

# Shifting the Focus: Increasing Engagement and Improving Performance of Nursing Students in Bioscience Subjects Using Face-to-Face Workshops to Reduce Anxiety

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## Abstract

The difficulty many undergraduate nursing students experience with science subjects is often attributed to deficiencies in background knowledge, but anxiety about science subjects could also play a role. While reports indicate that nursing students feel anxious about science-based subjects, the cause of this anxiety and how to reduce it has received less attention. This project aimed 1) to identify the sources of anxiety experienced by nursing students at the start of their first year, and 2) to develop a workshop to reduce anxiety and enhance engagement with science subjects. When surveyed, a substantial proportion of nursing students reported feeling anxious about a range of science and non-science-based activities. To address this anxiety, a two-day, face-to-face workshop was developed and made available to nursing students. Attendees report that the workshops reduced their anxiety and enhanced their engagement with science subjects. In addition, the final grades and the rate of progression of workshop attendees through their nursing course have been significantly higher than non-attendees. These outcomes demonstrate that face-to-face workshops aimed at reducing anxiety can improve nursing student's engagement with, and performance in, bioscience subjects.

## Introduction

Bioscience knowledge underpins the clinical practice of nurses and is an integral part of pre-registration nursing courses. In addition, student performance in first-year bioscience subjects has been identified as a predictor of success in subsequent science subjects (Thalluri, Penman, & Petkov, 2005) and the program overall (Wong & Wong, 1999). Despite their important role in patient care, the relevance of bioscience concepts is often not recognized by first-year nursing students (Logan, 2008), with science subjects seen as "...something to be survived rather than useful to future practice" (Cox, Logan, & Curtis, 2014; p.313). Indeed, bioscience subjects are a source of anxiety and an area of difficulty for nursing students (Caon & Treagust, 1993; Jordan, Davies, & Green, 1999; Mehta, Robinson, & Hillege, 2008), and nursing students have been found to report that science is more difficult to learn than other areas of the curriculum (Jordan et al. 1999).

In Australia, as in many other countries, the last two decades has seen a steady decline in the number of students electing to take science subjects in their final years of secondary school (Ainley, Kos, & Nicholas, 2008). In addition, many students appear to be disinterested and disengaged with science content outside of school or in relation to future career prospects

(OECD, 2007). As a result, a high proportion of students commencing university have done little or no recent science study, are disinterested in science, and lack confidence in their ability to do well in science subjects. We have previously suggested that these factors contribute to feelings of anxiety when students are exposed to science subjects in their first year of study, and that this anxiety could influence the performance goals and learning strategies adopted by these students, and ultimately, their academic performance (Crane & Cox, 2013).

While it is well documented that, as a group, nursing students are anxious about their science subjects (Andrew, Salamonson, Weaver, Smith, O'Reilly, & Taylor, 2008; Friedel & Treagust, 2005; Gresty & Cotton, 2003; Nicoll & Butler, 1996), the exact cause of this anxiety is less well understood. It has been suggested that many students experience "science-anxiety" (regardless of the course they are studying) when they are confronted with scientific concepts or tasks, and that this anxiety has a negative impact on the performance of students in science-based subjects (Mallow, 1986). To determine the prevalence of science anxiety, Mallow and colleagues developed the Science Anxiety Questionnaire that asks students to rate the level of anxiety they would feel while performing a range of science-based and non-science-based tasks (Mallow, 1986; Mallow, 2006). Using this survey, the prevalence of science-anxiety in students enrolled in science-based and non-science-based courses has been reported to range from 63 – 92% (Birkett & Shelton, 2011; Udo, Ramsey, & Mallow, 2001; Udo, Ramsey, & Mallow, 2004). However, the criteria used in these studies were strongly biased towards a categorisation of science-anxious, since students were classified as science-anxious if they believed they would experience anxiety in any one of the science-based scenarios presented. Further, how students rated each of the science-based and non-science-based tasks was not reported (Birkett & Shelton, 2011; Udo et al. 2001; Udo et al. 2004). Despite some concerns about the interpretation of the results of the Science Anxiety Questionnaire, it is a potentially useful tool for investigating the sources of anxiety experienced by first-year students, especially when the responses of students to individual items are examined.

Improved understanding of the sources of anxiety experienced by first-year nursing students would aid the development of targeted resources to help students succeed in bioscience subjects. Over the last two decades, many higher education institutions have trialled a variety of curriculum interventions to support the learning of biosciences for nursing students during their first year of study, including hands-on laboratory sessions and adjunct intranet-based programs (McVicar, Andrew, & Kemble, 2014). However, pre-enrolment support initiatives that deal with students concerns and anxieties about science subjects are much less common. This is surprising, as it has been recognised for some time that the basic needs of safety, belonging, and self-esteem must be satisfied before the desire to know and understand can develop and be pursued (Maslow, 1987). In addition, belief that there is support from lecturers and staff improves retention in nursing courses (Shelton, 2003). Therefore, we hypothesised that a well-designed, pre-enrolment support program could address many of these needs and have a positive effect on student engagement and performance in science subjects.

As such, the current project had two aims:

1. To determine the sources of science-related and non-science-related anxiety experienced by first-year nursing students.
2. To develop and run face-to-face, pre-enrolment workshops to reduce anxiety and enhance student engagement with their science subjects.

To address the first aim, first-year nursing students in a number of cohorts at Charles Sturt University (a regional university located in New South Wales, Australia) were asked to complete a modified version of the Science Anxiety Questionnaire. The results of this survey were then analysed to determine which science-based and non-science-based activities produced the feelings of anxiety in these students. To address aim two, the information obtained from the Science Anxiety Questionnaire was used to guide the development of a two-day, pre-enrolment workshop focused on reducing student anxiety about, and enhancing their engagement with, science subjects.

## **Methods**

### **Part 1: Science Anxiety Questionnaire**

#### ***Student cohort***

The cohort surveyed consisted of first-year nursing students spread across three separate campus locations at a regional university in New South Wales, Australia. In total, 118 nursing students (19 male and 99 female) participated in the study.

#### ***Science Anxiety Questionnaire***

The Science Anxiety Questionnaire (Mallow, 2006; Udo et al., 2001; Udo et al., 2004) was used to evaluate the anxiety that students felt towards science-based and non-science-based activities. However, the original questionnaire was modified slightly for the Australian context. The questionnaire asked students to imagine themselves in 15 science-based and 15 similar but non-science-based scenarios, and to rate the degree of anxiety they felt they would experience using a 5 point Likert-style scale, from not anxious (1) to very anxious (5).

#### ***Questionnaire delivery***

The questionnaire and an information sheet that outlined the nature and objectives of the research project were handed to students (by a staff member not involved in the project) at the start of the first lecture of a first-year biomedical sciences subject (Human Bioscience 1). This subject is a compulsory component of the undergraduate nursing course at this university, and represents the first biomedical subject taken by these students. In an attempt to ensure students felt comfortable self-reporting on their anxiety, the questionnaire did not collect any information that would allow the identification of individual students. Further, all students were informed that participation in the study (by completion of the questionnaire) was completely voluntary and that no analysis would be performed until after the grades for the subject had been finalised and released. Upon completion, all questionnaires were collected by the same staff member and maintained in a secure location until they were released for analysis (at the completion of the subject) by the authors. The details of the questionnaire and the method of its delivery were approved by The School of Biomedical Science Ethics in Human Research Committee, Charles Sturt University, NSW, Australia.

#### ***Data analysis***

For every student, the anxiety rating assigned to each scenario was collated, and for each scenario the percentage of students that rated their anxiety as a 4 or 5 (on the 5 point scale) was determined.

## **Part 2: Pre-enrolment workshops**

### ***Workshop design***

The workshop program consisted of a series of 1-2 hour sessions over the two days. While some science content was presented, it was used to stimulate discussions about its relevance to their chosen career and other aspects of their life, essentially beginning a conversation with students that directly addresses the important question of “why are we learning this?”

Group work was used extensively in an attempt to break down student anxiety around interacting with peers. In the first session of the workshop, students were asked to think about their perceptions of science:

- One word that best describes my feelings about science...
- If science were an animal what would it be?
- The hardest thing about science is...?

These responses were used as the basis for a whole group discussion where workshop facilitators were able to reassure students that feelings of anxiety are common and re-iterate the purpose of the workshop i.e. to support their transition into their first science-subject at university.

In an effort to reduce the anxiety students feel around academic tasks in science subjects, the workshop included a study skills session that explored different learning styles, different ways to study and to develop an understanding of scientific concepts. Evidence suggests that language is central to understanding the nature of science (Osborne, 2002). Thus, a session was included where students work in groups to put together a medical/anatomical terminology meta-language dictionary. Anxiety around mathematics was addressed directly by working through simple calculations of the concentration of solutions (e.g. molarity). A session discussing how to evaluate scientific evidence was also included. This is an important skill needed to implement evidence-based practice, and one that many nursing courses aim to develop. However, a recent survey has found that 30% of Australians are unsure of who to trust when seeking information about science and technology (Searle, 2014).

The workshops were run by the authors (anatomy & physiology lecturers with many years of experience in teaching science to nursing students). The face-to-face format not only gave students an opportunity to interact with each other but also allowed them to interact with lecturers and improve their confidence in asking questions (i.e. reducing the fear of asking a “dumb” question). Teaching methods within the workshop catered for a variety of learning styles. For example, for kinaesthetic learners, a small laboratory session was included on Day 1 of the workshop to allow students hands on experience with pH measurements, electrolytes, and microbiology.

The workshops commenced in 2011. A promotional flyer about the workshops was emailed to all commencing Bachelor of Nursing students upon enrolment in the nursing program. The workshops were free of charge and were run one to two weeks prior to the start of the academic year on three campuses. The ability for students to undertake this program prior to commencing their first bioscience subject was deemed essential not only to allow any fears or concerns about studying science to be addressed but also to allow the science teaching staff to engage with students and give students a sense of support from Faculty, an important factor in nursing students retention (Shelton, 2003).

### **Data analysis**

Both quantitative and qualitative evaluation of the workshops was undertaken. Semi-structured telephone interviews were conducted with volunteer participants 5 weeks after the workshop and again at the end of the academic session. All interviews were conducted by a research assistant using a pre-determined interview guide. Interview questions included:

- Do you feel the workshop helped you? If so, in what ways did it help?
- How important was it for you to have the workshop offered in a face-to face format?
- What things (if any) would you change about the workshop?
- Has anything else been helpful (or detrimental) to your science studies?

Interviews were recorded with a digital voice recorder and transcribed verbatim. To quantitatively assess the impact of workshop attendance, the performance of workshop attendees in their first bioscience subject (Human Bioscience 1) was compared with non-attendees from the same cohort. The final aggregate marks (out of 100) for this subject were pooled across three teaching sessions (spanning 2011 and 2012). The aggregate mark of workshop attendees was then compared with non-attendees using an un-paired Student's t-Test. Similarly, the marks for each of the three summative assessment items in Human Bioscience 1 were pooled and attendees marks compared with non-attendees using an un-paired Student's t-Test. Student interviews and data analysis were approved by The School of Biomedical Science Ethics in Human Research Committee, Charles Sturt University, NSW, Australia.

## **Results**

### **Part 1: Science Anxiety Questionnaire**

Similar to previous studies (Udo et al. 2001; Udo et al. 2004), the results of the Science Anxiety Questionnaire were used to categorise students. Students that scored any of the scenarios (science or non-science) as a 4 or 5 were classified as "generally anxious". Those students that scored none of the science or non-science scenarios as a 4 or 5 were classified as "not anxious". The "generally anxious" students were then sub-divided into two groups. Students that scored one or more of the science scenarios as a 4 or 5 (regardless of their response to non-science scenarios) were classified as "science anxious". In contrast, students that scored one or more of the non-science scenarios, but none of the science scenarios, as a 4 or 5 were categorised as "non-science anxious". When this categorisation was applied, 8.5% of nursing students could be classified as "not anxious" with the remaining 91.5% assigned to the "generally anxious" group. Amongst the "generally anxious" students, only 5.6% of students fit the criteria for "non-science anxious", with the remaining 94.4% of "generally anxious" nursing students classified as "science anxious". However, these criteria appear to be strongly biased towards a "science anxious" classification. For example, a student that rated all of the non-science-based items as producing anxiety, but only one of the science-based items, would still be categorised as "science anxious". As a result, further analysis of student's responses to the Science Anxiety Questionnaire focused on identifying individual science-based and non-science-based items that elicited feelings of anxiety. This was achieved, by determining the percentage of students rating each of the science-based or non-science-based scenarios as a 4 or 5 (Table 1).

**Table 1: The percentage of nursing students that rated the science-based and non-science-based items as producing feelings of anxiety (i.e. 4 or 5 on a Likert scale).**

All science-based and non-science-based items	% scoring item as 4/5 (n=118)
Explaining a scientific concept to a classmate.	42.4
<i>Explaining to classmates how to perform a clinical procedure.</i>	38.1
Reading a scientific research paper and preparing a report summarising the main findings of this research.	49.2
<i>Reading a sociology research paper and preparing a report summarising the main findings of this research.</i>	38.1
Transferring bacteria to an agar plate during a microbiology laboratory practical.	19.5
<i>Collecting a sample of your own urine for a medical test.</i>	16.1
Calculating the concentration of a solution to answer a question in your science laboratory practical manual.	35.6
<i>Calculating, from a recipe for 10 pancakes, the quantity of ingredients required to make 25 pancakes.</i>	3.4
Studying for a final exam in biomedical science.	72.0
<i>Studying for a final exam in history.</i>	70.3
Focusing a microscope in a science laboratory practical.	10.2
<i>Focusing the lens on an old camera.</i>	3.4
Heating distilled water in a science laboratory using a Bunsen burner.	4.2
<i>Using a gas burner while camping to boil water to make tea.</i>	1.7
Asking the lecturer a question during a biomedical science lecture.	32.2
<i>Asking the lecturer a question during a lecture on law and ethics.</i>	32.2
Reading a section from a science textbook to classmates and then answering questions on what you had read.	30.5
<i>Reading a section from an English literature textbook to classmates and then answering questions on what you read.</i>	32.2
Reading an article in The Australian on a recent scientific discovery and having a friend ask your opinion on what you read.	5.9
<i>Reading an article in The Australian about a new play and having a friend ask your opinion of what you read.</i>	9.3
During a science laboratory, neutralising a base solution by adding minute quantities of an acid.	20.3
<i>Adding chemicals to a pool until the water tests indicate that it is safe for swimming.</i>	11.0
Using a thermometer in a science laboratory practical to determine the boiling point of a solution.	2.5
<i>Using a meat thermometer to determine when a roast chicken is properly cooked.</i>	4.2
Memorising the names of the 12 cranial nerves in the body.	28.8
<i>Memorising the names of the last 12 Australian Prime Ministers.</i>	42.4
Having a classmate watch you perform an experiment during a science laboratory.	29.7
<i>Having a classmate watch you draw a picture in an art class.</i>	33.9
Converting grams to micrograms as part of a science experiment.	22.9
<i>Converting Australian dollars to English pounds when travelling in the United Kingdom.</i>	22.0

Note: Non-italicised text denotes science-based items. Italicised text denotes similar, non-science-based items

In general, the responses of students to science-based scenarios and analogous non-science-based scenarios were similar (Table 1). The majority of students (over 70%) believed they would feel anxious studying for an exam in biomedical sciences, and a similar percentage believed they would feel anxious studying for a final exam in history. While nearly half of all nursing students believed they would feel anxious reading a scientific research paper and preparing a report on its main findings, well over a third of students reported they would feel anxious performing the same task for a sociology paper. Over one third of students believed they would feel anxious explaining a scientific concept or a clinical procedure to a classmate, asking a question of the lecturer during a bioscience lecture or during a law-and-ethics lecture, and reading a science or English textbook to classmates and answering questions related to what was read. In addition, nearly one quarter of students reported they would be anxious converting grams to micrograms, and a similar proportion indicated they would be anxious converting Australian dollars to English pounds.

In only one case was there a clear difference between a science-based task and an analogous non-science-based task. Close to a third of students believed they would be anxious calculating the concentration of a solution to answer a question in a laboratory practical manual, whereas less than 5% of students believed calculating the quantity of ingredient needed to make 25 pancakes from a recipe for 10 pancakes would make them feel anxious.

In general, very few students felt that they would be anxious during science-based and non-science-based tasks that required the use of technical skills (e.g. recording temperature, boiling water, or focusing lenses).

## Part 2: Pre-enrolment workshops

To date, nine workshops have been run across three campuses since the inception of the program in 2011. A total of 166 Bachelor of Nursing students have attended these workshops. Attendees from the distance education cohort achieved significantly higher average marks than non-attendees in that cohort ( $t_{(249)} = 2.07, p = 0.02$ ; Table 2). Similarly, attendees from the internal cohort achieved significantly higher average marks than non-attendees ( $t_{(280)} = 2.01, p = 0.02$ ; Table 2).

**Table 2: Average final (aggregate) marks in Human Bioscience 1**

Cohort		Average Mark (out of 100)		
		Attendee	Non-Attendee	Total
Distance	Average	61.2*	55.1	56.3
	Std Deviation	16.7	19.2	18.9
	Number (n)	50	201	251
Internal	Average	60.5*	55.6	56.6
	Std Deviation	15.4	17.1	16.8
	Number (n)	61	221	282
Total	Average	60.8*	55.4	56.5
	Std Deviation	15.9	18.1	17.8
	Number (n)	111	422	533

\*, significant difference between attendees and non-attendees ( $p < 0.05$ )

**Performance in subsequent science subjects**

There were 111 students who completed Human Bioscience 1 in 2011 and went on to complete the subsequent science subject Human Bioscience 2 in either 2011 or 2012; 25 of these students participated in the science workshop. All (100%) of the workshop attendees successfully progressed through Human Bioscience 2, compared with a progression rate of 81.4% for non-attendees ( $p = 0.02$ ).

Analysis of assessment item marks found that attendees performed significantly better on the final exam than non-attendees ( $t_{(336)} = 1.79, p = 0.04$ ; Table 3).

**Table 3: Comparison of Achievement on Human Bioscience 1 Assessment Items**

Assessment		Attendee	Non-attendee	Total
Assignment (20)	Average	15.5	15.2	15.3
	Std Deviation	3.3	4.2	4.0
	Number (n)	75	329	404
Mini-tests (20)	Average	14.6	13.9	14.0
	St Deviation	3.2	4.3	4.1
	Number (n)	75	329	404
Exam (60)	Average	28.6*	25.8	26.3
	St Deviation	11.8	12.5	12.4
	Number (n)	75	329	404

\*, significant difference between attendees and non-attendees ( $p < 0.05$ )

**Retention and progression**

A Chi-Square test showed no difference between the retention rates (within course) of attendees and non-attendees ( $p = 0.2$ ) however, comparison of subject progression rates (i.e. subject points attained divided by subject points attempted) showed that workshop attendees progressed through subjects 10% faster than non-attendees ( $t_{(288)} = 1.65, p < 0.001$ ; Table 4).

**Table 4: Comparison of Progression Rates through Course**

		Progression Rate		
Subject Progression		Attendee	Non-Attendee	Total
Progression Rate	Average	0.69**	0.61	0.63
	St Deviation	0.16	0.21	0.20
	Number (n)	111	422	533

\*\* , significant difference between attendees and non-attendees ( $p < 0.01$ )

Qualitative feedback from the workshops consistently indicated that participants left the workshops feeling less anxious and more confident in their ability to tackle science subjects. This improvement in confidence was also reported to persist throughout the first 5 weeks of the teaching session.

*“You know I reckon I would have chucked it in by now if I hadn’t done the workshop, I’ve never, never done anything like this before. I guess it was mainly having them explain things to you face-to-face without making you feel stupid”*



When asked to comment on the format of the workshop, the face-to-face format was often reported to be an important determinant of student attendance and participation:

*“Yeah it was really good. I would not have attended if it were just another online session”*

*“The way the, the lecturers, were able to get around to everyone. You could ask them questions, and that one-on-one time was fantastic”.*

## **Discussion**

The first part of this project aimed to determine the prevalence of anxiety related to science-based and non-science-based tasks within cohorts of nursing students at the start of their first biomedical-science subject. A number of studies have reported that science subjects are a source of anxiety and stress for nursing students (Andrew et al. 2008; Friedel & Treagust, 2005; Gresty & Cotton, 2003; Nicoll & Butler, 1996) and that some nursing students withdraw from their course due to the difficulties they experience with science subjects (Andrew et al. 2008; White, Williams, & Green, 1999).

Applying the same criteria for categorising students used by previous studies (Birkett & Shelton, 2011; Udo et al. 2001; Udo et al. 2004), the present study found that nearly 95% of nursing students could be classified as science-anxious. However, the criteria are strongly biased towards such a categorisation, with students classified as science-anxious if they believed they would experience anxiety in any of the science scenarios. Therefore, in an attempt to determine more clearly the extent and nature of anxiety experienced by first year students, the present study focused on examining the results obtained on individual items of the questionnaire in more detail.

Analysis of responses to individual items revealed that the first-year nursing students we surveyed were feeling anxious about a range of science-based and non-science-based activities. Indeed, feelings of anxiety appeared related to the nature of the task (e.g. test preparation, evaluation by peers, approaching lecturers) regardless of the subject matter. As might be expected, studying for an exam (either in bioscience or history) was the scenario that generated feelings of anxiety in most students (>70%). It is now recognised that test anxiety does not simply impair the recall of information but also has a negative impact on how students study and prepare of exams (Cassady, 2004). As a result, test anxiety can cause impairments in all aspects of learning i.e. acquisition, consolidation and recall of information (Cassady, 2004). The fact that, in the present study, most nursing students reported some degree of test anxiety when surveyed at the very beginning of their first semester indicates that efforts to reduce test anxiety (e.g. regular opportunities to practice exam style questions and open discussion about how to deal with stress) should start as soon as possible.

Other sources of anxiety appeared to centre around: explaining concepts, reading and evaluating information, mathematics (e.g. calculating concentrations and unit conversion), interacting with peers, and asking their lecturer questions. These tasks are commonly encountered within a student's first year and are, in many ways, critical to success in both science-based and non-science-based subjects. While it is unclear from the results of this survey whether the level of anxiety experienced by students would affect their performance in these tasks, it is likely that efforts to reduce anxiety experienced by students could enhance student engagement with, and improve academic performance in, science-based subjects.

The results of the Science Anxiety Questionnaire revealed that a relatively high proportion of first-year nursing students at our institution were anxious about a range of academic tasks (both science- and non-science-based) that they would encounter. As such, the second part of this project aimed to develop a pre-enrolment, face-to-face workshop that would directly address student's anxieties and enhance their engagement with science. Feedback from many attendees indicated that the workshops did alleviate some of the anxiety around starting university and studying science.

*"I thought it was great, it got rid of a lot of the anxiety of starting uni. I've come straight from school and really had no idea of what to expect. It was fantastic."*

In addition, some students indicated that these workshops also enhanced their interest in science and their confidence in their ability to do well in science subjects.

*"I wouldn't like to tackle this subject without having attended this workshop as it would have been very overwhelming. This workshop has changed my perception... Science is not as scary as I thought and if presented in the right way it is understandable"*

In addition to the positive feedback from attendees, the workshops also appear to lead to improved academic performance in the first, as well as subsequent, bioscience subjects. The positive effect of the workshops on the academic performance is, perhaps, not surprising. It has been recognised for some time that the basic needs of safety, belonging, and self-esteem must be satisfied before the desire to know and understand can develop and be pursued. As such, students must feel secure and safe (e.g. not feel anxious), believe they are accepted by and supported by others (e.g. good relationships with peers and mentors), and develop a sense of confidence in their abilities (e.g. through experiencing success) before they become motivated to obtain knowledge and develop an understanding of the world (Maslow, 1987). The verbal feedback received from many students indicates that these workshops did help address some of these basic needs.

The increased interest in science and confidence expressed by some workshop attendees could also contribute to the enhanced academic performance observed. It has been argued that interest drives students to learn and persist in their studies (Silvia, 2008). Consistent with this, students that approach subjects with a mastery-approach goal (i.e. are intrinsically motivated to learn as much as possible) are more likely to adopt a range of behaviour beneficial to success, such as being more persistent in their studies, adopting deeper-learning strategies, and seek help (Elliot, Murayama, & Pekrun, 2011; Elliot & Murayama, 2008; Furner & Gonzalez-DeHass, 2011; Urdan & Schoenfelder, 2006). In addition, students that believe themselves capable of performing well in a subject (i.e. have a high self-efficacy) have been found to approach challenges more calmly and take more responsibility for their own learning (Pajares, 1996).

A number of students made it clear that the face-to-face format was critical to the success of the workshops.

*"A lot of the understanding was helped by the fact that it was in person. For example, the lecturers would try and explain something to us and you could see from the blank expressions on our faces that we didn't understand so they could then try and explain it from another angle. That's the key, that's why the online stuff doesn't work."*

However, in the absence of face-to-face workshops, the ability for students to interact in real-time (e.g. through video conference) with peers and lecturing staff during online, pre-enrolment support programs might have a similar effect on student engagement and success in science subjects. Such online workshops would also have the ability to reach a greater number of students, such as those studying by distance. To this end, we are using the lessons learned from the face-to-face workshops to develop an interactive, online, pre-enrolment workshop for students unable to attend the face-to-face workshops. While shifting the workshops online presents many challenges (e.g. ensuring students get a sense of faculty support and have an opportunity to interact with peers), the result of this study strongly suggest that these workshops, if done well, could lead to reduced anxiety, increased engagement, and better outcomes for nursing and other allied health students in bioscience subjects.

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