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Undergraduate use of medical radiation science mobile applications

L.R. Greene*, K.M. Spuur

Charles Sturt University, Faculty of Science, School of Dentistry and Health Sciences, Locked Bag 588, Wagga Wagga, NSW 2678, Australia

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ABSTRACT

Introduction: Despite the technologically intense nature of the medical radiation science (MRS) profession, literature specifically supporting the adoption of mobile learning in MRS education is scarce. To this aim, we explored student utilization of and influences for choosing MRS applications (apps, a specific type of mobile learning) within the Bachelor of Medical Radiation Science course at Charles Sturt University (CSU), Australia. Secondary objectives briefly investigated content reliability within selected chosen apps and overall student willingness to embrace this methodology prior to mainstream integration.

Methods: A mixed-method census survey was delivered to 415 enrolled students using the software Survey Monkey to compile responses to 28 questions. Inclusion criteria included students who owned a smartphone or tablet and who used any apps listed on the survey.

Results: Among the 97 students who completed the survey, 37% (36/97) freely use MRS apps at least weekly (70%, 21/30), of which anatomy atlases were reported as most popular. Peer recommendation influenced 67% (20/30) of students to choose the MRS apps used. Thirty-seven percent (11/30) of students integrated only one method to check the accuracy of app content prior to download. Students who do not use MRS apps (78%, 76/97) stated they were unaware of this resource; however, 91% (80/88) of the respondents indicated they would use MRS apps if incorporated into the curriculum.

Conclusion: The majority of CSU students agreed that apps offer a convenient way to engage in a variety of interactive content both in the classroom and on-the-go, using apps most pertinent to their specific curriculum and/or for revision. Students preferred to use MRS apps if integrated as supplemental study tools vetted by the lecturer.

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Introduction

The evolution from desktop and laptop computers to mobile devices (specifically smartphones and mobile tablets) has been rapid[1] as evidenced by its diffuse penetration worldwide, with smartphone and tablet consumers expected to total almost 2.5-billion[2] and 1.2 billion[3] respectively by 2017. Indeed, the pervasiveness of mobile technology has transformed many aspects of users' personal and professional lives, specifically in communication and social connectivity.[4] The ability to download small computer programs called applications (apps) on both devices further expands end-user capabilities.[4] Digital materials accessed on mobile devices offer advantages over traditional materials (e.g. books, journals, and models), such as greater convenience, accessibility, durability, and portability, both physical and virtual.[1,5,6] The continually expanding social connectedness has far reaching potential, particularly in areas that rely heavily on technological advancements such as medicine and education.

Literature review

Mobile learning and education

A common theme amongst millennial and post-millennial learners (a term that refers to students who turned 18 in or after the year 2000) is a desire to embrace face-to-face classroom methods blended with online-technology activities.[7,8] The umbrella term is typically called blended learning,[7,9] with mobile-learning as a facilitator.[9] As a learning mode, the mobile platform is personalized and interactive, offering younger generations an appealing 'learner-centered' and flexible environment with which to engage in

* Corresponding author. Present address: Stanford University Division of Nuclear Medicine and Molecular Imaging, 300 Pasteur Dr. H2233, Stanford, CA 94305, USA.
E-mail addresses: Lacey.greene@stanford.edu (L.R. Greene), kspuur@csu.edu.au (K.M. Spuur).

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knowledge construction and skill development across many contexts.[10,11] Additionally, the option to fully customize education resources to the needs of the learner supports various student learning styles and offers institutions versatility in selecting applicable content.[1]

The pedagogy of mobile learning

Successful integration of mobile learning into the curriculum occurs when lecturers understand the pedagogy supporting its use. Mobile learning is influenced by students' level of comfort with technology and its perceived value as a learning tool[9] so its effectiveness can be measured when students alter their normal behavior.[9,12] As a result, the pedagogy used to integrate mobile learning is student-focused, personal, interactive, and independent of time or location.[11–13] Pedagogical strategies must also be flexible and dynamic to meet the diverse student needs and to account for the vast selections of platforms and apps, both of which are often rapidly changing. Two examples that illustrate applying this pedagogy are: (1) create a closed-group Facebook page or Twitter feed where students can share ideas and experiences as they work through the year, or (2) use a 3D diagnostic app to illustrate procedures to patients at the point-of care which also reinforces student knowledge before performing the procedure.

Mobile learning and medical radiation science curriculum

Much evidence supports positive student attitudes toward adopting mobile learning across medical, nursing, and dental courses.[5,7,14–24] Literature investigating mobile learning adoption in medical radiation science (MRS) courses however, is scarce[1,24–26] despite the concentrated digital nature of modern MRS technology across many professions such as Radiography, Nuclear Medicine, or Radiation Therapy.[27] Approximately 79% of MRS apps are categorized as teaching (flashcards, revision guides/notes, textbooks, cases, tutorials) or reference (guidelines, cancer staging, radiology positioning guides, protocols, glossaries, calculators, or converters),[28] potentially making apps an excellent conduit to enhance the blended-learning experience while maintaining the authenticity of the profession.[7]

The choice to download: initial identification of MRS apps

Initial identification of apps that best meet both the subject outcomes and the needs of the learner amongst the myriad of choices can be challenging.[1] One study determined MRS students chose to download apps based on a mix of recommendations by radiology residents, the literature, online sources, curriculum, and user reviews in the Apple store.[1] Murfin[29] found that many users downloaded free apps before apps that required payment, though payment or a subscription may be required to access much of the content in most free apps. This can push some populations, such as students who often adhere to a budget, toward placing more weight on cost than content.

Content reliability and accuracy of medical applications in education

Content accuracy is vital with any educational tool. App stores often make it challenging to assess content reliability and/or accuracy when they merely provide customers with app screen shots and a brief description of the app content typically written by an undisclosed author that does not always include a direct link to the developer's website. Apps can be created by independent programmers who may not necessarily be knowledgeable in the content of the app they are creating. When scanning a selection of apps to download, the limited available identifying information makes it unclear whether the app is based on the knowledge of the developer or the most current evidence.[29] User ratings and reviews are typically available for apps, though they often lack validity and reliability as the expertise of the user/reviewer is frequently unknown.[28]

In fact, many studies investigating use of medical apps by the general public have raised concern regarding the validity and reliability of their content,[30–36] Rodrigues, Visvanathan, Murchison, Brady[28] determined that only 44% of MRS app descriptions explicitly noted medical involvement and/or use of published references or guidelines in the development of the app. Some developers do not validate medical apps for content accuracy or reliability, nor are some transparent in the formula(s) used for medical calculations.[37] In the MRS profession, using the correct formula(s) to calculate radiation dose and dosimetry is imperative to achieving the lowest possible radiation exposure in practice. As a result, students with limited knowledge in formal medical education training may have difficulty identifying and subsequently discarding erroneous information.

While MRS apps offer millennial and post-millennial learners an interactive way to immerse themselves in the digital nature of the profession remotely, they also pose potential risks to the novice learner if left invalidated or unregulated. For these reasons, further investigation into voluntary use of MRS apps by undergraduate students is warranted.

Research objectives

To our knowledge, this is the first study investigating voluntary student use of MRS applications at the undergraduate level. The primary aims of this study were to implement a course-wide survey to prospectively explore the current utilization of MRS apps among all students enrolled in the Bachelor of Medical Radiation Science course at Charles Sturt University (CSU), and to determine what influences students to download MRS apps including which apps they were most using. A secondary aim investigated how they established content reliability and accuracy within the app. Finally, we wished to reveal if integration of MRS apps into learning and teaching at CSU was desired by students and should consequently be pursued as an additional method of blended learning within the CSU MRS course.

Methods

Sampling method

A total of 415 students were identified as enrolled in the MRS course at CSU, Wagga Wagga, New South Wales, Australia. This was a census survey using a purposive sampling method. Inclusion criteria included: (1) students who owned a smartphone or tablet and (2) students who used any apps listed in the general and MRS categories found on the survey. Exclusion criteria were determined by the questionnaire design: (1) the participant is <18 years of age.

Methodology

This study employed a mixed-method survey design using the software Survey Monkey (maintained by Spatial Data Analysis Network (SPAN) of CSU, Wagga Wagga, NSW, Australia) to compile anonymous responses to 28 questions. Demographic data including year of enrollment, age group, and specialty were collected. Identification of a participant's chosen specialization was optional as those enrolled in their first year of study may not yet have decided

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