



Surveying the experiences and perceptions of undergraduate nursing students of a flipped classroom approach to increase understanding of drug science and its application to clinical practice



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ARTICLE INFO

Article history:

Accepted 5 September 2015

Keywords:

Blended learning
Pharmacology
Nursing education
Medication administration error
Student experience

ABSTRACT

Patient harm from medication error is a significant issue. Individual failures by health professionals including knowledge deficits and poor communication have been identified as increasing the likelihood of medication administration errors. In Australia, the National Strategy for Quality Use of Medicines in 2002 compels health professionals to have the knowledge and skills to use medicines safely and effectively. This paper examines nursing students' perceptions of the effectiveness of a flipped classroom approach to increase understanding of pharmacology principles and the application of this knowledge to medication practice. An internet-based self-completion questionnaire was used in 2013 ($n = 26$) after the flipped classroom approach was implemented, and pre- ($n = 6$) and post-flipping ($n = 25$) in 2014. Students who engaged with digitally recorded lectures (eLectures) prior to face-to-face workshops stated that they had greater understanding of the subject and enhanced critical thinking skills. The replay function of the eLecture was perceived by some students as most beneficial to independent learning. However, for some students, time constraints meant that they relied on eLectures alone, while others preferred traditional teaching methods. Although limited by sample size and potential participant bias, the results provide insights about the flipped classroom experience from a student perspective.

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Introduction

Patient harm from medication administration error is a significant ethical and public health issue. Medication errors result in poor patient outcomes and increased healthcare costs (Dormann et al., 2013; Handler et al., 2006; Roughead et al., 2013). Medication-related activities in hospital settings account for up to one third of a nurses' workload (Keers et al., 2013) and consequently, medication administration is perceived as a "routine task" (Hewitt et al., 2015, p.17). A task-orientated view of medication administration belies the multifaceted nature of medication related activities and the complex processes required to maintain patient safety and promote patient education (Hewitt et al., 2015; Roughead and Semple, 2009). The Nursing and Midwifery Board of Australia Code of Ethics for Nurses acknowledges that nurses' play a key role in the detection and prevention of errors and adverse events in health care settings and serves to remind the profession of its ethical obligation to "do no harm" (NMBA, 2008).

The National Strategy for the Quality Use of Medicines (2002) provides considerable impetus for health professionals to maintain their knowledge and skills in using medicines safely and effectively. Whilst organisational or system failures have been identified as one factor that contributes to medication administration errors by health professionals (Keers et al., 2013), another important issue is knowledge-deficits (Brady et al., 2009; Del Bueno, 2005; Meechan et al., 2011; Nichols et al., 2008). According to Boggs et al. (1988), nurses know dose, indication and adverse effects of medications but often have insufficient knowledge of how drugs work (pharmacodynamics) and interact with the body (pharmacokinetics). Ndosi and Newell (2008) discuss the need for nurse educators to redesign pharmacology courses to meet the challenges nurses face of administering multiple medications for multiple diseases. Hence, understanding the mechanism of action and drug interactions are an essential component of drug knowledge (Ndosi and Newell, 2008). Previously, nurse educators tended to give this type of knowledge little attention (Morrison-Griffiths et al., 2002) but a move towards collaborative, multidisciplinary approaches to medication management focus on developing knowledge, patient education skills

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and interprofessional communication to enable nurses to deliver safe, high quality care (Leufer and Cleary-Holdforth, 2013; Levett-Jones et al., 2012). The current imperative to provide nurse education via online components is driven by the diverse needs of 21st Century learners. Flipping the classroom means that: (i) what used to be presented in a formal lecture context is now learnt using online resources; and (ii) what was previously designated as homework is now worked on in class with the teacher present and involved in dialogue (Salyers, 2007; Bergmann and Sams, 2012; Kim et al., 2014). A flipped classroom approach can offer flexible delivery of technology-enhanced materials (Chen et al., 2014; Entwistle, 2008; Keppel et al., 2010; Johnston et al., 2013; Gedik et al., 2013; Bloomfield and Jones, 2013; Kim et al., 2014; Sidebotham et al., 2014; Simpson and Richards, 2015). According to Ferreri and O'Connor (2013) teaching approaches that move beyond traditional instruction are the most effective at engaging students and enhancing their learning.

Background

Reason for change

The pharmacology course is offered in second-year of the Bachelor of Nursing Science Degree. It is a theoretical course with no clinical skills component and is designed for undergraduate nursing students to learn foundational pharmacological concepts and their relevance to clinical practice. A strong focus on pharmacokinetic and pharmacodynamic principles within the course content complies with the Australian Health Practitioner Regulation Agency (AHPRA) accreditation standards, which require that nurses understand drug principles underpinning how drugs work and interact with the body.

Based on course evaluations and anonymous feedback from 2008 to 2009, it was apparent that many students found the fundamental pharmacological concepts difficult to understand and struggled to see their relevance to clinical practice. The surveys revealed that when using a conventional lecture format, it was the first time that students were exposed to difficult scientific concepts. In 2010–2011, the course coordinator realised that students were interested in learning about drug science and feedback on the lecturer and lecture content in that topic scored between 4.6 and 4.7 on a 5.0 point Likert scale (1 = very poor; 5.0 = Excellent). However, many students struggled to listen, write and make meaning of new and sometimes technical content in the lecture. The coordinator, in conversation with students, discovered that an inability to grasp new concepts was a source of discouragement, disengagement and frustration. These issues prompted a change to a flipped classroom approach in 2012 with the aim of enhancing students' understanding of pharmacology by inviting them to engage with the scientific concepts on their own, prior to gaining access to the knowledge via the lecturer. The starting point of this study was to gauge the level of understanding that students had been achieving through conventional teaching methods and measure their response to a flipped approach.

Justification for change

This university's strategic plan for 2011–2015 prioritised blended learning in acknowledgement of its world-wide appeal to students. Recent research on the impact in university teaching has focused on blending digital technologies with face-to-face learning using virtual learning environments (VLEs). Lamerias et al. (2012) defined VLEs as the course management systems that support student engagement through the provision of video, audio, weblinks, discussion boards, quizzes and chat rooms.

The literature supports the use of blended teaching approaches in nursing. Web-enhanced learning has benefited clinical skills development in nursing students by providing access to the theoretical principles behind each skill prior to practice sessions in a clinical skills class (Bloomfield and Jones, 2013). Digital lecture recordings have enhanced flexible engagement with anatomy and physiology course work, proving valuable to students as a way to supplement learning experiences of lecture content, laboratory classes and independent learning (Johnston et al., 2013). Within a Bachelor of Midwifery programme, blending face-to-face workshops with interactive online modules concerned with evidence based practice and research has resulted in high levels of student satisfaction and success (Sidebotham et al., 2014). This has also been shown by improvements in laboratory psychomotor skills outside the classroom and higher than average exam scores on final assessment (Salyers, 2007). In addition, blending of lectures with simulation has been effective in improving student satisfaction and self-efficacy in clinical skills education (Sinclair and Ferguson, 2009). Other benefits include increased graduate confidence, psychomotor skills and decision-making (Kerrigan, 2008). When teaching population health and health promotion to nursing students using a flipped classroom, Simpson and Richards (2015) found that students were enthusiastic about flexible delivery and self-paced learning, and faculty staff noted an increased understanding of the relevance of studying population health in the nursing programme.

Aim

The aim of the study was to elicit undergraduate nursing students' responses to a flipped classroom approach in pharmacology lectures and evaluate the impact on their understanding of drug science and its application to clinical practice.

Flipped classroom design

It was proposed that by engaging students in conversations concerning the analysis and synthesis of the lecture content with the lecturer present, it would be possible to focus on knowledge application (Pluta et al., 2013), critical thinking (Simpson and Richards, 2015) and detecting misconceptions (O'Flaherty and Phillips, 2015). Advocates for this approach have recognised that digitally recorded materials alone are not sufficient to benefit learning, rather they represent one component that needs to be integrated into a more holistic approach (Bergmann and Sams, 2012; Tucker, 2012; Chen et al., 2014).

In this flipped classroom design in 2013 and 2014, there were six components that remained consistent in the delivery of the lecture content over the two-year period. The study was designed to make comparisons about students' understanding and measure their responses so the only intentional change in the lecture series was the increased number of students enrolled. The six components were:

1. eLectures: pre-recorded voice-overs of lecture slides were prepared of lecture slides and all eLectures were made available from week one of the semester. The availability enabled students to watch, listen and engage with fundamental concepts at any time before the class;
2. Lecture format: the lectures were prepared such that they clearly stated the learning outcomes for the session; 3–5 quiz questions were written to test student understanding of three main concepts in the eLecture; and a case study was included to generate discussion on how the scientific concept(s) relate to clinical practice. Face-to-face attendance for lectures was not

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