, NY: Routledge.

STUDENT AUTHOR BIO SKETCHES

Kiersten Walters and **Ilya Rybakov** are advanced professional students in the Doctor of Pharmacy program at Purdue University, graduating in May 2017. Walters will complete a drug information fellowship sponsored by Purdue University, the Food and Drug Administration, and Eli Lilly. Rybakov will pursue a PGY-1 pharmacy residency at Baptist Health Louisville (Kentucky) in preparation for a career in infectious disease pharmacy and academia.