



Student learning styles in anatomy and physiology courses: Meeting the needs of nursing students



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ABSTRACT

Anatomy and Physiology is a core course in pre-registration nursing programs, yet many students have difficulty successfully negotiating the large volume of content and the complex concepts in these bioscience courses. Typically students perform poorly in these 'threshold' courses, despite multiple interventions to support student engagement. Investigation of the shortcomings in these courses, based on feedback from students indicated several key areas of difficulty in the course, especially focused around a relative lack of hands-on 'concrete' activities in laboratories and tutorials. To attempt to address this, academic and technical staff developed activities for students that promoted discussion and allowed students to interact easily and repetitively with content. Interactive tables and posters that needed to be labelled or 'filled-in' using pre-prepared Velcro dots, as well as pre-prepared flash cards to promote group work, were some examples of the activities used to enhance student experiences and promote hands-on learning. Over the academic year of 2013 these activities were introduced into the laboratory and tutorial classes for first year Bachelor of Nursing anatomy and physiology students. Staff and student participants positively rated implementation of these new activities on surveys, as they allowed them to explore the difficult aspects of anatomy and physiology, utilising various learning styles that may have been neglected in the past.

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Background/literature review

Anatomy and physiology (A&P) can be a very daunting, content-heavy subject during initial presentation in the first year of a nursing degree. A&P provides a foundation for nursing care, and thus successful engagement with the basics of anatomy and physiology is fundamental to the development of sound nursing skills and clinically-based critical thinking (Jordan and Reid, 1997; McKee, 2002). It is frequently one of the most content-dense and conceptually challenging courses that a nursing student will encounter throughout their degree and many students struggle to grasp key concepts (Birks et al., 2013; Smales, 2010). Consequently, students can expect lower passing rates and sometimes a reduction in content presentation such that programs barely meet industry-required knowledge levels (Davis, 2010). These phenomena have

been widely reported internationally and are summarised well in a recent systematic review (McVicar et al., 2014).

Many factors have been cited as contributing to student difficulty with A&P courses. Nevertheless, it appears many of these factors are inherent to the individual, ie: nursing students are often non-traditional students who may struggle due to limited 'social capital' (Lizzio et al., 2002); They are the first in their family to attempt tertiary studies; from a lower socio-economic background; working part-time or full-time to support themselves resulting in less time to spend on campus; speak English as a second language; or have lower school entry scores than many other university student groups (Lizzio et al., 2002; Wilson, 2012). Moreover a significant portion of nursing students are classed as mature age students and are returning to study, changing career, or developing a career after having children, and therefore have been out of the education system for many years. Common themes amongst these students when asked about their perceptions of studying include that they are worried about failure, feel overwhelmed by study, feel the need to develop study skills to cope with university, and commonly feel isolated (Birks et al., 2013; Drury et al., 2008; Craft et al., 2013).

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Evidence suggests however, that once students enter university, it is time on task that is the primary determinate of success, rather than any other 'background' factors – so the relative lack of achievement of nursing students in challenging A&P courses cannot simply be ascribed to the student population (Horstmanshof and Zimitat, 2007; Wilson, 2012).

Many other contributors to student difficulty with A&P courses have been identified. These include factors such as negative previous student experience with biosciences in schools and other tertiary preparatory institutes, causing students to become quite science-phobic and fearful of their ability to successfully engage with science courses (Craft et al., 2013; McKee, 2002), learning and teaching staff with greater or lesser backgrounds in the biosciences and variable teaching skills (Clancy et al., 2000), and the time required to spend covering this material (McVicar et al., 2014). Other factors have included teaching style and delivery technique. Increasingly, these courses are becoming self-directed theoretical courses with few hands-on activities (Friedel and Treagust, 2005; Johnston, 2010; Meehan-Andrews, 2009; McVicar et al., 2014), despite reports finding that densely web or technology-supported course presentation does not necessarily suit all students (Eom et al., 2006; McKinney and Page, 2009; Koch et al., 2010). Exploring methods for supporting student engagement with information content, as well as varying the methods of teaching used to present the information, may assist in alleviating the trepidation associated with A&P (Brown et al., 2008) and improve student engagement with content using kinaesthetic activities (Meehan-Andrews, 2009).

There are many models examining the ways students prefer to learn and the most effective ways students learn (McVicar et al., 2014). These include VARK (visual, aural, reading and kinaesthetic) and Kolb's learning styles inventory (James et al., 2011). They explore different aspects of a students' personality, social interaction, information processing and instructional preferences either as a whole or individually. Studies using the VARK model suggest that nursing students are more inclined to learn best kinaesthetically rather than through other methods (James et al., 2011; Meehan-Andrews, 2009). Other studies have shown that hands-on, practical laboratory exercises are very beneficial for first year nursing students (Johnston and McAllister, 2008). In the study conducted by Johnston and McAllister (2008) 85% of students indicated that they valued the hands-on experiences in laboratories, with the most valued activities including the real clinical tests students carried out. Similar studies have shown that nursing students visiting cadaver laboratories find this hands-on experience very helpful, enabling them to physically interact and visualise various parts of the body, that seemed difficult at the time of learning but became clear when looking at the cadaver (Johnston, 2010). These sorts of investigations help academic staff to tailor their A&P course presentation styles to best suit learning styles of students and thereby increase academic success. Clearly however, some kinds of hands-on activities including organ and cadaveric dissection/investigation have significant space and resource requirements. Dissections and other laboratory activities require experienced laboratory staff, ethical approvals, appropriately rated laboratory areas and suitable safety clothing and equipment for participants (Johnston and McAllister, 2008). Cadaveric facilities are even more difficult and expensive to access and may have too great an affective component to suit all students (Johnston, 2010) suiting only a proportion of nursing students.

The student lifecycle project implemented at Griffith University in 2012 highlighted seven learning styles based on a number of learning style theories (Heffernan, 2012). The learning styles incorporated aspects of the VARK system and also included characteristics of the student's personality and social interactions to

form the other three learning styles. The seven styles include: auditory/aural, verbal/oral, visual, logical, kinaesthetic, social or in groups, and solitary (Heffernan, 2012). These styles were then compared to the content in various nursing courses to see if the structure of the courses accommodated for all the learning styles. From this data the project team set out to improve completion rate of the nursing students at Griffith University and to relate undergraduate student activity to activities required in and by the workforce (Heffernan, 2012). One of the major findings of this project was a fear of the content in A&P, a widely reported finding in studies of nursing students' attitudes to the biosciences for decades (Clancy et al., 2000; Craft et al., 2013; McVicar et al., 2014).

To help alleviate trepidation associated with studying a science subject in the first year of the undergraduate nursing degree, and to get students to engage more with anatomical and physiological content in a supported environment, a restructure of laboratory materials was proposed. Challenging aspects of A&P needed to be presented in a different manner to help students overcome their anxiety and support both the rote learning and dense conceptual understanding required (Johnston, 2010). Due to the apparent lack of social and kinaesthetic learning activities in the course, it was proposed that by introducing different ways to visualise and interact with the content, the needs of students could be better met. New learning activities were created to not only teach the content but also to make the content fun and engaging, thus providing the opportunity for students to interact with the content and with their fellow students and to incorporating more styles of learning into the course.

Method

Initially, key areas for student support were identified from content analysis of the qualitative components of the teaching and course evaluations for the Anatomy and Physiology (A&P) courses. Identified themes were discussed by academic staff and technical support staff within the school of Nursing and Midwifery, who agreed that areas of content in the subject often lacked interactive laboratory support material. The challenging anatomical learning and physiological concepts that required greater support included: basic anatomical labelling and use of anatomical terms, electrolyte movement, action potential, the lymphatic system, homeostasis, and digestive enzymes.

In 2013, the students who enrolled in the first year undergraduate A&P courses participated in 3 h of lectures and either a two-hour tutorial or a two-hour laboratory class each teaching week. In the laboratory sessions students were requested to participate in dissection activities, body chemistry experiments, and the new activities aiming to promote hands-on learning and group discussion. The activities were designed by academic and technical staff based on the course content delivered in lectures and the prescribed course text book. Students participated in the activities in both tutorials and laboratory sessions. Alongside the lectures, tutorials and laboratories, students also had access to an online resource, Mastering A&P (Pearson, London), which they could work on during the laboratory session and/or at home in their own time.

Rote learning activities

The hands-on activities were divided into two areas, the first focused around rote learning activities. These activities required students to interact with repetitious tasks focused on anatomical areas in the form of: labelling posters of specific systems/organs, labelling each other, labelling the skeleton, or labelling an image of a full sized human body utilising Velcro dot tags (labels) that could be placed onto and off the activity. Images for the systems/organs

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