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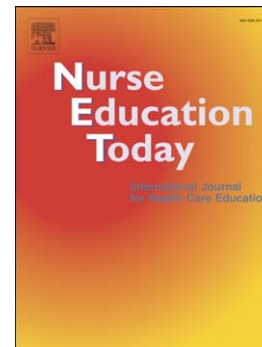
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THE IMPACT OF TIMETABLE CHANGES ON STUDENT ACHIEVEMENT AND  
LEARNING EXPERIENCES

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## ABSTRACT

### Background

Many pre-registration nursing programs in Australia use distributive models of clinical placement whereby students attend placement on regular days each week of the teaching semester. The use of this model offers practical advantages by increasing the placement offerings, but reduces the weekdays available for students to attend on-campus classes. The impact of introducing this model on the delivery of on-campus classes has not been examined.

### Objectives

The aim of this study was to explore the impact of delivering classes using a condensed weekly timetable on the academic achievement, learning experiences and approaches to learning of pre-registration Bachelor of Nursing Science students at an Australian regional university.

### Methods

This was a mixed methods study, including Likert-type and free text responses. Second-year students studying *Human Pathophysiology and Pharmacology* were invited to complete a questionnaire about their learning practices and experiences; student grades were obtained from official university records.

### Results

The academic achievement of students learning under the condensed class schedule was approximately 7.5% lower than that achieved by cohorts prior to the timetable changes. This resulted in an additional 9% of the cohort failing the subject compared to previous cohorts. Many students reported that they did not prepare adequately for classes and that their learning experiences were negatively impacted by the condensed class timetable.

### Conclusions

The incorporation of a distributed model for clinical placements required major changes to the delivery of on-campus coursework classes and added to the semester workload for some Nursing Science students. These changes coincided with lower academic achievement by students learning *Human Pathophysiology and Pharmacology* and poorer quality learning experiences. The development of students' awareness of how they study and the effectiveness of their study practices may help them to develop self-regulated learning skills which will assist them to succeed in diverse learning environments and workplaces.

## INTRODUCTION

A sizeable proportion of the nursing workforce in Australia is approaching retirement age and with the increasing population age (Commonwealth of Australia, 2010; National Health Workforce Taskforce, 2009), anticipated workforce shortages are predicted. In response to this and the Australian government's uncapping of domestic university places, tertiary institutions are offering greater numbers of undergraduate Nursing Science undergraduate admissions (Courtney-Pratt et al., 2012). Increases in enrolments have brought about challenges to the delivery of the curriculum to larger class sizes (Biggs, 1999; Jaffer et al., 2007; Mulryan-Kyne, 2010) and these challenges are further complicated by the greater diversity of student demographics (Biggs, 1999; Mulryan-Kyne, 2010). The delivery of programs that require professional workplace experience, such as Nursing Science, have been impacted even further due to the additional demand on hospitals and other health care settings to accommodate the increased student numbers.

Nursing pre-registration courses in Australia are accredited by the Australian Nursing and Midwifery Accreditation Council (ANMAC) who approve curricula designed to prepare students for registration as a nurse (ANMAC, 2012). Each higher education institution with a program accredited with ANMAC has its own model of integrating clinical experiences within the curriculum – this includes variations in the type of clinical setting, number of students in any given unit, style of facilitation, time of engagement and pattern of engagement in the workplace setting (Andre and Barnes, 2010; Bourgeois et al., 2011; Courtney-Pratt et al., 2012). Clinical placements may be scheduled in a 'block' mode in which a student attends for a week or longer at a time, a 'distributed' pattern in which a student attends on regular days each week during the semester, or a combination of these attendance modes (Levett-Jones and Bourgeois, 2015). The schedule of clinical placement has the potential to impact greatly on the lives of students; block mode can be difficult for students who have family, and financial and social commitments outside the normal 'student' hours, and distributive models can greatly decrease students' private time available for preparation, study and other activities during the semester.

## BACKGROUND

University programs, such as the Bachelor of Nursing Science, prepare students for entry level nursing positions by ensuring appropriate content knowledge and skills are achieved throughout the course of the degree. These goals are achieved by progress through a series of coursework subjects as well as clinical or professional placements. These professional experience placements allow students to gain supervised and guided experience in the clinical setting, allowing them to develop and apply the skills required for nursing practice. According to ANMAC regulations, workplace experience should be "sufficient to enable safe and competent nursing practice by program completion" (ANMAC, 2012), and so placement activities demand a considerable time commitment from students during their formal education. Effectual achievement in these placements is essential for progression through,

and completion of, the degree program, as they provide both *hands-on* learning experiences and exposure to clinical practice which in turn allows the opportunity for integration of theory with the practice of caring for clients (Chapman and Orb, 2000). During the course of their program, nursing students must also attain the skills that enable them to keep up with the growth of knowledge and expertise in their professional domain, that is, they must also become self-regulated learners (Zimmerman, 2002).

At James Cook University, situated in north Queensland, Australia, the second-year of the Bachelor of Nursing Science pre-registration program requires students to complete four subjects per semester for a full-time student load. In semester 2, three of these subjects are coursework: *Human Pathophysiology and Pharmacology*, *Indigenous Health Studies for Nursing and Midwifery*, and one of three possible elective subjects: *Specialist Nursing in Northern Australia*, *Rural and Remote Nursing*, or *Clinical Leadership and Management*. In addition, *Clinical Nursing Practice 4*, a subject requiring professional experience placement in a hospital or health care setting is completed. In 2013, to accommodate the requirement for some students to complete clinical placement during the semester, the timetable for scheduled on-campus classes was reduced to three days per week for the duration of the ten-week semester. Due to the limited available lecture theatres that could accommodate this large cohort, students were required to attend all five pathophysiology and pharmacology lectures in one day. These lectures were interspersed with lectures for *Clinical Nursing Practice 4*. The timetable for the following day included a one-hour pathophysiology and pharmacology tutorial and a four-hour professional experience workshop for clinical placement. Lectures for *Indigenous Health Studies for Nursing and Midwifery* were conducted the next day. Lectures and tutorials for the elective subjects were conducted in block mode outside this teaching period.

Science disciplines such as pathophysiology and pharmacology have often been described as difficult for nursing students to learn (Elberson et al., 2001; McKinney and Page, 2009; Reinke, 2014; Salamonson and Lantz, 2005), yet an understanding of pathophysiology is vital to support safe clinical practice (McKinney and Page, 2009). These subjects typically contain a dense curriculum including difficult concepts and complex relationships between concepts. Also, as with other science subjects, pathophysiology and pharmacology use their own distinct languages, including many words stemming from Latin and Greek roots. As many nursing students do not have strong science backgrounds, nor speak Greek or Latin, this makes the learning of science subjects even more difficult for these students. There are advantages to completing clinical placements concurrent with the theory of disease, disorders, injury, and drugs, as this offers the opportunity for theoretical learning to be reinforced and complemented by real-life exposure to both patients and disease management. This combination of learning experiences help to reinforce the learning process, encourage engagement in learning and promote high quality nursing practice, however, both demand a considerable time and energy commitment to achieve.

The constructivist theories of learning focus on the learner building knowledge (Biggs and Tang, 2007); individuals construct their own understanding and knowledge of the world, through facing new experiences and then reflecting on those experiences (Mahoney, 2004).

Existing knowledge then makes up the foundation and new information is built on and around what the learner already knows (Michael, 2007). One of the key principles of constructivist practice is the process of deep personal introspection into one's own learning process (Brooks and Brooks, 1999), thus the process of learning takes time. The amount of time spent engaged in learning activities, reflecting on learning and the way in which students engage with resources are important factors in learning (Reinke, 2014). For efficient and effective learning to take place, students need to be involved in engineered learning experiences – therefore attendance and attentiveness (engagement) in classes scheduled as part of the curriculum are important for learning and in turn, academic performance (Credé et al., 2010; Gunn, 1993; Hammen and Kelland, 1994; Moore et al., 2003; Van Blerkom, 1992). Alterations to the student workload by the inclusion of clinical placement sessions for two days each week, and changing the delivery of on-campus classes into fewer days per week, may therefore impact on students' approaches to learning, learning experiences and academic achievement.

The aim of this study was to explore the impact of delivering classes using a condensed weekly timetable on the academic achievement, learning experiences and approaches to learning pathophysiology and pharmacology, of pre-registration Bachelor of Nursing Science students at an Australian regional university.

## METHODS

### Design

This was a mixed methods study using a combination of questionnaire responses and university records for data collection. The questionnaire collected information about student demographics, responses to statements regarding student learning practices and experiences, and comments on student learning experiences. It consisted of six closed- and one open-ended question. Part 1 collected information about student demographics (sex, year of birth, student identification number, permission to access grades, number of hours in paid employment/week). Information about students' learning experiences were collected in Part 2 of the questionnaire; using a five-point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree) participants responded to nine statements about their study for pathophysiology and pharmacology and the timetabling of classes (see Table 3 for the list of statements). Students were also invited to comment on their experiences learning pathophysiology and pharmacology in an open-ended question.

### Data Collection

Bachelor of Nursing Science students enrolled in *Human Pathophysiology and Pharmacology* at JCU were invited to complete a questionnaire during the second last week of the teaching period. Student grades and overall position (OP; tertiary entrance) scores for the cohort were obtained from official university records. The overall position (OP) score is a rank order position from one (highest) to 25 (lowest) based on overall achievement. The OP score is used to rank students for entrance to courses at tertiary institutions (Queensland

Curriculum and Assessment Authority, 2017). This study was part of a larger project and other results will be published elsewhere.

### Ethical Considerations

This research project was approved by the Human Research Ethics Committee at JCU (Approval Number H4941). Participation in completing the questionnaire was voluntary and responses were deidentified following the inclusion of grades at the end of semester.

### Data Analysis

Quantitative data were analysed using the statistical software IBM SPSS version 20.0. 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 ( $SD$ ), minimum and maximum. Likert scale answers were scored where “Strongly Agree” = 1 to “Strongly Disagree” = 5. The strength of relationship between the variables were analysed using Spearman’s 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 statistical significance was set to 0.05, as suggested by Coolican (1996). Student entrance scores and grades (percentages) were analysed using one-way analysis of variances (ANOVAs). Where sample sizes were not equal, post hoc Scheffé tests were used to further investigate relationships between subgroups (Sheskin, 1997). Grade distributions were examined using chi-square tests followed by z-tests. When less than five observed frequencies were present in each cell, a Fischers’ exact test was performed to examine the relationships between variables.

Qualitative data was managed using *QRS NVivo 10*. An inductive approach to data analysis was performed by analysing the transcripts and identifying themes within those data.

## RESULTS

Eighty-four students participated in the study. Participants were aged between 19 to 58 years, with a mean age of  $27.95 \pm 9.8$  years (Table 1) and the majority (88%) of participants were female. The gender ratio and age of participants reflect the dominant female bias and the age distribution of the entire cohort of students. Participants completed an average of approximately 12 hours of paid employment per week (Table 1).

[insert table 1]

There was a statistically significant difference in student academic achievement in pathophysiology and pharmacology from 2011 to 2013, ( $F(2,782) = 49.7, p < .001$ ). Post hoc

comparisons indicated that the mean percentage achieved in the subject by the 2013 cohort was significantly less than that achieved by the 2012 and 2011 cohorts. There was no significant difference in the tertiary entrance (Overall Position, OP) scores for these cohorts (Table 2) and no relationship between the number of hours working in employment per week and academic achievement (percentage).

[insert table 2]

At the end of the semester, the academic achievement of each student was categorized into grades using the following criteria: High distinction (85-100%), Distinction (75-84%), Credit (65-74%), Pass (50-64%) and Fail (0-49%). The proportion of students awarded these grades was significantly different across the three years,  $\chi^2(8, n=814) = 82.10, p < .005$  (Figure 1). The proportion of the students awarded grades of Pass and Fail were significantly greater in 2013 compared to 2012 ( $p < 0.05$ ) and 2011 ( $p < 0.05$ ). The grades of Credit and Distinction were awarded to a greater proportion of students in 2011 and 2012 compared to 2013 ( $p < 0.05$ ). The proportion of students awarded the High Distinction grade did not change from 2011 to 2013. In summary, there was a shift in student grades from 2011/2012 to 2013 with a larger proportion of students achieving in the Pass and Fail categories and less in the Credit and Distinction categories in 2013.

[insert Figure 1]

Participants were asked to indicate their level of agreement with a series of statements regarding their study for pathophysiology and pharmacology and the timetabling of classes (Table 3). In general, students completed little preparatory work for lectures; more than half (53.6%) of the participants indicated that printing the lecture slides was their only preparation for each lecture and only 16.7% of respondents indicated that they read the appropriate sections of the textbook before attending lectures. In hindsight, 57.1% of participants agreed that they should have done some reading before each of the lectures and 75% of participants indicated that if pre-lecture activities were available, that they would have worked on them prior to attending the lectures (Table 3).

[insert table 3]

More than half the participants (64.3%) found that the delivery of all pathophysiology and pharmacology in one day per week made the subject difficult to study, yet approximately one



third of students (35.7%) liked this schedule. Towards the end of semester, approximately one third of students (31.0%) were confident in their ability to address the learning objectives for the subject on the final examination. Approximately 40% of participants indicated that they found the subject difficult due to the content of the lectures and over 50% indicated that they found the subject difficult mainly due to the delivery of classes within a condensed timetable. Examination of the relationships between agreement with each of these statements and academic achievement revealed a significant, medium strength relationship between academic achievement (percentage) and the subject being difficult due to the content of the lectures,  $r = -.304$ ,  $n = 54$ ,  $p < .026$ . Lower achieving students indicated that studying the subject was difficult due to the content (Table 4).

[insert table 4]

Participants were asked to comment on their experiences learning pathophysiology and pharmacology. Four main themes emerged from the responses: Lecture schedule; Additional support for learning; Alignment of content; and Content quantity.

#### Lecture schedule

The timetable was the main focus for student comments with more than half of the comments ( $n=38$ ) made by participants focused on the scheduling of classes. Some students ( $n=5$ ) felt the delivery of five pathophysiology and pharmacology lectures in one day was a positive aspect of the timetable:

“I do like getting the content given to us like this, to have more time at home to study.”

However, the majority of comments about the timetable ( $n=33$ , 86.8%) were focused on negative experiences with, or negative feelings about the condensed schedule. Some participants felt that if the pathophysiology and pharmacology lectures were spread out over more days of the week, it would have improved their learning experience:

“with topics as complicated as those covered in PP2231 (*Human Pathophysiology and Pharmacology*), I honestly believe it takes time to learn. I enjoy the content, however struggle learning so much in one day. If lectures were spaced out during the week it would make learning much more effective and enjoyable.”

“if the timetable was spread out a little more it would make studying easier as we s(h)ould have more time to understand the content.”

Noted difficulties brought on by the delivery of many hours of lectures in one day were problems with attention and concentration:

“I feel there is no physical way we can take in 7 hours of lectures in one day”

“not to put 7+ hours of vital learning in one day. The average attention span is a lot less than this. you are setting us up for failure.”

“the timetable does make it difficult to maintain concentration through the whole day...”

A small number of participants (n=4) commented that their learning experience could be facilitated by setting aside one day of the week for pathophysiology lectures and moving the classes for other subjects to another day of the week:

“as we have other subject lectures (such as NS2214) on the same day, it should be (a) separate whole day, just for PP (*Human Pathophysiology and Pharmacology*) lectures with sufficient break”

Alternative suggestions offered were to move all the pathophysiology lectures to another day of the week (other than Monday) – this was proposed to allow more time for preparation before the classes:

“having the lectures on a monday, i think, made it more difficult to prepare for it, due to work/other commitments on the weekend.”

“Don't have lectures on a monday; most students work on weekends, so i find it hard to prepare before Monday...”

#### Additional support for learning

There were a number of suggestions offered that might support learning in this subject. One student identified the physical space of learning to be important:

“organise a better, bigger room with more comfortable tables and chairs. it is hard to concentrate if you are not comfortable.”

Other comments were focused on the order and timing in which content was delivered from week to week:

“study patterns were strongly disrupted by having tutorials that did not line up with the lectures”

“...it was difficult that our tutorial (content) was one week behind lectures.”

“would help if PP (*Human Pathophysiology and Pharmacology*) was linked to nursing lectures every week”

#### Content quantity

A small number of participants (n=4) commented on the dense pathophysiology and pharmacology curriculum with expressions of “too much content” and “less content”.

## DISCUSSION

The professional experiences of clinical placements allow students to learn and gain competency and confidence in performing nursing skills, and also to assimilate theoretical knowledge with experiences in the workplace. The addition of a distributed model of clinical placement necessitated major changes to the delivery of coursework classes involved in the Bachelor of Nursing Science at JCU. This study explored the consequences of these timetable changes on the academic performance and learning experiences of second-year nursing students studying pathophysiology and pharmacology.

The inclusion of a distributed placement model brought about two major changes for the students learning *Human Pathophysiology and Pharmacology* in 2013:

1. Dramatic alterations to the timetable – the delivery of all lectures, tutorials and workshops were condensed into three days per week. This affected the entire cohort of students.
2. Some students completed clinical placement during semester as part of the distributed placement model, which increased their workload by two days per week and reduced their time available for study.

The changes to the class timetable and, for some students the timing of clinical placement, coincided with lower academic achievement of the cohort and a greater number of students failing the subject. The majority of students reported that the scheduling of all pathophysiology and pharmacology lectures in one day of the week made the subject difficult to study, and negatively impacted on their learning experiences. Few students adjusted their learning strategies to accommodate the timetable changes.

Students learning pathophysiology and pharmacology within this program have performed well over recent years (Table 1; Reinke, 2014) when only a block model for placement was in place and their timetabled classes were distributed over five days per week. These changes to the placement model and class timetable coincided with a significant decrease in the academic performance of students learning pathophysiology and pharmacology; student academic achievement was approximately 7.5% lower than the previous two years and fewer students achieved grades in the higher categories of Credit and Distinction.

The negative impact of external commitments and activities, in particular, paid employment, on the academic performance of nursing students has been documented by several studies (Pitt et al., 2012; Reinke, 2014; Rochford et al., 2009; Salamonson and Andrew, 2006; Salamonson et al., 2009), with Salamonson and Andrew (2006) reporting that working more than 16 hours per week had a detrimental impact on the academic performance of nursing students. The most logical explanation for this relationship is that of “time spent on task” – in general, students who have fewer external obligations (or a lighter workload) have more time available to commit to study. Within the present study, participants dedicated, on average, 12 hours towards paid employment each week which is similar to that of earlier *Human Pathophysiology and Pharmacology* cohorts at JCU (Reinke, 2014), however some students

in the present study were committed to an additional two days of “work” each week in the form of clinical placement. This would have greatly decreased their time available for study and, as the more time students spent engaged in study has been positively associated with academic achievement (Reinke et al., 2014), this may have contributed to the lower academic achievement of the 2013 cohort. There was no relationship between the number of hours students were engaged in paid employment and the grade achieved for this cohort, possibly because the data was collected from students who were completing distributed placement during the semester as well as those students who would complete block placement after semester finished. Thus, it is possible that the combined data from these two groups masked any relationship between employment hours and grades, that may have existed.

The pathophysiology and pharmacology disciplines have traditionally been delivered by guiding students through concepts in the lectures, and then, by using accompanying resources, students work through concept- and case-based questions in tutorial classes. Typically, a module or group of related lectures starts by revision of the relevant anatomy and physiology, followed by discussion of the disease or dysfunction, the relevant diagnostics, and finally intervention and management options. If there has been insufficient time for students to assimilate the earlier concepts, sequential course material will be disconnected and isolated. This may explain why approximately two thirds of the participants in this study identified the condensed timetable as the main reason that *Human Pathophysiology and Pharmacology* was difficult to study.

The delivery of many content-dense lectures in one day was a concern for many students with regard to their attention span and ability to concentrate throughout the seven hours of lectures delivered on that day of the week. Several students commented that the new schedule left them exhausted and some expressed angst at the schedule, as it was “setting us (them) up for failure”. The attention of students in lectures is thought to be maintained for up to fifteen minutes after which, it drops off rapidly unless a change in activity or rest are imposed (Biggs and Tang, 2007). Students were expected to remain attentive and engaged for four hours of lectures followed by a one hour break and then another three hours of lectures. Classroom attentional focus is also a prerequisite to further cognitive processing of information, therefore it is required for deep learning to occur (Lau et al., 2008). Students who were unable to retain focus for the duration of the lectures may have felt when revising their notes, that they were not familiar with the lecture content or terminology. This could prove quite discouraging for the learner who has persevered through many hours of lectures, which resulted in disappointing retention or understanding of the subject matter. This could partly explain why the lower achieving students indicated that they felt the content of the lectures was difficult to learn.

Achieving deep learning, or learning with understanding, is one important goal of higher education (Beattie et al., 1997). A deep approach requires the learner to establish links between new and existing information and to derive logical associations between areas of new learning (Bandaranayake and Harden, 2013); hence, achieving deep understanding requires more time compared to that required for rote memorisation or surface learning approaches. The delivery of pathophysiology and pharmacology classes across two days/week may have

created a *time-constrained* learning environment that encouraged surface learning or at the very least, discouraged the time intensive deep learning; the change in timetable corresponded with a shift in the proportion of students achieving the higher grade categories of Distinction and Credit, to that of Pass and Fail. Applying a surface approach to learning can be effective if the learning goals and assessment is geared towards simple concepts and fact recall. This approach may be detrimental to academic performance if the goal of assessment is to promote the application of knowledge, problem solving and critical thinking, as it is for complex disciplines such as pathophysiology and pharmacology. Students unwittingly choosing a surface approach to learning may have contributed to the lower achievement of the cohort in 2013 when compared to previous years.

The completion of pre-lecture preparatory tasks is viewed by many lecturers as a key learning strategy – reviewing prerequisite concepts and even a low level of familiarization with new terminology and new concepts can be very helpful to student comprehension during lectures (Seery, 2012). In the present study, the majority of participants recognized that there would have been benefits to completing pre-lecture tasks by indicating that, in hindsight, they should have engaged with the allocated pre-lecture textbook readings for this subject. Students' awareness of how they approach study and the effectiveness of these study practices in a given learning environment are important steps in successful learning and becoming self-regulated learners. These responses suggest that students approached learning in this challenging environment with the same strategies as they used when attending classes within a more traditional, well-spaced timetable, and although they may have reflected on their learning environment and strategies, they did not make adequate adjustments. This was likely to have made maintaining attention and interest during the lectures and understanding the content more difficult. Further development of more appropriate skills would most likely assist students in future learning endeavors, both in their university theoretical and practical learning and also as part of their professional development.

The results of this study highlight that the delivery of five hours of content heavy lectures in one day each week of semester appears to have placed an unreasonable demand on student attention considering the students preferred study strategies and strategies, which coincided with lower cohort academic achievement. This timetable offered little opportunity for assimilation of the content delivered before subsequent material was presented, nor did it allow students to utilize new material in a practical or applied fashion through tutorial work, or experience it during placement sessions. Despite the difficulties experienced with this class timetable and an increased workload for some students because of the completion of clinical placement during the semester, few students prepared adequately for class each week. Students did not change their usual study practices even though they found the learning environment to be more difficult compared to their 'regular' timetable.

## CONCLUSIONS

The delivery of five pathophysiology and pharmacology lectures in one day per week of semester was introduced into the Nursing Science program at JCU in 2013 to accommodate the completion of nursing professional experience placements concurrent with semester classes. The academic achievement of the cohort of students learning *Human Pathophysiology and Pharmacology* showed that although similar percentages of Nursing Science students excelled academically with this condensed schedule, fewer achieved Distinction and Credit grades. The lower overall academic achievement of the cohort along with questionnaire responses suggest the condensed timetable for class delivery negatively impacted on both student learning and their learning experiences. Students studying within this new schedule showed little inclination to adjust their learning strategies to accommodate the timetable and workload changes. The development of self-regulated learning skills is recommended as a means to assist students in their university theoretical and practical learning, and also to keep up with the growth of knowledge and expertise in their professional domain.

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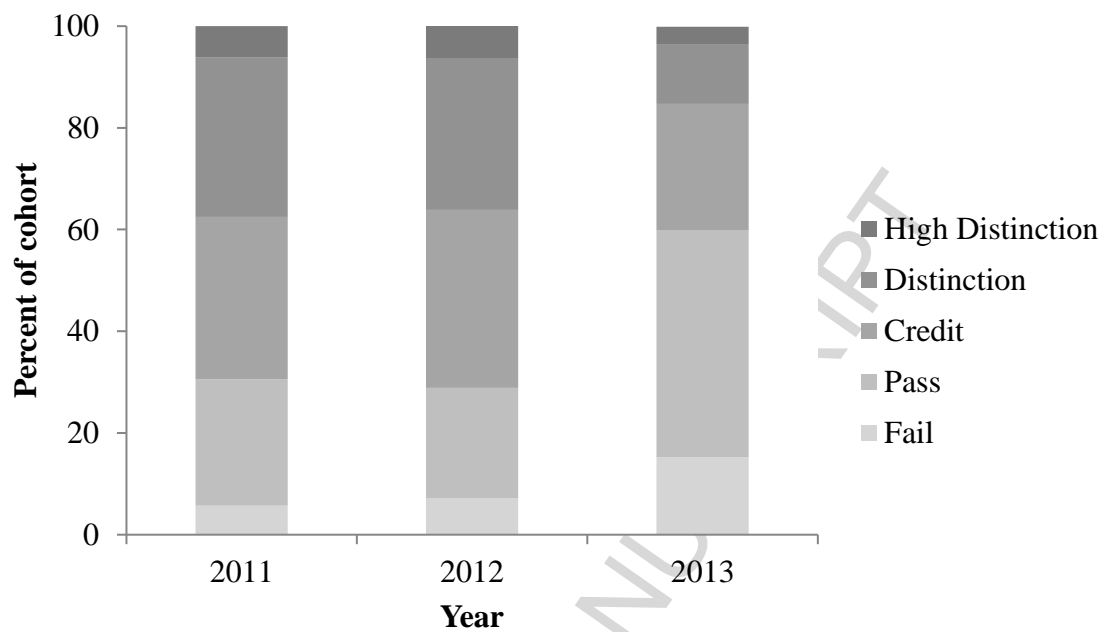
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**Figure 1. Grade distribution of Nursing Science students studying pathophysiology and pharmacology.**

**Table 1: Characteristics of Bachelor of Nursing Science students studying pathophysiology and pharmacology.**

Characteristics*	<i>N</i>	<i>M</i> ± <i>SD</i>	Range	Frequency	Percentage
Age (years)	83	27.95 ± 9.87	19 – 58	–	–
Paid employment (hours/week)	84	11.88 ± 10.13	0 – 40	–	–
Gender (male/female)	84	–	–	10/74	11.9/88.1

\* Not all participants responded to each question

**Table 2: Academic information of Nursing Science students studying pathophysiology and pharmacology. Data are mean  $\pm$  SEM (N).**

Year	OP score*	Academic achievement (%)
2011	10.74 $\pm$ 4.54 (190) <sup>a</sup>	70.49 $\pm$ 9.70 (220) <sup>a</sup>
2012	10.53 $\pm$ 4.47 (220) <sup>a</sup>	70.20 $\pm$ 9.94 (257) <sup>a</sup>
2013	11.25 $\pm$ 4.63 (268) <sup>a</sup>	62.79 $\pm$ 11.12 (308) <sup>b</sup>

\* Approximately 13% of each cohort did not receive an OP score.

Within each column, different superscripts signify significant difference

P<0.05

**Table 3. Participant responses to statements about learning pathophysiology and pharmacology (% of participants).**

Statement	Strongly agree/Agree	Neutral	Disagree/Strongly disagree
I found that (up to) 5 lectures in one day made the subject difficult to study.	64.3	13.0	22.7
I liked having all the lectures for this subject delivered in one day.	35.7	16.7	47.6
I prepared for the lectures by reading the appropriate section in the textbook before the lectures.	16.7	39.3	44.0
The only preparation I did for the lectures was to print the lecture slides.	53.6	17.9	28.5
In hindsight, with the condensed timetable this semester, I should have done some pre-lecture reading for this subject.	57.1	32.1	10.8
If there were pre-lecture activities would you work on these activities prior to the lectures.	75.0	14.2	10.8
I am confident about my ability to address the topics on the final examination for the subject.	31.0	39.2	29.8
I found this subject difficult to study, mainly because of the content of the lectures.	41.7	28.5	29.8
I found this subject difficult to study, mainly because of the condensed timetable.	52.3	23.8	23.9

**Table 4. Relationship Spearman's correlation between student grade (%) and response to statements (N=54).**

Statement	Spearman's Correlation Coefficient (rho)	Significance
I found that (up to) 5 lectures in one day made the subject difficult to study.	.026	.851
I liked having all the lectures for this subject delivered in one day.	-.081	.563
I prepared for the lectures by reading the appropriate section in the textbook before the lectures.	-.210	.128
The only preparation I did for the lectures was to print the lecture slides.	-.063	.651
In hindsight, with the condensed timetable this semester, I should have done some pre-lecture reading for this subject.	.016	.906
If there were pre-lecture activities would you work on these activities prior to the lectures.	-.032	.820
I am confident about my ability to address the topics on the final examination for the subject.	.168	.226
I found this subject difficult to study, mainly because of the content of the lectures.	-.304	.026*
I found this subject difficult to study, mainly because of the condensed timetable.	-.137	.322

\* P&lt;0.05