Review

Can active learning principles be applied to the bioscience assessments of nursing students? A review of the literature☆

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SUMMARY

Objectives: To explore if active learning principles be applied to nursing bioscience assessments and will this influence student perception of confidence in applying theory to practice?

Design and Data Sources: A review of the literature utilising searches of various databases including CINAHL, PUBMED, Google Scholar and Mosby's Journal Index.

Methods: The literature search identified research from twenty-six original articles, two electronic books, one published book and one conference proceedings paper.

Results: Bioscience has been identified as an area that nurses struggle to learn in tertiary institutions and then apply to clinical practice. A number of problems have been identified and explored that may contribute to this poor understanding and retention. University academics need to be knowledgeable of innovative teaching and assessing modalities that focus on enhancing student learning and address the integration issues associated with the theory practice gap. Increased bioscience education is associated with improved patient outcomes therefore by addressing this "bioscience problem" and improving the integration of bioscience in clinical practice there will subsequently be an improvement in health care outcomes.

Conclusion: From the literature several themes were identified. First there are many problems with teaching nursing students bioscience education. These include class sizes, motivation, concentration, delivery mode, lecturer perspectives, student's previous knowledge, anxiety, and a lack of confidence. Among these influences the type of assessment employed by the educator has not been explored or identified as a contributor to student learning specifically in nursing bioscience instruction. Second that educating could be achieved more effectively if active learning principles were applied and the needs and expectations of the student were met. Lastly, assessment influences student retention and the student experience and as such assessment should be congruent with the subject content, align with the learning objectives and be used as a stimulus tool for learning.

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Introduction

Nursing is becoming more self-governing and as such the ability to apply theoretical bioscience concepts to clinical practice is essential (Efstathiou and Bailey, 2012; Taylor et al., 2015). The complexity of the health care sector is often characterised by a dynamic and evolving mass of information and research (Mate, 2013). Consequently employers expect nursing graduates and students to have not only a specialised knowledge base, but to be competently able to apply this knowledge to solve complex health related problems through efficient methods of care (Boud and Falchikov, 2007; McVicar et al., 2010, 2015). An increased knowledge of the biosciences is fundamental in

order to produce a nursing practitioner with the critical thinking skills needed to make autonomous, logical, and safe clinical decisions (Logan and Angel, 2011; Whyte et al., 2011). Bioscience knowledge is crucial for nursing competence and should form a substantial part of the nurse's knowledge base (McVicar et al., 2010; Wissen and McBride-Henry, 2010; Efstathiou and Bailey, 2012). Therefore it is considered vitally important that nurses are able to comprehend bioscience content and apply it into their clinical practice (Wissen and McBride-Henry, 2010). Research has detailed improved patient outcomes when nurses possess an increased knowledge of bioscience which provides support to their inclusion in the nursing programme (Davies et al., 2000; Taylor et al., 2015). Facilitating the required level of learning has proven to be an extensive problem for academics with multiple factors that impact on the student learning experience needing consideration (Logan and Angel, 2011; McVicar et al., 2015; Taylor et al., 2015). Facilitating the required level of bioscience education has been identified as a global problem in tertiary institutions as nursing students question their competence in bioscience, they report failing to see its relevance to practice, experience anxiety, and have poor confidence in

appropriately applying concepts to patient conditions (Wissen and McBride-Henry, 2010; Birks et al., 2011). Students detail that the lack of applied learning in the bioscience curriculum has led to difficulties in their role as a registered nurse (Davis, 2010; Logan and Angel, 2011; Taylor et al., 2015). Therefore academics are challenged to incorporate active teaching and learning strategies that reflect the diversity in student demographics and ensure that they produce safe competent practitioners (Meehan-Andrews, 2009; McVicar et al., 2014).

Problems

Teaching bioscience presents a multifactorial problem, and can be challenging due to, students differing academic entry levels, large class sizes, length of classes, allocated time motivation, and, concentration (Efstathiou and Bailey, 2012; McVicar et al., 2015; Taylor et al., 2015). Due to the current Australian government marketing initiatives and widening participation agendas, universities have increased access to the Bachelor of Nursing degree (Koch et al., 2010; Taylor et al., 2015). Subsequently there has been an increase in the educational diversity of students enrolling in the course, with some of these students having no science or nursing background (Koch et al., 2010; Efstathiou and Bailey, 2012). Bioscience is reported to be an intense subject with a heavy study load that is conceptually challenging (Davies et al., 2000; McVicar, 2009; Johnston et al., 2015). Students have found that many of the concepts are not familiar and the binomial nomenclature is difficult to grasp (McVicar, 2009; Logan and Angel, 2011). Mature aged students may have not entered a learning environment for a substantial amount of time, and younger students find that the mode of content delivery is substantially different from secondary school (McVicar et al., 2010; Efstathiou and Bailey, 2012; Johnston et al., 2015).

The large class sizes for lectures, particularly in first year where most bioscience units are taught pose a problem as complex systems need to be explored and the students may lack confidence in the learning process (McVicar et al., 2010; Efstathiou and Bailey, 2012). Content delivery modalities have been criticised as not appropriate or favourable in regard to student learning approaches (Davis, 2010; McVicar et al., 2015). Students have conveyed that there is insufficient time allocated for the large amount of content they are required to learn (Davies et al., 2000; Meehan-Andrews, 2009; Taylor et al., 2015). There has been discussion that more curriculum time and teaching content in smaller groups may be more beneficial (McVicar, 2009; McVicar et al., 2015; Taylor et al., 2015). The delivery of bioscience content through a lecture series is favoured by students and universities as this didactic approach is often viewed as efficient and economical (Meehan-Andrews, 2009; Efstathiou and Bailey, 2012). It is viewed as a method to present concepts to a large group of students and stimulate topic interest (Meehan-Andrews, 2009) though it is heavily criticised as outdated, and ineffective to learning as the students remain passive and can experience stress from the surplus of information (Meehan-Andrews, 2009; Efstathiou and Bailey, 2012). It has further been demonstrated that students can only concentrate for 20–30 min at a time and as such there is a limited amount of actual information exchange occurring (Davies et al., 2000; Efstathiou and Bailey, 2012). Therefore due to their time length lectures are criticised as being a poor mode of content delivery that may compromise student learning (Meehan-Andrews, 2009; Efstathiou and Bailey, 2012). Lectures if utilised should incorporate a combination of visual, aural, kinaesthetic and reading processes with question time encouraged to facilitate active learning ideals and maintain student participation and concentration (Meehan-Andrews, 2009).

An ensuing problem associated with the teaching of bioscience includes that there is no congruency in the level and depth of teaching between units and institutions (Efstathiou and Bailey, 2012; Taylor et al., 2015). This may be because bioscience educators may be ill equipped and unprepared to teach the complex subject matter (Efstathiou and Bailey, 2012; McVicar et al., 2015; Taylor et al., 2015). Additionally there is a trend in Australian universities for scientists to

teach the nursing bioscience curriculum (Craft et al., 2013; McVicar et al., 2015). This has promoted surface or rote learning of bioscience content due to the high volume of concepts (Logan and Angel, 2011; Craft et al., 2013). These factors may have led to decreased comprehension levels of the intrinsic relationship between bioscience and the clinical interventions utilised in nursing practice (Logan and Angel, 2011; Christopher et al., 2013; Craft et al., 2013). Scientists may never have been exposed to the clinical environment and this lack of context can lead to the student's poor integration of bioscience theory into the clinical setting (Logan and Angel, 2011, 2014; Craft et al., 2013; Christopher et al., 2013). Research details a theory-practice gap where the theory that should guide nursing practice is unable to be understood to be applied (Wissen and McBride-Henry, 2010; Logan and Angel, 2011).

Methods

Aim

Therefore taking into consideration the problems detailed above this literature review will explore if active learning principles be applied to nursing bioscience assessments and will this influence student perception of confidence in applying theory to practice?

Search Strategy

- The search process utilised four databases, namely CINAHL, PUBMED, Google Scholar and Mosby's Journal Index. The citations of the identified papers were also manually reviewed to identify studies that could be of relevance to our literature search.
- The keywords utilised included bioscience, assessment, assignment, student, nursing, and teaching. These keywords identified from the research theme were integrated with Boolean operators "and" and "or" to create appropriate search phrases.
- Eligibility criteria were applied to further narrow down the selection of studies and suitable papers were identified by removing duplicates and reviewing the title and abstract. Inclusion parameters were applied further to narrow the list to documents published in the last fifteen years (2000–2015), with the full text available, from peer reviewed publications in English. This prevented any translational problems and preserved the authenticity of the papers.
- From the literature 26 journal articles of various methodology including qualitative discursive and review articles were found to meet the inclusion criteria. A critical analysis of the methodology of the remaining papers established validity with various congruent themes identified utilising an inductive strategy detailed in the results.

Results

From the literature several themes with additional concerns were identified. Firstly there are many problems with teaching nursing students bioscience education (Taylor et al., 2015). These include: student academic entry level, motivation, concentration, length and size of class, a lack of congruency in teaching depth between institutions, insufficient time allocated for classes, a lack of confidence in the learning process, ineffective teaching modalities and the types of assessment utilised by educators (Efstathiou and Bailey, 2012; McVicar et al., 2015; Taylor et al., 2015). Secondly that educating could be achieved more effectively if active learning principles were applied and the needs and expectations of student were met (Al-Modhefer and Roe, 2009; Koch et al., 2010). These needs and expectations include: utilising tutorials, practical and lab based learning, providing feedback, innovative teaching and assessment strategies, anonymity in the marking process and a learning focus (McVicar et al., 2015). Assessment that employs active learning is congruent with the subject content and aligns with the learning