Nursing students collaborating to develop multiple-choice exam revision questions: A student engagement study

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ABSTRACT

Background: Nursing students find bioscience subjects challenging. Bioscience exams pose particular concerns for these students, which may lead to students adopting a surface-approach to learning.
Objectives: To promote student collective understanding of bioscience, improve their confidence for the final exam, and improve deeper understanding of bioscience.
Design: In order to address exam anxiety, and improve student understanding of content, this student engagement project involved nursing students collaborating in small groups to develop multiple-choice questions and answers, which became available to the entire student cohort.
Settings: This study was conducted at two campuses of an Australian university, within a first year bioscience subject as part of the undergraduate nursing programme.
Participants: All students enrolled in the subject were encouraged to attend face-to-face workshops, and collaborate in revision question writing. Online anonymous questionnaires were used to invite student feedback on this initiative; 79 respondents completed this feedback.
Methods: Students collaborated in groups to write revision questions as part of in-class activities. These questions were made available on the student online learning site for revision. An online feedback survey was deployed at the conclusion of all workshops for this subject, with questions rated using a Likert scale.
Results: Participants indicated that they enjoyed the opportunity to collaborate in this activity, and almost all of these respondents used these questions in their exam preparation. There was strong agreement that this activity improved their confidence for the final exam. Importantly, almost two-thirds of respondents agreed that writing questions improved their understanding of content, and assisted in their active reflection of content.
Conclusions: Overall, this initiative revealed various potential benefits for the students, including promoting bioscience understanding and confidence. This may improve their long-term understanding of bioscience for nursing practice, as registered nurses' bioscience knowledge can impact on patient outcomes.

1. Introduction

Registered nurses need to have adequate understanding and knowledge underpinning their practice to ensure safe and proactive patient care. Indeed, nurses' knowledge can have significant impact on patient outcomes (Prowse and Heath, 2005; Sturgeon, 2008; Smales, 2010). In particular, registered nurses acknowledge the importance of having increased bioscience understanding (Choi-Kwon et al., 2002; Davis, 2010). One aspect of nursing knowledge includes the biosciences, which are a key aspect of undergraduate courses. Accordingly, in the current project we utilised one approach to promote nursing students' understanding of bioscience within their first year.

Increasing student engagement with the assessment is an effective measure to promote learning (Bakon et al., 2016). This is particularly important within the context of the current study, given that bioscience is commonly assessed by exams. Students who have written and answered student-generated questions in other disciplines had increased exam performance (Draper, 2009). There is also evidence that student-generated questions favours the lower performing students (Jobs et al., 2013), and those writing questions had more increases in metacognitive learning than those answering questions (Yu and Liu, 2008); this suggests that merely providing revision questions for students to use for practise at answering questions during their own exam preparation may not achieve the same benefit as student-generated questions. Given that nursing students find bioscience challenging, the process of writing student-generated revision questions for bioscience was utilised in the current study.

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2. Background

Nursing students within Australia and internationally usually study bioscience subjects within their undergraduate studies; these consist broadly of topics including anatomy, physiology, pathophysiology and pharmacology. However, nursing students find bioscience subjects to be particularly challenging, for reasons including the lack of prior science studies, the level of difficulty and their perceived lack of clinical relevance to their profession (Friedel and Treagust, 2005; Whyte et al., 2011; Gordon and Hughes, 2013; Craft et al., 2013; Andrew et al., 2015). Exams remain the mainstay of assessment in these large bioscience subjects, but exams also constitute a specific stress within nursing studies (Timmins and Kaliszer, 2002; Craft et al., 2013). The combination of bioscience assessment being dominated by exams, and the students' lack of perceived relevance of bioscience content, may lead to nursing students adopting surface-learning approaches to survive exams, without deeper learning (Salamonson et al., 2013; Taylor et al., 2015). This is a critical concern, as nurses' knowledge of bioscience concepts is necessary to become "knowledge brokers" for patients (Logan and Angel, 2011). Within the clinical workplace, registered nurses have indicated a preference for improved knowledge of bioscience (Choi-Kwon et al., 2002; Davis, 2010; Craft et al., 2017). Despite the challenges of bioscience studies, whilst undertaking clinical placement during their studies, nursing students have identified the importance of bioscience to the nursing profession (Fell et al., 2016). Together, this indicates that measures to increase bioscience understanding during undergraduate studies are necessary to better prepare students for their future roles as registered nurses.

Active engagement within assessment can improve learning for nursing students (Bakon et al., 2016). One method to engage students with assessment is students writing questions, which become available to all students for reflection and revision; some of these may also be used on the actual exam. This process of writing and answering student-generated questions promotes more positive perceptions of assessment (Baerheim and Meland, 2003), and improves exam preparation and performance by utilising higher order thinking (Draper, 2009).

Academics may provide practice or revision questions for students, and these are designed for students to attempt in their own time within the context of their personal study in preparation for examinations. These questions are usually uniquely written by the academic, or sourced from larger test banks of revision questions. Student-generated revision questions have a similar purpose, but have been written by students individually or in groups. Student-generated questions have been utilised in disciplines including health, physics and computing. For example, medical students reported learning from both the process of creating their own questions, and from reviewing other student's questions (Gooi and Sommerfeld, 2015). When medical students provided peer critique of other students' questions, there was a correlation with academic performance (Kadir et al., 2014). Of particular interest, the ability to utilise a student-generated bank of questions favoured the lower-performing medical students (Jobs et al., 2013). Through the process of computing students generating questions, enhanced self-reflection, learning, and an interactive approach to learning occurred, which may promote deeper understanding of content (Hutchinson and Wells, 2013). Together, this indicates that students' learning and academic performance have benefited by student-generated questions, including an enhanced benefit for lower-performing students.

As nursing students find bioscience subjects challenging and experience concerns regarding exams, approaches that innovate and empower students regarding exams are critical. In the current project, students collaborated in groups to write questions, in order to improve student learning and their understanding of content. This activity may also promote student's confidence for the final exam, and potentially increase long-term comprehension; ultimately, this may lead to improved long-term understanding and integration of bioscience within future nursing clinical practice.

The specific aims of this project were to:

1. promote collective understanding of content by students collaborating in groups
2. improve students' confidence in their preparation for the final exam
3. improve students' deeper understanding of bioscience content

This approach was designed to assist students to obtain deeper understanding of exam question writing, provide increased familiarity with exam questions, and thereby improve confidence regarding exams.

3. Methods

This project was held within the context of an Australian university, and included students from main urban and outer regional campuses. All students were studying the undergraduate Bachelor of Nursing program, and some were studying nursing as a double degree with another course, such as Bachelor of Paramedics. This case study worked with students within a first year bioscience subject mainly consisting of pathophysiology (disease processes). This subject was studied by approximately 600 nursing students who undertook individual and group activities within their regular subject teaching activities (face-to-face workshops). For the current activity which lasted approximately ten minutes, students were advised to work in a group to develop one multiple-choice exam question which related to the topics of that week; in the introduction, staff explained that the purpose was to facilitate their deeper learning of content, as the question writing would allow them to focus on areas of importance or difficulty, and explore how some aspects of contents were similar or different to others. Students needed to supply the correct answer and three incorrect options (distractors) to complete one question. Students were advised that these would be collated into a large pool of revision questions to become available for all students. These questions were collected, entered into Microsoft Word, edited for accuracy, and released to the subject site on the online learning platform, Blackboard, as a revision resource for all students. Several staff-generated revision questions were also available on the Blackboard site, in accordance with usual practice within this subject. A list of correct answers was also provided for all student- and staff-generated questions to facilitate student revision.

In order to evaluate this learning activity, students were invited to provide detailed feedback in accordance with the ethics approval from the institution (UHREC number 1600000910). Accordingly, a Student Feedback Survey was developed, and administered online via the institution's endorsed survey tool, KeySurvey. This invitation to provide anonymous feedback was emailed to all students enrolled in the subject, and deployed after the completion of all Workshops. Students were informed that providing such feedback was voluntary and anonymous; student consent to provide such feedback was inferred by those who chose to complete the online Survey. The Student Feedback Survey included questions on participant demographics, along with quantitative questions to rank using a Likert scale (1 = strongly disagree to 5 = strongly agree). An opportunity to provide a written response was also included. Responses to questions were analysed using descriptive statistics, and frequency histograms prepared. Qualitative responses were integrated within quantitative responses.

4. Results

4.1. Student-generated Questions and Feedback Participants

A sample of the student-generated questions from a range of topics is provided in Table 1. The number of student-generated questions ranged from 197 in the first week, to only 49 in the final week of workshops. This progressive decline likely reflects the usual decline in face-to-face attendance at classes later in the semester. Means and standard deviations to Student Feedback quantitative questions are