Are We Providing Resources That Stimulate Engagement, Active Learning and Academic Achievement? A Case Study of On–campus Nursing Students

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Abstract

Pathophysiology and pharmacology subjects are keystone to the pre-registration Bachelor of Nursing Science degree at James Cook University. These disciplines are typically considered by nursing students to be difficult to understand, and academic achievement in these subjects is often lower than in other subjects within the Bachelor of Nursing Science program. On-campus and off–campus students are provided with a range of resources to aid learning. The purpose of this study was to investigate the engagement of on–campus students with the resources provided for learning pathophysiology and pharmacology, to determine which resources promoted active learning, and to use this information for comparison with the responses of the off–campus cohort. Students were invited to complete a questionnaire which collected information about student demographics, interactions with learning resources, and subject grades. On–campus and off–campus cohorts reported different patterns of engagement with learning resources; however, both the total amount of engagement and the total amount of active learning showed positive relationships with academic achievement. Delivery of key pathophysiology and pharmacology concepts through formats in which students engage with more often and more actively may be strategic in promoting academic achievement and enjoyment in learning pathophysiology and pharmacology.

Introduction

Higher education in Australia is continuing to offer us challenges. The past ten years have seen increases in the number of students studying at university, along with changes in the demographics of those increased student populations. Student numbers are still rising and the number of offers made to students within low Australian Tertiary Admission Rank (ATAR) bands has increased (Department of Industry, Innovation, Science, Research and Tertiary Education, 2012). Many degree programs, such as the Bachelor of Nursing Science, are bound by professional standards as well as principles of academic integrity and ethics. Adjustments to the delivery of on– and off–campus subjects may be needed to ensure all students in the widening demographic are offered both enriched and complete educational experiences, and to support retention and academic achievement. Understanding the cohort demographics and ensuring quality learning for the diversity of the student body are as important as ever.

The constructivist theory of learning focuses on knowledge construction by the learner (Biggs & Tang, 2007). A learning environment based on constructivist theory should promote

opportunities that encourage and support the building of knowledge (Kala, Isaramalai, & Pohthong, 2010). Existing information forms the foundation and the new information is linked to what the learner already knows (Michael, 2006). Learning resources, experiences and feedback are provided by the teaching staff (Vygotsky, 1978), who lead the students through their construction of knowledge (Solvie & Kloek, 2007). Constructional design focuses on the creation of learning environments that enable and support individual construction of knowledge by engaging in tasks. The tasks create an environment where knowledge–building tools and activities are used, enabling students to construct knowledge through active learning and trial and error (Frank, 2008).

'Learning resources' encompass any tool with educational value which contributes directly to successful learning. Resources are commonly organised and provided by academics to assist students with their learning, and may be different in nature depending on factors such as discipline, subject, topic and lecturer. For example, the majority of on–course university subjects include lectures as a learning resource, yet the nature and delivery of the lecture is different for each individual lecturer. Learning resources may also include paper or electronic materials such as texts, documents and puzzles, as well as videos, software, and activities such as writing, presenting, acting and listening.

The learning resources should promote student engagement, but simple engagement is not enough; active learning is the key factor for successful learning (Kala et al., 2010). Active learning is the process of keeping students physically and/or mentally active in their learning through activities that involve them in gathering information, reflecting on concepts, problem solving (Collins & O'Brien, 2003), and assimilating the new information with their pre–existing knowledge. To promote active learning, the quality of the learning materials is crucial in both supporting the learning and influencing learning outcomes (Gerjets & Hesse, 2004; Woo & Kimmick, 2000). Students must actively engage with multiple learning resources which have clear educational purpose (Meyers & Jones, 1993). The role of the educator is to create an effective teaching–learning environment which, in accordance with constructivist theory, includes both active learning and quality learning materials (Kala et al., 2010).

Within the Bachelor of Nursing Science program at James Cook University (JCU), Townsville, Australia, the subject 'Human Pathophysiology and Pharmacology 2 (HPP2)' is offered by both internal (on–campus) and external (off–campus) modes. This subject relates the normal body function to the physiological changes that occur as a result of disease, the body's ability to compensate, and the pharmacological interventions that may be required to control the disease. Human Pathophysiology and Pharmacology 2 is divided into nine modules: infectious diseases, neoplasia, degenerative diseases and trauma to the central nervous system, central nervous system pharmacology, anti–inflammatory pharmacology, and the pathophysiology and pharmacology of the endocrine, reproductive and gastrointestinal systems. Pathophysiology is considered by students to be among the most difficult subjects in the nursing curriculum (Elberson, Vance, Stephenson, & Corbett, 2001) and students tend to record lower grades in these pathophysiology subjects (Salamonson & Andrew, 2006). Nursing students have also traditionally experienced difficulties in understanding pharmacology (Manias & Bullock, 2002) and express higher levels of dissatisfaction with these subjects when compared to others within the curriculum.

Numerous learning resources were developed for on–campus students studying HPP2. These included face-to-face lectures and tutorials, lecture slides, and textbook readings. As this

subject is also offered to off–campus students, additional resources such as podcasts (audio recordings) of lectures and workbooks were also prepared. The workbooks consisted of readings, short answer and extended match questions, puzzles and other activities. To be equitable to all students, the learning resource documents (lecture slides, workbooks) and podcasts were made available to both on-campus and off-campus students via an online course management system (*LearnJCU*). Learning resources offered to the off–campus students mainly differ in that they did not attend weekly lectures and tutorials. They did, however, attend a four–day on–campus intensive block of classes which involved a combination of didactic lectures, tutorials, small group work and discussions.

A previous study examining the engagement of off–campus HPP2 students with learning resources identified some interesting relationships between student use of learning resources and academic achievement. There were positive correlations between: the amount of student engagement with the learning resources and academic achievement; and the amount of active learning and academic achievement (Reinke, 2012). Clearly the interactions between the off–campus students and the resources were important in aiding or guiding their study. The present study assessed the engagement and active learning of on–campus students with learning resources.

To ensure students are attaining the learning outcomes, and to retain students through to degree completion, it is essential that they are provided with learning resources that are utilised, are effective in aiding student learning, and are enjoyable for students to use. We should be providing resources that encourage active learning in order to promote the building of knowledge by students. The present study aimed to examine the following in a cohort of Bachelor of Nursing Science students studying Human Pathophysiology and Pharmacology: examine the use of learning resources by on–campus nursing students, identify the degree of active learning associated with each learning resource, and ascertain whether engagement with resources can be correlated with academic achievement. This study also aimed to compare the engagement and active learning of the internal student cohort to the previously examined off–campus cohort (Reinke, 2012).

Methods

This research project was approved by the Human Research Ethics Committee at JCU (Approval Number H4318). Participation in this quantitative study was voluntary and responses were anonymous and confidential. Student volunteers were recruited from a second–level subject (Human Pathophysiology and Pharmacology 2, HPP2) within the Bachelor of Nursing Science degree at JCU that is delivered to on–campus students. An Information Sheet describing the aims and methods of the study was distributed to students at the conclusion of three tutorial sessions in the last week of semester; 89 students were invited to participate of which 62 responded.

Students were invited to complete an online questionnaire. The questionnaire was developed from literature analyses of current research, and collected information about student demographics, university grades and study habits. Responses were requested to 32 statements about the learning resources provided in HPP2 encompassing the degree of, and method in which students interacted with the resources, and the student's feelings about the learning resources. Students were asked to indicate their response to each statement on a five–point Likert scale where '5' represented high agreement with the statement and '1' represented low agreement with the statement. A Cronbach's alpha of 0.79 was obtained

from the responses to 32 statements as a measure of reliability (Coaley, 2010). The questionnaire was tested for face validity by a panel of academics, and had been tested for response validity on students enrolled in other degree programs (Burton & Mazerolle, 2011).

All data were analysed using *IBM SPSS Statistics 20* statistical software. Demographic and academic achievement data were investigated by using descriptive statistics: categorical variables were investigated by using frequencies; continuous variables were investigated using means (*M*), standard deviations (*SD*), and minimum and maximum. Responses to statements were presented as % (*n*) and averaged to provide an overall composite measure out of a possible score of 5, with higher scores indicating higher agreement. The strength of relationship between the statement responses were analysed using Spearman's Rank Order Correlation (rho) and interpreted using Cohen's (1988) guidelines: a small rho (.10 to .29) indicated a weak relationship, medium rho (.30 to .49) represented a moderate strength, and a large rho (.50 to 1.00) represented a strong relationship. The significance of test results was based on the traditional probability level of $p < 0.05$, as suggested by Coolican (1996).

Results

Student demographics
Sixty–two students responded to the invitation to complete the online questionnaire, of which 56 (90.3%) were female (Table 1). This male/female ratio of respondents reflects the ratio of the entire student cohort. The age of respondents ranged from 18 to 50 years of age, with a mean age of 28.0 years. About 25% of respondents were aged 20 years or younger. Private study hours per week ranged from zero to ten; on average, 4.4 hours were spent each week devoted to private study for this subject (Table 1). There was a medium strength positive relationship between the age of respondents and the number of private study hours completed per week, *rho* = .30, *n* = 55, *p* < 0.05.

Table 1: Characteristics and academic performance of on–campus nursing students

Characteristic	*N*	
Age (*M ± SD*) years	62	28.0 ± 8.8
(min/max) years		18/50
Sex (male/female) %	62	9.7/90.3
Private study (*M ± SD*) hours/week[*]	58	4.4 ± 2.7
Paid employment (*M ± SD*) hours/week	62	9.8 ± 10.7
(min/max) hours		0/40
Academic achievement in HPP2 (*M ± SD*) %	62	73.8 ± 9.4
High distinction (85-100%), % (*n*)		8.1 (5)
Distinction (75-84%)		46.8 (29)
Credit (65-74%)		32.3 (20)
Pass (50-64%)		9.7 (6)
Fail (0 - 49%)		3.2 (2)

[*]no response was recorded by four respondents

Approximately 58% (*n* = 36) of respondents were employed in paid work during the semester (Table 1). Time engaged in paid employment ranged from zero to 40 hours per week; on average, students completed 9.8 hours of paid work per week. The majority of employment (60%) was completed in the health sector, for example, in a nursing home or hospital. Over

90% of respondents were carrying a full–time study load (three or more subjects per semester).

Most of the students who participated in the survey where students who performed well academically; of the 62 respondents, 60 attained a passing grade or higher in HPP2 and two students failed the subject. The mean subject percentage for the participants was 74.2 (SD = 8.3; Table 1), but this was not representative of the entire cohort; many students who failed the subject did not complete the questionnaire. No relationship was found between the number of hours spent in private study per week and HPP2 academic achievement, however there was a negative relationship between the number of hours spent in employment each week and the percentage achieved in HPP2*, rho = -.47, n = 62, p < 0.01.*

Engagement with learning resources
Respondents were asked to indicate their use of the learning resources, using a five–point scale, where '5' indicated interaction with the learning resource for all of the modules in HPP2, and '1' indicated no interaction with the learning resource (Table 2). All resources were utilised for learning. Students interacted with the lecture slides, tutorials, lectures and workbooks for most or all of the modules; over 90% of students interacted with lecture slides for all of the modules in HPP2. Respondents interacted with the textbook and podcasts for few of the modules. There was a medium strength positive relationship between total interaction with learning resources and academic achievement in HPP2, *rho = .46, n = 61, p <* 0.01.

Respondents were asked to rate the learning resources based on how interesting, how useful, and how enjoyable the learning resources were for student engagement. Five–point Likert scales were used for each rating, where '5' represented very interesting/very useful/very enjoyable, and '1' represented not interesting at all/not useful at all/not enjoyable at all to engage with. The responses for each resource were collated and the mean and SD were used to compare scores between resources (Table 2).

All learning resources were rated as useful, all having mean scores above three (on the five–point scale; Table 2). Lecture slides, workbooks and lectures were rated as the most useful learning resources. The lecture slides, lectures and tutorials were rated as the most interesting and most enjoyable learning resources for student engagement. The textbook and podcasts were rated as the least interesting, the least useful and the least enjoyable of the learning resources for engagement.

Active learning
Students were asked to indicate how often their engagement with the learning resources involved physical activity such as taking notes, highlighting or summarising, and how often their engagement involved cognitive actions such as thinking about the information contained in the learning resources. These 'active' ratings were used to identify forms of active study techniques as opposed to passive techniques, for example listening to podcasts whilst taking notes (active), and listening whilst exercising (passive); rewriting lecture notes mapping ideas (active), and rewriting without thinking about the content (passive). These two active rating scores from physical and cognitive actions were pooled to form an active learning score (Table 3).

Table 2: On–campus nursing students' feelings about and interactions with the learning resources

	Lectures	Tutorials	Lecture slides	Podcasts	Workbook activities	Textbook
Interaction with resources	(*N* = 61)	(*N* = 61)	(*N* = 61)	(*N* = 61)	(*N* = 61)	(*N* = 61)
(Mean)	4.2	4.6	4.8	2.7	4.1	3.0
(SD)	1.4	0.8	0.6	1.4	1.1	1.5
5 = for all modules, % (*n*)	67.2 (41)	75.4 (46)	88.5 (54)	18.0 (11)	45.9 (28)	18.0 (11)
4	8.2 (5)	14.8 (9)	9.8 (6)	9.8 (6)	24.6 (15)	26.2 (16)
3	4.9 (3)	6.6 (4)	0 (0)	21.3 (13)	18.0 (11)	16.4 (10)
2	11.5 (7)	3.3 (2)	0 (0)	24.6 (15)	11.5 (7)	16.4 (10)
1 = for no modules	8.2 (5)	0 (0)	1.6 (1)	26.2 (16)	0 (0)	23.0 (14)
Useful in aiding learning	(*N* = 61)	(*N* = 61)	(*N* = 61)	(*N* = 61)	(*N* = 61)	(*N* = 61)
(Mean)	4.5	4.2	4.9	3.5	4.6	3.2
(SD)	1.0	1.0	0.4	1.5	0.7	1.4
5 = very useful, % (*n*)	70.5 (43)	54.1 (33)	85.2 (52)	36.1 (22)	66.7 (40)	21.3 (13)
4	14.8 (9)	23.0 (14)	14.5 (4)	21.3 (13)	23.3 (14)	24.6 (15)
3	8.2 (5)	16.4 (10)	0 (0)	18.0 (11)	8.3 (5)	23.0 (14)
2	3.3 (2)	4.9 (3)	0 (0)	6.6 (4)	1.7 (1)	14.8 (9)
1 = not useful	3.3 (2)	1.6 (1)	0 (0)	18.0 (11)	0 (0)	16.4 (10)
Interesting to engage with	(*N* = 62)	(*N* = 61)	(*N* = 62)	(*N* = 61)	(*N* = 60)	(*N* = 62)
(Mean)	4.2	4.0	4.2	2.9	3.9	2.9
(SD)	1.2	1.0	0.8	1.3	1.0	1.4
5 = very interesting, % (*n*)	51.6 (32)	37.7 (23)	40.3 (25)	11.5 (7)	30.0 (18)	17.7 (11)
4	29.0 (18)	37.7 (23)	38.7 (24)	27.9 (17)	35.0 (21)	21.0 (13)
3	8.1 (5)	16.4 (10)	21.0 (13)	21.3 (13)	26.7 (16)	19.4 (12)
2	4.8 (3)	4.9 (3)	0 (0)	18.0 (11)	8.3 (5)	21.0 (13)
1 = not interesting	6.5 (4)	3.3 (2)	0 (0)	21.3 (13)	0 (0))	21.0 (13)

	Lectures	Tutorials	Lecture slides	Podcasts	Workbook activities	Textbook
Enjoyable to engage with	($N = 59$)	($N = 59$)	($N = 59$)	($N = 59$)	($N = 59$)	($N = 59$)
(Mean)	3.9	4.1	4.1	2.5	3.7	2.3
(SD)	1.4	1.1	1.1	1.4	1.3	1.5
5 = very enjoyable, % (n)	57.6 (34)	54.2 (32)	49.2 (29)	15.3 (9)	35.6 (21)	11.9 (7)
4	10.2 (6)	16.9 (10)	20.3 (12)	8.5 (5)	23.7 (14)	16.9 (10)
3	8.5 (5)	16.9 (10)	23.7 (14)	15.3 (9)	22.0 (13)	5.1 (3)
2	15.3 (9)	10.2 (6)	1.7 (1)	30.5 (18)	11.9 (7)	18.6 (11)
1 = not enjoyable	8.5 (5)	1.7 (1)	5.1 (3)	30.5 (18)	6.8 (4)	47.5 (28)

Table 3: Physical and cognitive learning of on–campus nursing students when using the learning resources

	Lectures	Tutorials	Lecture slides	Podcasts	Workbook activities	Textbook
Physical activity	($N = 60$)	($N = 60$)	($N = 62$)	($N = 62$)	($N = 62$)	($N = 61$)
(Mean)	4.4	4.3	4.7	3.3	4.1	2.7
(SD)	1.3	1.1	0.8	1.6	1.3	1.5
5 = for all interaction, % (n)	75.0 (45)	58.3 (35)	79.0 (49)	33.9 (21)	54.8 (34)	19.7 (12)
4	10.0 (6)	28.3 17)	14.5 (9)	16.1 (10)	21.0 (13)	11.5 (7)
3	3.3 (2)	1.7 (1)	1.6 (1)	16.1 (10)	11.3 (7)	21.3 (13)
2	1.7 (1)	6.7 (4)	3.2 (2)	11.3 (7)	4.8 (3)	18.0 (11)
1 = never during interaction	10.0 (6)	5.0 (3)	4.6 (1)	22.6 (14)	8.1 (5)	29.5 (18)
Cognitive activity	($N = 58$)	($N = 59$)	($N = 58$)	($N = 59$)	($N = 59$)	($N = 60$)
(Mean)	3.6	3.5	3.7	2.8	3.4	2.9
(SD)	1.5	1.4	1.3	1.4	1.3	1.4
5 = for all interaction, % (n)	36.2 (21)	28.8 (17)	31.0 (18)	10.2 (6)	20.3 (12)	15.0 (9)
4	27.6 (16)	33.9 (20)	32.8 (19)	27.1 (16)	33.9 (20)	23.3 (14)
3	10.3 (6)	13.6 (8)	19.0 (11)	18.6 (11)	25.4 (15)	21.7 (13)
2	8.6 (5)	8.5 (5)	8.6 (5)	18.6 (11)	8.5 (5)	15.0 (9)
1 = never during interaction	17.2 (10)	15.3 (9)	8.6 (5)	25.4 (15)	11.9 (7)	25.0 (15)
Total learning activity[*]	($N = 58$)	($N = 57$)	($N = 58$)	($N = 59$)	($N = 59$)	($N = 59$)
(Mean)	7.9	7.8	8.4	6.0	7.5	5.6
(SD)	2.5	2.3	4.6	2.6	2.1	2.6

[*]total learning activity = physical activity + cognitive activity

Students usually used active study techniques when engaging with the learning resources for HPP2 (Table 3). Respondents reported the highest levels of physical and cognitive activity when engaged with the lecture slides, lectures, tutorials and when using the workbooks. Scores for both physical and cognitive activity were lowest when students were using the textbook and podcasts; about 10% of students reported that they always listen to podcasts when they are occupied by another activity such as driving or exercising. When engaging with all learning resources except the textbook, students reported higher levels of active physical compared to active cognitive learning activities. There was a medium strength positive relationship between total active learning scores and academic achievement in HPP2, *rho* = .33, *n* = 53, *p* < 0.05.

Discussion

The continuing increase in number and diversity of the population of university students compels teaching staff to focus more attention to the delivery of quality education (Bradley, Noonan, Nugent, and Scales, 2008). Adjustment to the delivery of subject content may be needed to ensure an enriching and complete educational experience is available to all students in order to support retention and student success. This is of particular importance in degrees such as pre-registration nursing which are bound by professional standards, and also in disciplines such as pharmacology and pathophysiology which are traditionally considered by nursing students to be difficult subjects (Elberson et al., 2001; Manias & Bullock, 2002). The implementation of Tertiary Education Quality and Standards Agency standards may also have effect on content delivery to ensure threshold learning outcomes are met (Australian Qualifications Framework Council, 2011)

Most students involved in the present study were not traditional Australian university students (Department of Education, Employment and Workplace Relations, 2011). The majority of students were over the age of 21 years, employed for an average of 9.8 hours per week, and carried a full–time study load. More mature students dedicated a greater time commitment to private study each week. The choice or requirement of students to complete part–time employment while studying at university has been shown to have negative consequences to university grades (Rochford, Connolly, & Drennan, 2009; Salamonson & Andrew, 2006; Wenz & Yu, 2010) and this is supported by the present study (see Table 1). However the employment of nursing students within the health sector may have some positive outcomes for the final graduate in both workplace experience and career advancement. Such employment also makes an important contribution to the health industry.

Academic engagement involves the interaction of students with the learning content (provided via learning resources) to construct meaning and promote deep learning (Thomas, 2012). Engagement is a key factor in student success; the overall amount of engagement with the learning resources showed a positive relationship with academic success in the subject. Students are more likely to engage with a learning resource if they find it interesting, enjoyable to use, and effective in helping them to learn. Students in the present study engaged with all the learning resources to some degree; however, they engaged more often with lecture slides, tutorials, lectures and workbooks. These four resources were also considered favourably when rated for how interesting, useful and enjoyable they were for student engagement.

The value of lectures as a learning resource has been questioned due to the history of didactic presentation of material making such lectures passive learning experiences for students (Holt,

Rice, & Armakas, 2003). The lectures in HPP2 were designed to be active learning experiences for students and data demonstrated that students were physically active in taking notes, discussing concepts and answering questions, and also mentally challenged to reflect, think critically, and assimilate the information. The lecture slides were useful when used in conjunction with the face-to-face lectures, to produce a set of learning notes, and as a guide for further inquiry.

Completion of the workbook activities involved problem solving and the application of knowledge, often requiring use of the other learning resources. The workbook activities sometimes included clinical cases and applications relevant to nurses and nursing students, and were designed to promote knowledge discovery and active learning. On–campus students recorded high engagement with the workbooks, as well as high active learning with this resource. An earlier study of off–campus HPP2 students using the same workbooks reported low engagement and low active learning when using the workbooks; several of these off–campus students commented that workbooks would be more useful if answers were also supplied (Reinke, 2012). Although a specific set of answers were not supplied in the current study, it is possible that the on–campus students were able to obtain feedback on their workbook answers more easily than the off–campus students, and hence made the engagement with the workbooks a more valuable activity. On–campus students had the opportunity to work together with peers, and could have approached lecturers in person, either in class (weekly lectures and tutorials) or during consultation hours, for discussion and clarification of answers. Off–campus students had the opportunity to contact lecturers by email or phone, but personal or electronic contact was not built in to the normal weekly schedule. Perhaps the convenience and opportunities for feedback made engagement with the workbooks seem more worthwhile for the on–campus students.

With increasing external demands on student time, including paid employment, it was anticipated that student engagement with podcasts would show high ratings. Podcasts are popular with many on–campus students as they allow for note taking at their own pace, to assist students who cannot attend lectures, and to revise for examinations and assignments (Copley, 2007). Students in the present study preferred to attend the live lectures, and make use of the lecture slides during this time, instead of relying on the podcasts for this learning experience; both lectures and lecture slides showed high ratings for engagement, and podcasts rated much lower. As expected, the on–campus students did not engage with podcasts as often as the off–campus students (Reinke, 2012) as the on–campus students had the option of, and also preferred, attending the live lectures.

On–campus students reported low engagement with the prescribed textbook, and rated the textbook low for enjoyment to engage with, interest and ability to aid learning. Many of the images from the textbook were included in the lecture slides; this may have decreased the need or incentive of students to use the textbook. In a curriculum based around learning resources, the resources need to make a unique contribution to student learning in order to be useful (Holt et al., 2003). Students may not have believed the prescribed textbook was a vital component of learning (Berry, Cook, Hill, & Stevens, 2011) and so did not engage. Competing demands on students' time, such as employment, may also have played a role (Barnett, 1996). Brost and Bradley (2005) suggest that students are unlikely to complete assigned text readings as they do not understand the purpose of the readings. It is possible that the students in the present study did not engage often with the textbook as they were not sufficiently guided as to why the textbook readings were recommended, did not have time to

complete the readings, and/or felt that the material covered in the textbooks had been duplicated by other learning resources.

On–campus nursing students used physically and cognitively active study techniques when utilising the lecture slides, workbooks, and when in lectures and tutorials. The positive relationship between total active learning scores and academic achievement reinforces the importance of active learning for students (Michael, 2006). This relationship was also observed in the off–campus cohort of HPP2 students (Reinke, 2012). The style or nature of a learning resource may promote active engagement, but in reality, how students engage with learning resources and their study strategies, are also moulded by their past learning experiences (Prosser & Trigwell, 1999). For example, lectures, podcasts and tutorials can be passive or active learning experiences largely dependent upon the type of resource and the study strategies the student applies to the learning process.

With the massification of higher education, it is expected that the diversity of the student population will further expand. As such, it is important for teaching staff to understand the demographics and learning needs of their students to ensure suitable learning resources are provided for student learning. The present study identified learning resources that on–campus nursing students engaged with often, and actively i.e. lectures, lecture slides, tutorials, and workbooks, but not podcasts. Comparison with an earlier study highlighted that the learning resources engaged with by on–campus students differed to that of off–campus students; off–campus students reported higher engagement and active learning with the face-to-face intensive, lecture slides and podcasts, but not the workbooks (Reinke, 2012). The overall amount of engagement with the learning resources, and active learning showed positive relationships with academic success in the subject, for both on–campus and off–campus cohorts. These findings emphasised the need for teaching staff to monitor if, and how, the learning resources are being utilised by students towards reaching the learning outcomes of a subject. Providing resources that foster active learning and academic engagement are likely to promote this end.

Conclusion

This study suggests the style of the learning resources is an important factor in promoting student engagement and academic success, but the way in which students choose to engage with the resources is also significant – students who engaged actively with learning resources were more likely to perform well on assessments. Identification of the strategies students are using to learn pathophysiology and pharmacology, and the development of discipline-specific skills in students might be key in promoting student success, along with the provision of high quality and effective learning resources.

Acknowledgements

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