



Experiences in Teaching and Learning

Pharmacy students' use and perceptions of Apple mobile devices incorporated into a basic health science laboratory



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ABSTRACT

Objective: To describe pharmacy students' use of mobile devices in a basic health science laboratory and to report the students' perceptions on how solving cases with their mobile devices influenced their attitudes, abilities, and view on the use of mobile devices as tools for pharmacists.

Methods: First-year pharmacy students utilized mobile devices to solve clinical case studies in a basic health sciences laboratory. A pre-survey and two post-surveys were administered to assess the students' comfort, awareness, use, and perceptions on the use of their mobile devices and apps.

Results: The pre-survey and first post-survey each had a response rate of 99%, and the second post-survey had a response rate of 100%. In comparing the pre-survey and first post-survey data, there was a statistically significant increase in the number of students that agreed or strongly agreed that they were more comfortable utilizing their mobile device ($p = 0.025$), they were more aware of apps for pharmacists ($p < 0.005$), and they have used more apps that can be useful for pharmacists ($p < 0.005$). The second post-survey demonstrated that over 78% of students agreed or strongly agreed that completing the case studies influenced them to be more comfortable with their mobile devices, to be more aware of apps that can be useful for pharmacists, and to be more agreeable with mobile device utilization by pharmacists in improving patient care. In addition, the second post-survey also demonstrated that 84% of students responded that using their mobile devices to solve the cases influenced them to either use their mobile device in a clinical setting for a clinical and/or pharmacy-related purpose for the first time or to use it more frequently for this purpose.

Conclusions: The use of mobile devices to solve clinical cases in a first-year basic health science laboratory course was perceived as beneficial by students and influenced them to utilize their mobile device even more in a pharmacy practice setting.

Background and purpose

Handheld computers, often referred to as mobile devices, are becoming increasingly incorporated into the assessment, management, and delivery of health care.^{1–3} These mobile devices allow for quick access to health care information and health care-related mobile applications (apps) including disease information, drug information, laboratory references, medical calculators, medical news, and continuing education programs.^{4–7} In particular, the adoption of mobile technology into pharmacy practice is

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viewed as having a strong potential benefit to pharmacists and their patients.^{4,8,9} Some evidence confirms that the majority of pharmacists at various locations already use mobile devices and mobile apps in their practice and view these apps as having an increasingly positive impact on patient care.^{10,11} Pharmacists perceive them as useful for supporting health care education, consulting with patients, verifying orders in patient rounds, assessing experiential students, increasing productivity of practice responsibilities, and improving efficacy in patient care.^{11–13}

In addition to the use in practice settings, mobile devices are also demonstrating increasing use, value, and support in clinical training settings. In a recent study, most hospital neurology residents utilized iPads and perceived them as useful in improving clinical care and were likely to continue using them in the future.¹⁴ The majority of residents and preceptors in a family medicine residency program reported that iPad use made the teaching and learning process more convenient, more engaging, and helpful to achieving learning or teaching goals.¹⁵ Distribution of iPads to medical residents of various specialties at the University of Virginia resulted in the majority reporting that the iPad improved coordination of care and they recommended the universal adoption of iPads among residents and fellows.¹⁶ The iPad mini, although smaller than the iPad, has also been reported to be helpful to clinicians in training by increasing the frequency with which residents in a physical medicine and rehabilitation program were able to complete tasks associated with their training.¹⁷ Almost every preceptor surveyed at a variety of pharmacy practice sites supported the education of pharmacy students on the use of mobile devices and relevant software.¹⁸

Incorporating mobile devices into the early didactic and experiential curriculum of health professions programs can be an important initial step to improving mobile device perceptions, use, expertise, and utility for future clinicians. The year-long use of iPads by medical students resulted in an increase in their use and expertise with mobile technology.¹⁹ Medical students have reported favorable responses to the incorporation of iPads into problem-based learning sessions and to the use of iPads for completing and submitting clerkship assignments.^{20,21} Nursing and midwifery students reported that iPads provided improved access to resources, improved time management, and improved their ability to provide patient education.²² Pharmacy students reported that iPads were appropriate for accessing clinical information and for using pharmacy-related apps.^{23,24} The use of iPads by pharmacy students during practice experiences resulted in the desire to have access to more mobile apps relevant to drug information and patient care.²⁵

Academic institutions should identify ways to incorporate mobile devices into the early curricula of future clinicians, although this integration can have challenges.²⁶ When asked about issues encountered when accessing medical resources on mobile devices, the majority of medical students, medical residents, and medical faculty reported that knowing which resources were available was a barrier.²⁷ Another study showed that the incorporation of iPads into pharmacy courses for note taking and slide annotation was not positively received by the students.^{23,24} Although the incorporation of mobile devices into pharmacy curricula is strongly encouraged, there are few evidence-based publications about the incorporation of mobile devices into pharmacy education.²⁸

In 2009, Shenandoah University began providing first-year pharmacy students with an Apple mobile device (the choice of an iPod Touch, iPhone, or iPad) in addition to an Apple MacBook Pro laptop. The same year, the authors of this paper initiated a pilot program to incorporate the Apple mobile devices into a first-year course they coordinated. The mobile devices were incorporated into the laboratory section of the Integrated Basic Health Sciences course taken by all first-year pharmacy students. The Integrated Basic Health Sciences course covers cell biology, genetics, anatomy, physiology, and pathophysiology. The weekly laboratory portion involves the traditional use of dissections, physiological experiments, microscopy, and anatomical models. The instructors aimed to incorporate the mobile devices the students received from the university in a way that highlighted the present and future clinical utility of these devices. A series of patient case studies directly related to the basic science material being taught were developed that the students would solve using only apps (such as Micromedex, Lexicomp, etc.) and websites (such as cdc.com, drugs.com., etc.) on their Apple mobile devices. The instructors termed this novel laboratory assignment the “iSolve Case Studies.” Further details of the creation, objectives, and implementation of the iSolve Case Studies—including a sample case study—can be found in the 2014 publication by Richard and Bryant.²⁹

An assessment of student experiences and their perceptions with the iSolve Case Studies can also be found in the prior publication by Richard and Bryant.²⁹ The authors administered a single survey to 88 pharmacy students in fall 2012 (Class of 2016) after the students completed several iSolve Case Studies. The results of the study demonstrated that the incorporation of clinical case studies solved with mobile devices was perceived as helpful to pharmacy students in a basic science laboratory to increase their understanding of basic science material and related clinical information. A limitation of this prior study was the lack of a pre-test to be able to know if students’ perception changed after completing iSolve Case Studies. An additional limitation was the absence of survey questions that asked if their comfort, awareness, use, and perceptions about the use of mobile apps and mobile devices for pharmacists were directly influenced by using mobile devices to solve the case studies.

In this follow-up study, a pre-survey and two post-surveys were administered before and after the completion of several iSolve Case Studies, respectively. The objectives of this article are to describe pharmacy students’ use of mobile devices in a basic health science laboratory and to report the students’ perceptions on how solving cases with their mobile devices influenced their attitudes, abilities and view on the use of mobile devices as tools for pharmacists.

Educational activity and setting

Full approval through the university’s Institutional Review Board was obtained before the surveys were administered. This study included 68 first-year pharmacy students in the Class of 2017 enrolled in the Integrated Basic Health Sciences laboratory course in the fall of 2013 and spring of 2014. Half of these students participated in their Introductory Pharmacy Practice Experience (IPPE) in the Fall of 2013 and the other half of the students participated in their IPPE in the spring of 2014. Students selected an iPad or an

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