Reciprocal Peer Tutoring in an Australian Undergraduate Clinical Skills Setting:

A Mixed Methods Study

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'The value of education ... is not the learning of many facts, but the training of the mind to think ...'

Albert Einstein. (Calaprice, 2011, p.100)

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Abstract

Background

Incorporation of active learning approaches in the preparation of nursing students for future educational roles is an imperative. Reciprocal peer tutoring (RPT) is an active teaching/learning approach, in which individuals from similar academic levels rotate teaching/learning roles. This study aimed to explore the outcomes of RPT on undergraduate nursing students learning.

Design/Methods

A sequential explanatory mixed methods design, incorporating pre-post intervention surveys and focus groups with a convenience sample of 102 final-year students, from a cohort of 132 (RR = 77.3%), from a regional Australian university campus. Prior to attendance, online resources were provided on teaching fundamentals and two selected clinical skills, namely tracheostomy suctioning and intravenous cannulation. Attending participants were randomly allocated into pairs, rotating teaching and learning roles within clinical skills laboratories. Pre-post intervention survey tools examined knowledge and self-reported attitudes to a peer teaching and clinical teaching preferences (Clinical Teaching Preference Questionnaire). Post-intervention measures included a peer teaching experience (Peer Teaching Experience Questionnaire). Focus group interviews (n = 4) were conducted with 22 participants, to further understand students' RPT experiences.

Results

There was positive improvement in attitudes to peer teaching (M = 49.2, SD = 10.0 to M = 52.3, SD = 8.2, $p < 0.05$, [95% CI = 0.7 to 5.4]). Knowledge scores also increased significantly (M = 6.9, SD = 2.0 to M = 9.7, SD = 1.9), $p < 0.05$ [95% CI = 2.3 to 3.2]. Aggregate mean knowledge scores increased more for peer teachers (M = 3.3) than they did for peer learners (M = 2.2). Thematic outcomes from focus groups indicated challenging yet beneficial journeys, collective learning outcomes, along with benefits of RPT including enhanced teaching, self-confidence, communication, and independent and collaborative learning.

Conclusion

This study concludes that RPT is effective in clinical skills teaching and sets a foundation for further research.

Statement of authorship

Except where explicit reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole, or in part from a thesis by which I have qualified for or been awarded another degree or diploma. No other person's work has been relied upon or used without due acknowledgement in the main text and bibliography of the thesis.

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Thesis chapter	Publication title	Publication status	Nature and extent (%) of student researcher's contribution
2	Gazula, S., McKenna, L., Cooper, S. & Paliadelis, P. (2017). A systematic review of reciprocal peer tutoring within tertiary health profession educational programs. *Health Professions Education, 3*, 64–78. doi:10.1016/j.hpe.2016.12.001	Published	60%—Concept development, key idea, drafting, editing and submission

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student researcher's contribution to the published work.

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Ethics approval

The Human Research Ethics Committee, Federation University Australia, granted ethics approval for the current study involving students on 27 October 2016—Project no. **A16-153.**

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List of abbreviations and acronyms

ANMAC	Australian Nursing and Midwifery Accreditation Council
ANOVA	Analysis of variance
CSL	clinical skills laboratories
CTPQ	Clinical Teaching Preference Questionnaire
EN	enrolled nurse
IT	information technology
NMBA	Nursing and Midwifery Board of Australia
NPT	near-peer teaching
PAL	peer assisted learning
PASS	peer assisted study sessions
PICC	peripherally inserted central catheter
PTEQ	Peer Teaching Experience Questionnaire
RN	registered nurse
RPT	reciprocal peer tutoring
RTP	research training program
SD	standard deviation
SPSS	Statistical Package for Social Sciences
SRA	self-reported attitudes
US	United States

Chapter 1: Introduction

Peer assisted learning (PAL) is an overarching concept in which individuals formally and informally learn from each other (Boud, 2013). Furthermore, Topping (2005) asserted matched companions use active learning approaches to gain knowledge and skills. Although there are numerous forms of PAL, this study has focused specifically on reciprocal peer tutoring (RPT), in which individuals from similar academic year levels interchange roles of tutor and learner to learn collaboratively (Gazula, McKenna, Cooper & Paliadelis, 2017). Literature confirms the widespread use of RPT, due to many years of its use in primary and secondary school education, higher education and health professional education programs. However, its recent use in nursing education is limited.

This chapter presents an outline of the thesis, including a synopsis of literature, research question, aims and methodology. This chapter also describes the student researcher's personal experience in providing the impetus for undertaking this study. Relevant literature is explored in detail within Chapter 2.

1.1 Background

Nursing education, similar to most other health professional education programs, requires adherence to prescribed standards by relevant professional organisations. This section provides an overview of nursing education in Australia, including the professional requirements of registered nurses. It also summarises relevant changes in the higher education sector within Australia, specifically focusing on graduate attributes. Finally, clinical skills teaching and changing role of educators are summarised.

1.1.1 Professional requirements

Within Australia, there is extensive diversity in nursing student cohorts (Bradley, Noonan, Nugent & Scales, 2008) and nursing professionals (Koch, Everett, Phillips & Davidson, 2014) in terms of age, gender and nationality. While this diversity in students could be viewed as a strength, it may possibly also result in diminished quality of the final product—the nursing graduate. To ensure professional standards,

higher education institutions offering nursing education within Australia are mandated to follow the accreditation standards of Australian Nursing and Midwifery Accreditation Council (ANMAC), which is the national accrediting organisation. ANMAC (2012) expects higher education institutions to apply teaching approaches, which will nurture collaborative and independent approaches to foster active learning.

The Nursing and Midwifery Board of Australia (NMBA) is the national organisation that is the final approver of all educational programs leading to professional registration as nurses or midwives within Australia. The NMBA sets the minimum standards and expectations of registered nurses and midwives. Every practising nurse within Australia is required to achieve the practice standards mandated by the NMBA: including all graduating nursing students. As part of the NMBA (2016) standards for practice, nurses are expected to use their teaching skills to educate themselves, their peers and their patients, highlighting teaching as a core requirement of all registered nurses. Hence, nurse educators need to proactively consider ways to develop nursing graduates with broader capacities.

1.1.2 Clinical skills education

Nursing is a practical profession. Undergraduate nursing education involves training students with a blend of theory and practice. The practical preparation is usually in the form of clinical skills teaching in controlled environments such as clinical skills laboratories (CSL). Students are then supervised in real-life situations within clinical placements (Tapler, 2016). Hence, CSL are important precursors to prepare students for real-life clinical settings. Apart from psychomotor skill development, simulation is increasingly used in the CSL as a holistic approach to offer quality learning opportunities (Staykova, Stewart & Staykov, 2017; Wellard & Heggen, 2010).

Considering the challenges posed by clinical placements, it is necessary to optimise student learning in the CSL for enhancing clinical learning (Staykova et al., 2017). One such challenge in clinical learning is proving quality experience within the prescribed clinical practice period. The minimum clinical practice in healthcare settings for professional-entry programs in Australia is 800 hours (ANMC, 2017), which is one of the lowest in the world (Miller & Cooper, 2016). Further, McNett (2012) identified several ever-growing challenges such as increasing student numbers, complex disease conditions, shorter hospital stays and staff shortages, which limit,

and vary, the learning opportunities offered through clinical placements. These challenges have a negative impact on the quality of the student learning experience, in which academics are expected to emphasise best practice with limited staff and inadequate quality clinical placements (Duffield, Gardner, Chang, Fry & Stasa, 2011; Reierson, Hvidsten, Wighus, Brungot & Bjørk, 2013). These lead to limited opportunities for skills practice and inadequate prospects for psychomotor skills development (Ross, 2012). Students may not receive comparable opportunities to their peers from elsewhere due to inconsistencies in the quality of various placements.

Limited staffing poses the risk of heavily relying on content transmission and disregarding how it is taught in the CSL, thereby limiting engagement (Wellard, Woolf & Gleeson, 2007). Nurse educators in the CSL continue to adopt a non-evidence-based, teacher-centred instructional approach, in which the educator demonstrates the clinical skill and the students replicate it (Wellard & Heggen, 2010). Kantar (2014) found that implementing learner-centred approaches within nursing curricula was also a challenge, as academics often focused on teaching content, rather than being learner-focused, which can potentially limit the development of higher-order thinking in students. She further argued of the merits in replacing traditional teacher-centred methods with learner-centred approaches will lead to deeper learning and engagement. Merely implementing laboratory sessions does not guarantee active student participation (Muñoz-García, Moreda, Hernández-Sánchez & Valiño, 2014). There are risks that students' learning will be limited to skill mastery by mechanical repetition of tasks, rather than comprehending the concepts to apply knowledge, which requires higher-order cognitive skills. Variable practice opportunities in the clinical environment make undergraduate clinical skills learning an essential part of nursing education (Haraldseid, Friberg & Aase, 2015); they provide a safe environment in which to learn and apply psychomotor skills using simulated clinical scenarios (Maginnis, Croxon & Croxon, 2010; Tapler, 2016). Acquisition of these psychomotor skills is a precursor to clinical placements, which in turn enables students to develop and apply knowledge and skills in the real world. Nurse educators need to consider using a range of educational approaches, especially considering the complex nature of psychomotor skill acquisition (Benner, Sutphen, Leonard & Day, 2010), which demands innovative teaching styles to elicit active student engagement (Bovill, Bulley & Morss, 2011).

1.1.3 Educational trends

Over the years, tertiary education has undergone numerous changes. Yan and Kember (2003) argued that education is not simply the transmission of knowledge, but rather the development of student thinking as they become active participants in their learning. Cotterill (2015) noted that tertiary education institutions are changing from being limited to the provision of a prescribed 'recipe' to be learnt to beginning to motivate and inspire students to learn. He stated that the emphasis is shifting from demonstration and assessment of learning outcomes to empowering and inspiring students to undertake learning. A limited focus can minimise student motivation and increase the likelihood of shallow engagement with content. Nursing educators are challenged to move away from merely delivering information to exploring effective teaching approaches that better engage students (Benner et al., 2010; Moorman, Hensel, Decker & Busby, 2017).

Deep learning, as opposed to superficial learning, helps students engage with content. Yan and Kember (2003) distinguished between deep and superficial learning; the former is exemplified by the engaged behaviour of students working collaboratively to comprehend the content. Conversely, the latter often limits students to achieving minimum academic requirements. An engager approach results in students actively involved in organising and planning their learning activities, thereby learning about the learning process. These authors claim peer learning to be one of the vehicles for engager behaviour due to the mutual active participation and engagement. Level of engagement with the content (Bovill, Cook-Sather & Felten, 2011) is one of the factors determining student success. This engagement can be achieved by nurturing active student participation in their learning process (Kuh, 2008), with metacognitive awareness of the learnt content (Bovill, Cook-Sather et al., 2011). Kember, Ho and Hong (2010) developed a motivational orientation framework for university students. After interviewing 36 undergraduate students from nine degree programs, they used grounded theory to explore factors influencing student motivation. In doing so, they identified creating interest, relevance and a sense of belongingness as some of the positive parameters for motivation. Using innovative teaching strategies that interest students and foster their mutual interactions could enhance their motivation to learn.

1.1.4 Graduate attributes

Apart from profession-specific requirements, there is a growing focus on attainment of transferable generic skills in tertiary education. Generic skills, also called graduate attributes, are defined by Bowden, Hart, King, Trigwell and Watts (2000) as the abilities any university community agrees its students would desirably develop during their tenure at the institution and consequently use in their profession and as a citizen. Thus, there is a broader emphasis on the application of these skills, which could be unique to every tertiary education provider. Bridgestock (2009) observed the growing focus on these attributes, which is contributed to rapidly changing economic environments, causing prospective employers to expect generic skills that are transferrable to various occupational situations. She also noted the various synonyms used for generic skills: core skills, key competencies, transferrable skills and underpinning skills. The Australian university at which the current study was conducted also expected a set of generic skills from its graduates. These included becoming a critical thinker, knowledgeable learner, effective communicator and an independent and collaborative worker (Federation University Australia, 2014). The student researcher aimed to align the current study to generate opportunities for participants to develop generic skill sets at their university. Rooney, Hopwood, Boud and Kelly (2015) acknowledged the pivotal role of educational institutions in shaping future professionals for practice through provision of opportunities to develop both discipline-specific and generic skills. It is vital that just like discipline-specific skills, academics need to think of ways for creating opportunities for students to develop traits such as communication, teamwork, leadership and interpersonal skills (Kember et al., 2010). This is a challenge for nursing academics, who are often busy delivering a content-heavy curriculum within a limited period, resulting in few opportunities to consider new creative ways to teach generic skills. McKenna and French (2011), questioned whether all nursing educational programs provide students with the skills they require to become effective facilitators of learning. The CSL is an integral part of the undergraduate nursing curriculum. If used creatively, it can not only serve to offer opportunities for practical learning, it can also improve other generic skills such as communication, cooperation and problem-solving (Benner, 2004). Therefore, it is vital to creatively incorporate teaching–learning activities that foster generic skills to develop students beyond just a discipline-specific skill set.

1.2 Peer assisted learning

Across the literature, there is inconsistency in terminologies used to define PAL (Stone, Cooper & Cant, 2013). However, in general, PAL remains viewed as individuals learning from matched companions. Although this is a simple connotation for PAL, there are numerous inconsistencies in the terminologies, which creates confusion about this form of learning. There are numerous PAL forms, which—although similar in their overall nature of having non-teaching individuals learn from each other—are each distinct from the other. There are various types of PAL reported. One commonly used form in health professional education programs is near-peer teaching (NPT) (Brannagan et al., 2013; Carey, Chick, Kent & Latour, 2018; Hardy et al., 2014; McKenna, Irvine & Williams, 2018; Williams, Hardy & McKenna, 2015a). NPT involves an individual who is academically ahead by a year or two teaching a peer who is typically junior (Williams et al., 2015a). Another form of PAL used in healthcare education programs is RPT, which involves the structured switching of teacher and learner roles among individuals from same year level (Boraks & Allen, 1977). Healthcare education programs are becoming more open to formally embedding PAL due to the myriad of benefits it offers to institution, staff and students (Herrmann-Werner et al., 2017).

1.3 Reciprocal peer tutoring

This section provides an overview of RPT; it scrutinises its uniqueness, benefits and context in higher education, specifically for nursing education. RPT is a form of active learning in which students actively participate in teaching themselves in order to comprehend the content that they consequently teach their peers (Muñoz-García et al., 2014). In RPT, students not only learn from their peers, but also through the groundwork they undertake to teach and engage their peers (Manyama et al., 2016; Rees, Quinn, Davies & Fotheringham, 2016). RPT specifically involves the structured switching of tutor and learner roles by individuals from the same year level (De Backer, Keer & Valcke, 2012), encouraging peer-to-peer learning as opposed to teacher-centred learning (Muñoz-García et al., 2014).

Initial RPT implementation has been undertaken in primary and secondary schools (Allen & Boraks, 1978; Boraks & Allen, 1977). However, it is now successfully used

in higher education within a range of disciplines, such as medicine (Youdas, Krause, Hellyer, Hollman & Rindflesch, 2007), physiotherapy (Hennings, Wallhead & Byra, 2010), teacher education (Miravet, Ciges & García, 2014), mathematics (Tsuei, 2012) and information technology (Shadiev et al., 2014). The reported benefits of RPT for students are:

- Improved understanding and retention of content (Bentley & Hill, 2009);
- Better skill retention (Iserbyt, Elen & Behets, 2010);
- Improved communication (Youdas et al., 2007);
- Engagement with learning at a greater depth to enable generalising and reflection beyond the content (Lueg, Lueg & Lauridsen, 2015); and
- Greater self-direction in meeting learning objectives (Asghar, 2010).

RPT has been found to be promising within laboratory learning; it appears to enhance student enthusiasm and engagement with content (Manyama et al., 2016). Muñoz-García et al. (2014) argued that despite the successful use of RPT in educational settings, it remains underutilised in higher education programs, especially in non-metropolitan learning environments (Lin, Justice, Paul & Mashburn, 2016).

1.4 Research question and objectives

The overall research question for the current study was 'What is the effect of RPT on student learning within undergraduate clinical skill settings?'

To answer this overarching research question, the six objectives were to:

1. Explore the use of RPT within contemporary literature;

2. Measure the effect of RPT in terms of knowledge development and clinical teaching preference;

3. Determine the effect of RPT on student attitudes to teaching peers;

4. Examine the effect of RPT on student competence and confidence to teach;

5. Explore how students teach and learn from their peers in a laboratory setting; and

6. Understand student perspectives of RPT within a laboratory setting.

1.5 Research approach

This study adopted a sequential explanatory mixed methods approach. Findings of the quantitative data were further explored in the focus groups, thereby the sequential nature of this approach enabled explaining the quantitative results. Each data set were equivalent in answering the overall research question and therefore there was equal weighting allocated to the quantitative and qualitative datasets. The quantitative data included a one-group pre-test–post-test design. Final-year undergraduate nursing students were prepared to teach through a range of online resources on teaching theory. Students were randomly paired to take turns in teaching one clinical skill to a peer. Their roles reversed the following week with a different clinical skill. The two selected clinical skills were intravenous cannulation and tracheostomy suctioning. Quantitative data were gathered through pre- and post-test surveys on knowledge, self-reported attitudes to peer teaching, clinical teaching preference and peer teaching experience. The preliminary quantitative data analysis was used to inform the qualitative data gathered using focus groups and both datasets were collected in a sequential manner.

1.6 Significance of the study

The current study enabled the exploration of an underused, yet promising learning approach within a nursing laboratory-teaching context. Thereby, it provided fresh insight into aligning an active learner-centred approach within the contemporary context of higher education and nursing. It will enable greater understanding of the role that RPT can play in facilitating nursing students' learning, one in which students not only learn the psychomotor skills and underpinning knowledge, but also learn to teach these to peers. It also enables understanding of how RPT supports students' independent and collaborative learning through the opportunities to observe, communicate and provide constructive feedback to one another. The findings of this study have the potential to inform nursing curricula for supporting clinical learning. Teaching peers requires comprehending the content to be taught and responding appropriately to learners' questions. Teaching skills are typically constrained to formal teaching within universities, but they also play a vital role in informal health teaching to patients by nursing students and professionals, as the principles of teaching remain generally unchanged (McKenna & Stockhausen,

2013). Teaching skills gained by students will potentially improve the quality of nursing education and help graduates become better clinicians, thereby contributing to changes in nursing practice. RPT has shown to promote lifelong learning skills in other disciplines, so there is room to be cautiously optimistic that the introduction of RPT into nursing may create more effective learning opportunities in the clinical environment. In summary, the current study adds new knowledge to the limited research available about the use of RPT in nursing education. Thus, it complements existing literature about the effectiveness of this teaching and learning strategy.

1.7 Situating the student researcher within this research study

I have worked as a nursing academic for some time. I have worked for over 11 years in local and international higher education institutions offering undergraduate nursing programs. This has given me extensive experience in teaching a variety of students, including domestic and international cohorts, in clinical and university settings. I have also taught using varied curriculum delivery approaches, including traditional teacher-led to a blended online learning delivery model. Having coordinated clinical courses, I was interested in unpacking how student learning continued from the classroom to clinical placements. In Australia, a clinical educator or preceptor usually supervises nursing students in small groups during placements. In informal classroom debriefings after their placements, students recounted 'not having learnt anything' or described their placement as 'a waste of time' if their clinical teaching staff took time off work. There was a perception by students that learning could not take place in the absence of a teacher. This led me to start exploring student-centred ways to teach, which would engage them through active participation.

By working in a range of healthcare settings, I have experienced innumerable instances that demanded registered nurses use their teaching skills. Dynamic healthcare environments—with complex health conditions and newer treatment modalities—demanded informal teaching to educate patients, colleagues and myself. This made teaching an integral part of nursing; hence, it was imperative to explore ways to nurture these skills in nursing students by providing opportunities to develop them.

These combined reasons led me to explore the literature of how students can learn from each other. I explored PAL and realised that there were many forms of PAL. RPT specifically attracted my attention, as it involved individuals from the same academic

year level. Realising that students from same year level were by themselves during placements, I began exploring RPT. I led a small in-house study with some students, using peers to assess clinical skills, instead of the regular academic-led clinical skills assessment. The outcome was positively received by both staff and students. This experience propelled me to further explore peer learning, specifically RPT, to embark on my PhD journey. I felt that this area needed to be explored further for applicability in nursing education.

1.8 Organisation of the thesis

This thesis is presented using conventional thesis chapters. It comprises seven chapters with the addition of one published manuscript in Chapter 2; each of these is outlined below.

Chapter 1: Introduction

This first chapter introduces the topic by offering a brief literature synopsis to lay the background of the study. It also introduces RPT within the context of nursing education, highlighting the gap in literature. This leads to the research questions and aims, with a brief discussion of the significance of this study. The research approach is summarised with an overview of the research methodology.

Chapter 2: Literature review

The second chapter comprises the literature review, outlining the context for the current study. It explores the genesis of PAL, specifically RPT. It also contains an original paper published in a peer-reviewed journal on systematic review of RPT in health professional education programs, which has been pivotal for this study.

Chapter 3: Methodology

This chapter explores the research paradigm and philosophical underpinnings, enlisting the research aim and objectives for the current study. The methodology is described along with the detail of tools, data collection phases and analysis techniques. The RPT intervention, pilot study, criteria for participants in the main study along with ethical considerations are also described.

Chapter 4: Quantitative results

This chapter presents the findings obtained from quantitative surveys analysed using SPSS. These include a self-report of attitudes to peer teaching (Williams, Olaussen & Peterson, 2015b), a knowledge questionnaire (Austin Health, 2017; Endacott, Jevon & Cooper, 2009), Clinical Teaching Preference Questionnaire (CTPQ) (Iwasiw & Goldenberg, 1993) and Peer Teaching Experience Questionnaire (PTEQ) (McKenna & French, 2011). Descriptive and inferential statistical findings of the participant demographic data and survey outcomes are also presented.

Chapter 4: Qualitative results

This chapter presents the focus group findings, which were analysed using Colaizzi's phenomenological framework. Three themes and the subthemes that emerged from the analysis include: *challenging yet beneficial journey* (initial hesitancy, changed perceptions and academic benefits), *learning together*—tensions and triumphs (tensions, triumphs and strategies) and *real-world relevance* (essential lifelong skills).

Chapter 6: Integrated discussion

This chapter discusses the significant integrated key findings from both datasets in relation to contemporary literature. It highlights the new knowledge generated by the study and identifies the current study's strengths and limitations.

Chapter 7: Conclusion and recommendations

This final chapter offers an overall conclusion to this study, along with implications for nursing education. It also presents recommendations for policy, practice, education and research.

1.9 Chapter summary

This chapter has outlined the premise for this study. It has provided an overview of the existing literature to reveal the context and need for the current study. It has also identified the student researcher's positioning within this research. The research question, aims and approach provided the foundation for the current study. The significance of this study has been explored, and finally, this chapter provided the structure of this thesis. In the next chapter, relevant literature is explored in relation to the PAL and RPT to understand the background underpinning and informing the current study.

Chapter 2: Literature review

2.1 Introduction

This chapter explores the literature to gain a deeper understanding of the topic and position of the current study within the existing nursing educational context. Initially, literature search strategies are outlined; the chapter is then divided into two main sections. The first section sets the scene by discussing contemporary nursing education and, specifically, clinical skills education. It continues to explore the PAL literature with an aim to examine it in general within health and nursing. This section also includes a brief discussion of PAL theory.

The second part of this chapter focuses on RPT specifically in health professional education and nursing. It includes a published systematic review on RPT. This review was intended to provide understanding of the emerging area of RPT and identify the gap in the literature by detecting knowledge deficits. Overall, exploring the literature has been beneficial to understand the background of PAL and RPT. Further, this systematic review was valuable in gaining a structure and foundation for the current study.

2.2 Nursing education

As in any other health professional education, nursing involves a blend of theory and practice. Largely, undergraduate nursing education is aimed at preparing the students with the theory and skills to scaffold learning before they embark on clinical placements. Despite the change from an apprenticeship model to tertiary-based education, there is no dispute that CSL are central to undergraduate nursing education (Brown et al., 2011). While classroom settings offer the context for learning theory, CSL offer opportunities to learn and practise clinical skills in a simulated and safe environment; thus, they are integral to undergraduate nursing education. Cohen and Boni (2018) argued that holistic nursing simulation is the integration of simulation as technology and holistic nursing as care, aiming to produce safe, competent nurses with a holistic approach to patient care; thus, it benefits students and patients. CSL learning uses various form of simulation, ranging from replicating clinical scenarios,

to using complex technology to prepare nursing students for providing rounded patient care.

Nurse academics are well aware of the importance of CSL in undergraduate nursing education. Ewertsson, Allvin, Holmström and Blomberg (2015) viewed CSL as a 'bridge' to connect university learning with clinical settings. After completion of clinical placements, they interviewed 16 second-year Swedish undergraduate nursing students to understand the role of CSL learning in preparing for clinical practice. Although they found CSL instrumental in preparing students for the real world, some tensions were identified in the form of discrepancies between the two settings. Ewertsson et al. (2015) argued for creating opportunities to stimulate active learning in the CSL by moving away from a single way of performing a clinical skill to supporting independent and cooperative studying skills.

Realistically, there are many challenges that hinder the preparation of nursing students. These include a lack of resources, time-bound delivery of a content-laden curriculum, growing numbers of student cohorts and a shift towards including technology-based curriculum delivery (Haraldseid et al., 2015). Nonetheless, nurse academics have to strive to creatively optimise the resources available to deliver the curriculum in an innovative manner. Creating opportunities to practise clinical skills in a simulated environment, with a focus on patient safety, is paramount (Duhn et al., 2012; Peddle, 2011). Monaghan (2015) argued that it is common for students to be inadequately prepared for the professional demands of being a registered nurse due to inadequate time for practising clinical skills during their undergraduate education. After performing a critical analysis of 26 articles published in the United Kingdom, which studied the theory–practice gap among newly qualified nurses, Monaghan (2015) identified newly qualified nurses' inabilities to practise autonomously. He recommended that educational institutions incorporate opportunities for stimulating higher-order cognitive skills such as independent thinking and collaborative working. Nurse educators need to think beyond content delivery to develop other skills in students. A similar finding to Monaghan (2015) was an international survey by Christensen et al. (2016). It investigated the practice readiness of 223 final-year undergraduate nursing students from New Zealand, United Kingdom and Australian universities to scrutinise their transition to practice. They revealed doubt in self-capabilities among the New Zealand cohort, more so than among the other two

cohorts. This highlights that regardless of the country of origin, nursing students need assistance to transition into their graduate roles.

While planning the teaching–learning activities for students, nurse educators need to be mindful that each student is unique in the way they learn. Patterson et al. (2017) performed an international multi-site study at four universities in Australia, Hong Kong, New Zealand and United Kingdom to investigate how undergraduate nursing students managed and experienced their individual learning. Using eight focus groups with a total of 46 participants, they discovered that students had personal learning preferences. Examples of the preferred learning ranged from listening, watching, discussing, writing and practical methods, with a mixed inclination to learn along or from peers. Conversely, Andreou, Papastavrou and Merkouris (2014) argued that learning styles are not static. In a systematic review of six articles, they illuminated the diversity in learning styles among undergraduate nursing students. It is important to cater to the variety of learning preferences to allow for concrete experiences, reflection opportunities and abstract conceptualisation. Nurse educators must offer a variety of learning approaches to stimulate various learning styles. One such method is the four-stage approach to clinical skills teaching (Bullock, Davis, Lockey & Mackway-Jones, 2016), also referred to as Peyton's four-steps approach (Münster, Stosch, Hindrichs, Franklin & Matthes, 2016). This approach is common in medical education, more so with one-to-one teacher–student ratios. However, it has also been successfully trialled for small group teaching (Bugaj & Nikendei, 2016). The four stages in teaching a clinical skill focus on how new information is processed by the learner and allows for scaffolded firsthand experience and reflective observation. It also allows for visual, oral, kinaesthetic and auditory learners. Ibrahim and Hussein (2016) highlighted the importance of considering the learning styles of nursing students before planning learning activities. In fact, Gonzales et al. (2017) suggested that considering student learning styles is essential in designing the nursing curricula for promoting learning. However, in a time-bound educational system, do nurse educators practically think about shaping their teaching to suit learner diversity? Interferences from completing the content delivery and assessments in a time-bound manner shifts the focus from the learner (Wellard & Heggen, 2010).

2.3 Peer assisted learning

2.3.1 Literature strategies

Relevant online databases were examined using the search terms displayed in Table 2.1. The primary search terms were used individually and in combination with 'Higher Education' and 'Health' by subject. A variety of search terms was necessary due to the vast inconsistencies in terming PAL. Truncation symbols and database (Levy & Lemeshow, 2011) headings were also used for this search.

Table 2.1: Literature search strategy

Online databases/search engines		Primary search terms	
Academic Search (EBSCO)	Science Direct	'Peer Assisted Learning'	'peer coaching'
MEDLINE (EBSCO)	Scopus	'peer learning'	'peer modelling'
British Medical Journals	Taylor and Francis Online	peer tutoring'	
Cumulative Index to Nursing and Allied Health Literature (CINAHL)	Wiley Online Library	'near peer tutoring'	
Cochrane library	Google Scholar	'Reciprocal Peer Coaching'	
MEDLINE (EBSCO)	PSYCHINFO	'Reciprocal Peer Teaching'	
Proquest Medical and health Complete	thesis database	'collaborative learning'	
SAGE Journals Online		'Reciprocal Peer Tutoring'	

Additionally, pertinent literature was located through manual searching of reference lists from the articles located electronically. This search was confined to peer-reviewed articles written in English up to 2016 to source the contemporary literature around the topic.

2.3.2 History

PAL has been a form of learning since the time of the ancient Greeks (Topping & Ehly, 1998) when Socrates taught his students by using active forms of learning

(Garcia, Abrego & Robert, 2017). One of the earliest references has been dated back to ancient Roman times, when Lucius Annaeus Seneca endorsed the concept of learning together by declaring in Latin, '*Qui Docet Discet*', which means 'those who teach learn' (Johnson, Johnson & Smith, 2013, p. 104). Czech philosopher Johann Amos Comenius, known as the 'father of modern education', who lived in the sixteenth century, believed in the benefit of students teaching and being taught by their peers (Garcia, Abrego & Robert, 2017). Thus, for centuries, the value of placing the learner in the role of the teacher has been recognised (Kneen & Pattison, 2012; Krych et al., 2005). Documented use of PAL in Western civilisation can be traced from the first century AD spreading from Greece, Rome, Germany, Europe and America (Wagner, 1982). Martin and Edwards (1998) used the term 'cooperative learning' to describe PAL and contend it to have been formally instigated by John Dewey in 1899 to contest traditional teaching. Initially, PAL began as an informal way for students to learn together. However, as time has progressed, it is increasingly recognised as a formal learning strategy within a range of disciplines. Widespread application of PAL spans from face-to-face forms (Topping, 1996) to more innovative forms such as using online learning platforms, on which students learn from each other through online media (Raymond, Jacob, Jacob & Lyons, 2016).

2.3.3 Nomenclature

There is a variety of PAL descriptions in the literature. More generically, PAL is defined as learners learning from fellow learners (Lincoln & McAllister, 1993; Martin & Edwards, 1998). Boud (2013) described peer learning as encompassing both formal and informal ways of learning among students, while Topping (1996) resorted to defining it as the informal helping of self and others by individuals from similar social groupings who are not professional teachers. Yet, others refer to PAL as an educational arrangement involving students teaching other students (Burke, Fayaz, Graham, Matthew & Field, 2007; Ten Cate & Durning, 2007). PAL goes beyond merely bringing students together for learning; it involves careful intentional planning to ensure an organised approach for learning (Topping, 2005).

Various terms used in lieu of PAL include cooperative learning, collaborative learning, peer tutoring, RPT, peer modelling and peer coaching. Other synonyms include peer teaching, and supplemental and near-peer instruction (Hammond, Bithell,

Jones & Bidgood, 2010). It is important to note that each term is distinct; hence, they cannot be used as synonyms. PAL is an umbrella term to capture various forms of learning that are each distinct in configuration, application and results (Ladyshewsky, 2000). Despite this broad definition, PAL is sometimes narrowed down to represent one of its forms. For example, senior students teaching junior students is referred to as PAL (Carey et al., 2018; Max, 2007), which is actually a distinct form of PAL called NPT (Irvine, Williams & McKenna, 2018). Similarly, another recent study by Pålsson, Mårtensson et al. (2017) denoted students from similar year levels alternating to teach and learn from each other as PAL; once again, this is a distinct form of PAL known as RPT. The recency of these articles highlights the prevailing tension in understanding PAL and its forms. They also highlight the misrepresentation of PAL forms in contemporary literature, potentially underscoring the lack of consensus and comprehension of this ancient form of learning.

Olaussen, Reddy, Irvine and Williams (2016) expressed frustration with PAL being defined as an umbrella term to include any learning, which involves learners learning from other learners. Their frustration is a result of the broad portrayal of PAL, which undermines the uniqueness of each of its discrete forms. Nonetheless, they identified a lack of consensus in defining PAL within the literature and proposed various approaches to defining the different PAL forms. The first of these is the relation between students—that is, whether individuals are from the same or different year levels. The second aspect considers the number of peer learners assigned to each peer teacher, ranging from one or two to over 10 peer learners. Finally, they proposed different terms to name PAL programs, such as peer mentoring, peer tutoring and peer didactic for peers from same year levels; near-peer mentoring, near-peer tutoring and near-peer didactic for different year level students. Nonetheless, this nomenclature is not comprehensive, as it does not recognise other forms of PAL except peer tutoring and does not distinguish between the formal and informal nature of learning.

Although these authors argue that there is limited evidence about PAL on its outcomes, formal and informal PAL are different. For example, formal PAL has clear expectations and objectives as well as training for the roles or some form of expert-led facilitation. Conversely, informal PAL is relatively less planned, with minimal to the complete absence of expert facilitation, causing it to be implemented on an ad-hoc basis. Thus, it is vital to consider the formal/informal nature of PAL. Ross and

Cameron (2007) attributed the diversity in nomenclature and definitions to varied methods, historic geneses, academic disciplines and countries of origin. Each discipline is unique; hence, their features make them heterogeneous. However, with technology increasing knowledge-sharing capacity, it is important to cease working in silos and learn within and outside the discipline.

2.3.4 Forms/typology

As stated previously, there are various forms of PAL that are exclusive from each other. Ladyshewsky (2000) described cooperative learning, peer tutoring and reciprocal peer coaching to be forms of PAL. Yet, Bruffee (1995) argued cooperative and collaborative learning to be different, disputing that the former pertained to children, while the latter was used for similar interactions among older students undertaking higher education. Nonetheless, these continue to be used interchangeably (Kyndt et al., 2013). Topping and Ehly (2001) suggested peer counselling, peer monitoring and peer assessment as emerging forms of PAL.

A rather elaborate typology of PAL, proposed by Topping (1996), includes 10 dimensions. These largely include curriculum content, contact arrangement, year level of study, participant aptitudes, role continuity, location of PAL, timing, tutee and tutor characteristics and the objectives for implementing PAL projects. He further concluded that peer tutoring and cooperative learning are widely used forms of PAL. Topping (1996) referred to peer tutoring as more formal than cooperative learning, involving specific assigned roles of tutor or tutee with emphasis on curricular content. He further cautioned that mentoring should not be mistaken for tutoring, as it is limited to an informal, encouraging relationship with an experienced colleague. Alternatively, cooperative learning is described as structuring interdependence between small groups, which is facilitated by an expert towards a common goal. While both these forms are popular in schools, peer tutoring has gained momentum in higher education.

Although there are numerous PAL forms, discussing each of them in detail will remove the specific focus from the aim of this chapter. Hence, the next discussion on PAL is limited specifically to NPT, due to NPT's growing popularity in higher education and its close association with the topic of the current research. Additionally,

broader PAL is included in this chapter, as it provides a solid background of the topic and continues to be used in lieu of NPT or RPT.

2.3.5 Peer assisted learning theory

PAL is a widely used learning form but reportedly has the major disadvantage of not centring itself upon a clearly identified theory (Ginsburg-Block, Rohrbeck & Fantuzzo, 2006). Given its wide use in various educational sectors and programs, it is necessary to consider the educational science directing student interaction, by having a theoretical basis for structuring PAL. As rightly identified by others. There are numerous theories relating to PAL, some of which include Jean Piaget's cognitive development, Dewey's pragmatism and Bandura's self-efficacy theory (Ertmer, 1993; Iwasiw & Goldenberg, 1993; Ladyshewsky, 2000; Pålsson, Mårtensson et al., 2017; Topping, 1996). PAL theory proposed by Topping and Ehly (2001) was a product of condensing available theories from the existing literature into one theory. This theory was derived from Piaget's (1932) cognitive development and Vygotsky's (1978) zones of proximal development, which was later refined through 'apprenticeship in thinking' model (Rogoff, 1990). This theory was determined to be suitable for the current study and will be discussed further in Chapter 3 of this thesis.

2.3.6 Benefits and challenges of PAL

There are several benefits from PAL for all involved parties, including education providers, peer teachers and peer learners (Hill, Liuzzi & Giles, 2010; Topping, 2005; Topping & Ehly, 1998). Although the age-old saying 'to teach is to learn twice' claims to illuminate the crux of peer tutoring (Topping, 1996, p. 324), it fails to capture the entirety of the experience. Boud (2013) declared the commonly shared gains through PAL to be skills such as reflection, critical enquiry, communication, content comprehension, peer assessment, independent and collaborative learning. Kyndt et al. (2013) argued that any student, regardless of their education level, gains more by learning with others as opposed to learning by themselves. Learning with others can be detrimental, as the individual may succeed in doing less work than others (Slavin, Hurley & Chamberlain, 2003). Hence, it is important to carefully plan PAL interactions to optimise the benefits for all students involved.

When conducting any research, it is necessary to disseminate all aspects of the study to enable knowledge gain among the wider research community. In a meta-analytical review, Ginsburg-Block et al. (2006) identified the omission of crucial aspects in the published literature on implementing PAL, such as the theoretical basis of the studies. Further, they identified biased author opinions rather than empirical findings. While they identified positive PAL effects in the form of increased academic achievements, they also discovered gaps in reporting comprehensive research information. These authors requested that researchers using PAL interventions should include detailed information about the sample, setting, intervention and underlying theory used to enable a broader understanding of their research for other researchers. Thus, it is not only important to give careful thought to planning and implementing PAL, it is equally vital to report objective and comprehensive information about the study for the benefit of the wider academic community.

A systematic review of PAL, including RPT and NPT in health education programs (specifically in clinical education), revealed largely positive outcomes of PAL (Secomb, 2008). These included enhanced student confidence, gains in psychomotor and cognitive domains. Conversely, there were negative aspects identified in the form of poor student learning resulting from mismatches in dispositions, learning preferences of learners and less time with field experts. Nonetheless, this review highlights the applicability of PAL forms in clinical education.

Although PAL has many benefits, staff and students reportedly hesitate to use it. This could be due to the extra workload for staff in planning PAL, resource intensity, or a lack of preparation by peers (Herrmann-Werner et al., 2017). Other challenges of PAL highlighted by Tai, Haines, Canny and Molloy (2014) were the inability of students to teach or provide feedback, probably due to inadequate training and knowledge. They contend that PAL could instigate unhealthy competition and endanger collegial relationships.

PAL offers a range of learning opportunities for students from the same discipline and avenues for interprofessional synergies. One such United States (US) study by Shields, Pizzimenti, Dudley-Javoroski and Schwinn (2014) involved senior-level physical therapy students teaching junior level medical students, with both student groups expressing high levels of satisfaction from their interactions. The medical

students learnt musculoskeletal anatomy from senior physical therapy students. Following a high level of satisfactory feedback on this intervention from all student cohorts, Shields and colleagues planned to embed similar interprofessional PAL sessions to teach key anatomical concepts within their curriculum. Another study, conducted by Cushing, Abbott, Lothian, Hall and Westwood (2011) in London, qualitatively explored peer feedback among 48 nursing and 45 medical students in their graduate entry-level programs. All students participated in communication workshops to polish their interactions skills. Additionally, they were made aware of the principles of providing constructive feedback. Using simulated patients, each student received an opportunity to become the candidate undergoing clinical skill assessment, observer and assessor. Focus group findings revealed that participants found the learning to be invaluable. However, students were split in their preference for learning from a content expert or peer. Thus, this study used PAL in peer assessment and interprofessional education, thereby highlighting the creative applications of PAL.

Another study endorsing interprofessional PAL was undertaken by McLelland, McKenna and French (2013) in Australia to investigate the benefits of interprofessional PAL. Final-year midwifery students designed and delivered workshops for perinatal care of the newborn for second-year paramedic students. Using questionnaires, they gathered quantitative data to explore experiences of peer learners and near-peers. Separate focus groups with both cohorts enabled exploring their experiences further. After initial discomfort acclimatising to a different professional education, most participants liked the interprofessional approach and requested additional similar opportunities in the curriculum. This study exhibited professional benefits that extended beyond content gains for all participants, regardless of their disciplines. While the positive outcomes are inclined to confirm the benefits of interprofessional education, they do not necessarily refer to the NPT component. Additionally, there are practical difficulties in synchronising the timetabling of cohorts undertaking different programs; nonetheless, if carefully planned, there are merits in conducting interprofessional PAL.

2.3.7 PAL in health professional education and nursing

PAL is becoming increasingly popular globally within higher education, particularly in health professions education, with a quest to maintain learning quality in the wake of a lack of resources, increasing staff workloads and increased student numbers (Boud, 2013; Brannagan et al., 2013). Beneficial outcomes for students with lesser staff input has increased PAL's popularity in higher education. Students undertaking health professional education programs, such as medicine and nursing, have to work with other students due to the professional nature of working cooperatively with other personnel. Tai et al. (2014) conducted a cross-sectional survey with third-year medical students to explore how they used PAL in their clinical placements. Although their sample size was relatively small—54 respondents from a cohort of 415—they determined that students found value in using formal and informal PAL during their clinical placements. The informal PAL occurred through self-selected study groups during lunchtime and observing practice on the ward. They also reported a lack of confidence in assessing peer performance, highlighting the need for preparing them within the program. Thus, if there are PAL activities embedded within the curriculum, it could enhance students' confidence and help them develop abilities such as observation and provision of feedback.

NPT is fast gaining popularity in medicine, dentistry, physiotherapy, midwifery, nursing and paramedicine (Evans & Cuffe, 2009; Hardy et al., 2014; Williams et al., 2015a). Reasons for its uptake range from potential cost effectiveness in replacing skilled experts with senior peers, alleviating teaching burden from faculties with ever-increasing student numbers and resource constraints, offering teaching experience to senior students and benefits for students through NPT interactions (Burgess, McGregor & Mellis, 2014). More recently, NPT has been used as an engaging teaching approach (Williams & Fowler, 2014).

One reason for NPT's uptake is the growing emphasis of higher education providers on generic learning outcomes, coupled with employers seeking graduates with an array of generic skills that are beyond their discipline-specific skills, enabling their cohesive functioning as a team (Boud, 2013). These generic skills are acknowledged with various terms, such as key competencies (Mayer, 1992), transferrable skills (Assiter, 2017), generic attributes (Higher Education Quality Enhancement Council,

1995) or capabilities (Stephenson & Yorke, 2012). Nonetheless, these attributes encompass a repertoire of skills that foster lifelong learning. Investigating the generic outcomes, specifically teaching, through NPT, McKenna et al. (2018) followed up six graduate nurses who had undergone formal NPT in their undergraduate nursing degrees. Using semi-structured interviews, they discovered that participants were surprised to find out the extent of teaching required in nursing, thereby recognising it to be an integral part of nursing. Having undergone the theory and practical experience of NPT, they reported feeling better prepared in their teaching roles. This study endorsed formally embedding PAL approaches in undergraduate health programs to foster generic skills such as teaching.

In an Australian interprofessional study of NPT, involving a total of 26 paramedic and undergraduate nursing students, McKenna and Williams (2017) conducted four separate focus groups with peer learners and peer tutors to explore the experiences of near-peer teachers and learners during NPT sessions. To provide the background, the final-year nursing student cohort had to undertake a mandatory teaching unit. In this, each prepared a lesson plan and taught vital signs in a two-hour session to a first-year nursing student. During these sessions, the second- and third-year paramedic students volunteered as peer teachers to teach basic life support to first-year nursing students. None of the peer learners had experienced clinical placements at this point. The authors identified an array of unintended learning outcomes taking place alongside the formal NPT interactions. These included identifying with peers, gaining self-confidence for clinical placements and being able to manage challenging situations. Thus, this study concurred with others (Ramani, Mann, Taylor & Thampy, 2016) that the merits of PAL engagement reach beyond content gains.

As in other educational fields, nursing education has explored PAL as a student-centred educational initiative. To examine the effectiveness of PAL in undergraduate nursing education, Stone et al. (2013) explored the literature over a decade to the year 2010. They identified a range of 18 studies using assorted research methods with various forms of PAL in clinical or educational settings. All these studies confirmed PAL gains in the form of decreased anxiety and increased confidence and competence. PAL was also instrumental in developing critical thinking and communication skills. The authors concluded that PAL was a rapidly emerging form of learning in undergraduate nursing education and was as effective as traditional

teacher-led teaching. Most of these studies had implemented NPT, demonstrating the popularity of this PAL form in nursing education.

Another systematic review, undertaken by Nelwati, Abdullah and Chan (2018), qualitatively scrutinised PAL experiences of undergraduate nursing students in published studies over 10 years to 2017. The critical appraisal skills program ([CASP], 2013) was used to evaluate quality of the six identified articles from Canada, Hong Kong, Iran, the United Kingdom and South Korea. They identified some methodological flaws in two out of the six studies, such as the omission of clear steps in analysis or how trustworthiness was maintained in the findings. Nonetheless, they also discovered that PAL was an effective learning strategy for preparing undergraduate nursing students personally, and for their professional future. It also indicated a paucity of PAL use in nursing over previous years and gaps in communicating robust research. Thus, PAL benefits reach beyond developing content-specific knowledge and have promising long-term applications.

Although Boud (2013) observed the informal and practical nature of PAL in people's daily lives, McKenna et al. (2018) noted that educators in undergraduate healthcare programs are increasingly resorting to formally embedding PAL within the curriculum to help sharpen teaching skills among their students. Ross and Cameron (2007) claimed that to obtain optimal student learning outcomes and smooth implementation, it is necessary to carefully plan and implement PAL. They developed the PAL planning and implementation framework, which encompasses 24 questions to be carefully considered by academics before implementing PAL. Broadly, these cover features such as location of PAL within broader curriculum; aims for tutors, tutee and institution; recruitment, training and debriefing for tutors and tutees; resources, activities and types of interactions between tutors and tutees; evaluation of the program; stakeholders in the project; potential organisational challenges; timelines; and leadership for the project. Thus, this guide offers a comprehensive and explicit guide for the development, execution and evaluation of PAL interactions. Despite being created by medical academics for medical students, the guide is sufficiently generic to be applied in various contexts outside medical education.

2.4 Reciprocal peer tutoring

RPT is a specific form of PAL involving students from the same academic year level, alternating roles of tutor and learner. This form of PAL began gaining popularity with elementary school children as a remedial program (Boraks & Allen, 1977) and the term RPT was subsequently coined (Allen & Boraks, 1978). Since then, it has maintained its popularity among elementary school students. Some of the achievements obtained using RPT included improving mathematical performance and social interaction among underachieving fifth-grade students (Pigott, Fantuzzo & Clement, 1986). Over the years, it has developed in other fields, including higher education. One of the initial documented applications of RPT in health was with same-year-level medical students teaching each other interviewing and problem-solving skills (Pepe, Hodel & Bosshart, 1980). The researchers developed a peer-teaching program with seven groups of second-year medical students in Ohio. Each group had six members and conducted one annual peer teaching experience with the assistance of a physician and educator to develop transcripts for preparing simulated patients. Following this, each student except for the peer tutor in the group conducted video-recorded interviews with a patient actor and completed a written medical record. Subsequently, the peer tutor engaged in self-appraisal and the appraisal of group members. Overall, these authors found that peer review and feedback were beneficial. However, the opportunity to teach was limited to only a few students, while all students had the opportunity to be peer learners.

In nurse education, the earliest documented use of RPT was by Costello (1989), who administered a questionnaire to 18 US nursing students to explore how they learnt in their clinical placement. Costello termed the same-year-level student pairs who were learning together 'learning cells'. He found that students reported learning most from their colleagues. Crucial aspects have been excluded in the report of this study, such as the year level of the participants or the details of the questionnaire. Another study that used RPT in nursing was also in the clinical area with second-year Canadian nursing students who took turns to teach their peers the clinical skill of performing a surgical dressing, with one observing, another performing and yet another supervising (Goldenberg & Iwasiw, 1992). However, once again, there were crucial research aspects of methodology, such as study setting and participant preparation that were not reported in this article. Thus, RPT is not necessarily new to nursing education, but

with key information missing, it is difficult to completely understand how this research was implemented. These studies cannot serve as resources for informing future studies but provide a valuable lesson of communicating all research aspects to serve as robust learning tools. Thus, despite the literature suggesting use of RPT in nursing education for decades, there is a gap in this area that demands further research.

2.5 Contemporary nursing literature using RPT

As described earlier, one challenge in locating RPT literature is the lack of clear terminology used to recognise it as a distinct type of PAL, making it difficult to locate relevant studies. Nonetheless, some research has explored RPT in nursing. Pålsson, Mårtensson et al. (2017) conducted a quasi-experimental study with 70 first-year Swedish undergraduate nursing students attending their first clinical placement block, grouped into experimental and control groups. The study aimed to investigate the effects of peer learning in clinical education using self-rated surveys. The experimental group received additional reciprocal peer support while on placement in the form of working together during the clinical shifts to learn from each other. Conversely, the control group received traditional supervision. Several pre- and post-test questionnaires were administered to measure critical thinking, learning and development, collaborative behaviour, satisfaction with care provided, self-efficacy, and psychological and structural empowerment. Results concluded that learning with peers improved self-efficacy more than traditional supervision. Pålsson and colleagues termed their intervention a 'peer learning intervention'. However, in essence, they paired peers from the same year level to informally teach and learn from one another, which is suggestive of RPT. This is an example of impromptu RPT. Unfortunately, with little information about how the students were prepared for teaching roles or clearly identified study limitations, this study does not help in gaining a rounded understanding of RPT use for nursing students. The authors suggested further investigation to gain a greater understanding of RPT in nursing education.

In another endeavour to understand PAL in nursing, Pålsson, Engström, Leo Swenne and Mårtensson (2017) undertook a quasi-experimental study with five pairs of recently graduated nurses, working across three Swedish hospitals. They aimed to

examine the feasibility of a 'peer learning intervention' in newly graduated nurses. They assigned graduate nurses to work together in pairs over three months and scheduled time for reflecting together for a minimum of two times per week. A clinical preceptor offered support and advice if required but was largely passive in the nursing activities. A fidelity checklist was used on five occasions by the researchers to ensure that participants complied with the intervention. Using repeated semi-structured interviews, Pålsson and associates applied deductive analysis to conclude that learning with peers with similar backgrounds was advantageous for graduate nurses. Once again, this intervention tends to render itself to impromptu RPT, due to individuals from similar levels who were teaching and learning from each other. Within the 'peer learning intervention', there is not much information about the active measures put in place by expert(s) to prime the nursing graduates for teaching and learning from each other. Although it was a descriptive study, the small sample size limited generalisability of the results. Thus, this study, although conducted with nursing graduates, is very similar to the study by Pålsson, Mårtensson et al. (2017), which explored a 'peer learning intervention' with first-year nursing students. Both nursing studies are recent and suggest the use of informal RPT; they also lack understanding of PAL and its unique forms. Studies from other disciplines have proved that RPT works well after formally introducing its concepts to participants (Manyama et al., 2016; Youdas et al., 2007). The role of the expert in both studies by Pålsson, Engström et al. (2017) and Pålsson, Mårtensson et al. (2017) has been to provide guidance on demand. Hence, they may not offer consistent assistance to all participants. Teaching and learning concepts are unique, requiring formal exploration guided by experts. Similarly, teaching is a complex task, demanding a range of skills, such as observation, instruction and feedback, all of which necessitate scaffolding by an expert. Thus, although there is some suggestion of RPT use in nursing education, it is mainly informal, poorly designed and reported. Existing studies lack the depth required to influence and inform future formal RPT.

2.6 Systematic review

After exploring the literature, it is evident that PAL is not simply one entity. It encompasses a variety of forms, which although similar, are divergent from each other. Since the focus of this PhD was on nursing students from the same year level,

RPT was identified as the most appropriate form of PAL. Numerous studies reported the use of RPT in higher education, such as information technology, mathematics and language learning. However, these fields are diverse from nursing and there were no contemporary nursing studies or systematic reviews identifying the implementation of RPT activities in the literature. To address this gap in the literature and to scrutinise the practices in using RPT within health professional education programs, including nursing education, a systematic review was undertaken. With some similarities in health-related educational programs, including nursing, the search was further narrowed from an initial focus on general higher education to health professional education programs. The review included identifying and reviewing all studies on RPT up to the year 2016. This review identified relevant studies from health professional education and summarised the key findings. The quality of these studies was evaluated using precise quality assessment framework (CASP, 2013). The nature of peer teaching was limited to peers from the same educational year level in a formal reciprocation of teacher and learner roles. Hence, the following published systematic review (Gazula et al., 2017) was instrumental in providing an understanding of RPT in the health professional education and provided insight to the student researcher in designing the current study.

Gazula, S., McKenna, L., Cooper, S. & Paliadelis, P. (2017). A systematic review of reciprocal peer tutoring within tertiary health profession educational programs. *Health Professions Education, 3*, 64–78. doi:10.1016/j.hpe.2016.12.001

This review sought to answer the following questions:

1. What are the reported challenges of implementing RPT formally in health professional education? ;
2. What are the reported benefits of implementing RPT as a formal strategy in health professional education? ; and
3. How can RPT be implemented successfully as a formal teaching–learning strategy in undergraduate health sciences?

2.6.1 Key systematic review findings

This systematic review identified benefits and challenges in executing RPT in health professional education programs and included the lessons learnt after its implementation. It highlighted the many terms used for RPT, the variety of which posed a challenge in locating relevant articles. More importantly, it enabled an understanding of the gap in the literature; there were no nursing studies published within the set period using RPT, although it is acknowledged that this could be due to the lack of consistency in terms used.

2.6.2 Implications of the systematic review

This review provided contemporary evidence of implementing PAL in health professional education programs, which is invaluable for guiding future studies. It also identified a lack of contemporary research in nurse education using RPT and the challenges faced by nursing educators to implement this learning form.

2.6.3 Published systematic review

A Systematic Review of Reciprocal Peer Tutoring within Tertiary Health Profession Educational Programs

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Abstract

Introduction: Reciprocal Peer Tutoring (RPT) is a form of collaborative learning that involves students of similar academic backgrounds experiencing interchanging roles of tutor and learner.

Purpose: Use of RPT has not been explored to the same degree as other forms of peer-assisted learning which may involve learners of different levels. The aim of this systematic review was to examine the role of RPT in health professions education in order to identify the benefits and challenges, as well as the best approach for its successful execution.

Method: A search of the literature between January 2005 and February 2016 was conducted using applicable electronic databases and snowball referencing searches. Methodological quality of the selected studies was ascertained with the use of the Critical Appraisal Skills Programme (CASP) checklist.

Results: Eight articles met the set inclusion criteria for the review. Within these it was found that RPT could potentially enhance cooperative learning, communication, metacognition and teaching skills apart from enhanced understanding of the topic under study.

Discussion: Whilst RPT has been found to have a positive impact upon learner experiences, further investigation is required around its use, particularly in assessing learning outcomes in health education programs.

Contents

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1. Introduction

1.1. Peer Assisted Learning (PAL)

Peer-assisted learning (PAL) is a form of collaborative learning described as the acquisition of knowledge and skill through active help and support among status equals or matched companions.[1] PAL is an umbrella term encompassing various forms of peer-assisted learning including peer teaching, peer learning, peer assessment, peer mentoring and peer leadership.[1] Whilst distinct from each other, all variations have some commonalities such as similar discipline groups, mutual interaction and non-professional teaching roles.[2]

Earlier work in the field has been undertaken in primary and secondary schools [3] and is increasingly being disseminated within higher education healthcare programs.[4,5] Incorporating peer teaching within professional curricula helps to meet expectations of health professional competency standards related to teaching others.[5] PAL is not a new innovation but it is suggested that despite its ancient existence, it is an underused, yet highly prospective resource in higher education.[6]

1.2. Reciprocal Peer Teaching: a form of PAL

Reciprocal Peer Tutoring (RPT) is one form of PAL specifically involving structured switching of tutor-tutee roles amongst individuals of the same academic-year level.[7,8] Numerous systematic reviews have been conducted to gain an understanding of PAL within medical,[9,10] nursing,[11] medical and allied health education programs [2] as well as undergraduate health sciences education,[12] however none have focused on RPT specifically.

Initial documented evidence of RPT use was found in the 1970s with primary school children in USA, where fellow classmates interchanged roles of learner and tutor to study remedial reading facilitated by undergraduate teacher trainees.[3] Benefits to the approach have been identified within tertiary education[13] including improved understanding and retention of content,[7,13] better skill retention,[14] improved communication[7,15] and greater self-direction.[16] In a study with language students within Ireland,[17] RPT was found to be the catalyst for improving individual responsibility and accountability, as well as increased group solidarity. Due to the nature of interchanging roles of learner and teacher, RPT enables students to simultaneously learn while contributing to their peer's learning, sharing mutual experiences and reducing power differentials. Academics from various fields including medicine,[15] physiotherapy,[18] language learning,[17] teacher training,[19–21] mathematics [22] and information technology [23] have successfully embraced the use of RPT. However, despite identified merits, RPT is not widely popular in health professions education.[7]

Notably, some authors[24] highlight that conversely to being a highly valuable and established learning asset in higher education, RPT remains underutilised.

One of the reasons for the limited focus on RPT is prevalence of disagreement on peer learning terminologies. It is important to note that despite sharing commonalities, PAL forms are distinct from each other.[2] Although sounding similar, Reciprocal Peer Tutoring and Reciprocal Teaching are different,[25] where the latter is a phenomenon that involves reciprocating instructor roles between expert professional teacher and novice learner. These authors also indicate the applicability of Reciprocal Teaching to cross-age peer tutoring settings, thereby linking Reciprocal Teaching with Near Peer Teaching (NPT) where a learner who is typically junior is tutored by a senior student within the same program of education.[26] NPT is also referred as fixed peer tutoring,[21] while others [27] refer to NPT as PAL, despite being a form of PAL. Yet others [16,19] denote RPT as Reciprocal Peer Coaching. Given the recency of these articles, prevalence of disagreement about PAL nomenclature can be reasonably inferred.

Given the variety of terms used for defining RPT, it is imperative to clarify the definition for this review. Hence, in this systematic review, RPT is defined as a form of peer-assisted learning where students from similar educational backgrounds, that is, in the same year of study, alternate roles of tutor and learner to meet identified learning objectives. This definition was selected due to its alignment with the pioneering description of RPT.[3]

This systematic review sought to explore the use of RPT within undergraduate and postgraduate health education programs, aiming to identify benefits and challenges reported from peer-reviewed research studies. The review aimed to examine the literature in relation to RPT and to present the findings in relation to tertiary health profession education programs globally, in order to inform curricula and the manner to best implement RPT within undergraduate health programs.

The specific research questions were:

1. What are the reported challenges of utilising Reciprocal Peer Teaching (RPT) as a formal teaching-learning strategy within tertiary health education settings?
2. What are the reported benefits of RPT as a formal strategy within tertiary health education settings?
3. How can RPT be implemented successfully as a formal teaching-learning strategy within undergraduate health sciences?

2. Methods

2.1. Design

A comprehensive search strategy was used to identify potentially relevant published research studies, using quantitative, qualitative or mixed methods, which met the inclusion criteria. Narrative reviews, non-peer reviewed articles and editorials were excluded from the search. Articles were searched within a period of just over 10 years from January 2005 to February 2016.

2.2. Search strategy

Article searching was performed electronically to locate peer reviewed articles using the search engine Google Scholar and electronic databases including EBSCO host, Taylor and Francis, JSTOR, ScienceDirect, Wiley Online Library, Oxford, Emerald, Cambridge Journals, Springerlink, British Medical Journals, and Cumulative Index to Nursing and Allied Health Literature (CINAHL). Additionally, snowball sampling was conducted through manual searching of reference lists from selected papers. Key search terms used were: 'Reciprocal Peer Tutoring', 'Reciprocal Peer Teaching', 'Reciprocal Peer Coaching', 'Peer Assisted Learning' individually, and in combination with 'Higher Education' and 'Health' by subject.

2.3. Inclusion and exclusion criteria

Inclusion criteria included classroom, laboratory, or clinical settings within undergraduate or postgraduate health disciplines, published in English between January 2005 and February 2016. The manner in which RPT was carried out included students of similar levels alternating roles of tutor and learner to meet identified educational outcomes. It was essential to have the conforming RPT definition clearly articulated within the study in order to be included within this review. Outcome criteria/measures were not specified. Exclusion criteria comprised non-peer reviewed articles, non-empirical studies, non-health science studies and those outside of the definition of RPT.

2.4. Assessment of study quality

All articles meeting the inclusion criteria were included in this review, regardless of their selected level of evidence as RPT based studies are inclined to use study designs, such as observational, case series and cohort studies which are considered inferior in the grading of evidence.[28]

Quality of each article was evaluated using criteria for cohort and qualitative studies from the Critical Appraisal Skills Programme (CASP).[29] While CASP is a tool used to assess quality of articles within systematic reviews, there could be other quality appraisal tools used in adjunct with it.[30] However, given the types of articles included in this review, no other quality appraisal tools were applied apart from CASP. The authors recognise that despite not being of high quality, all articles have been included within this review due to the scant published literature around RPT in health professions education. Two independent assessors individually assessed the study aims, research design, sample selection as well as recruitment, ethical considerations in sample recruitment, consideration to researcher and participant relationship, rigorous analysis and discussion of results. Where consensus was not reached, a third expert would have been consulted, however this was not required. Studies often neglected to identify ethical issues, assessment tool development and interrelationships between participants and researchers. Only three [31–33] out of the eight studies clearly indicated that ethical approval had been formally gained. Nonetheless, one study [31] did not clarify if the facilitators of focus groups, who were also year coordinators, were involved in direct teaching of the participants. Some studies[7,15] asserted the effectiveness of RPT based upon positive perspectives from participant and academics, but did not clearly identify the limitations in making these claims.

3. Results

3.1. Overview of studies

Based upon the combination of the primary search terms, 31 articles were identified in higher education. Sixteen eligible studies were identified after eliminating narrative reviews, non-health education articles and non-peer reviewed journal articles. Abstracts and full papers were then examined to ensure that they satisfied the inclusion/exclusion criteria. The definition of RPT was carefully scrutinised which resulted in the exclusion of eight studies with non-conforming definitions, leaving a final collection of eight articles for inclusion (see Fig. 1). These were two qualitative, one quantitative and five studies using mixed methods. The small number of articles arising from this search demonstrates that RPT has not been explored to a great extent in recent years.

3.2. Study designs, participant characteristics, theories and aims

As shown in Table 1, questionnaires, surveys and focus group interviews were used to capture qualitative data. Four studies[13,15,32,33] accessed students' course grades, in which one[33] additionally utilised the Tutor Intervention Profile, Likert Scales, assessment checklist and academic scores to elicit quantitative data. Observations through video-recording were conducted by some[18] to obtain a percentage success of performance. Most of the studies were conducted with undergraduate students ($n=7$), out of which four[7,13,16,31] chose first year students, two[32,33] selected third years and one study [18] has not specified the precise year level of their undergraduate participants. Only one was conducted with postgraduate participants.[15] Four articles were identified from the USA, two from the UK, one from South Africa and another from Bahrain. The disciplines included medicine, osteopathy, physical education and physiotherapy (Table 2). Since physical education involves studying physiology and human anatomy, it was included as a health discipline within this review. Three out of the eight studies used theories to support their study as a framework. One researcher[16] used both

Literature search
Reciprocal Peer Tutoring/PAL in health professions education in multiple databases

↓

31 articles identified with search terms (Excluded articles not from higher education)

↓

16 studies
{After removal of non-health science articles (13), narratives (1), Non peer reviewed Journal article (1)}

↓

8 articles meeting the inclusion criteria
{After excluding articles with non-conforming/unclear RPT definition/use (8)}

Fig. 1. Flowchart of literature search process.

Table 1
Characteristics of the selected studies.

Author, Year, Place of Study	Study design	Participants	Theory used	Study aim
Asghar, 2010, UK	Four semi-structured individual interviews and a Focus group interview	First year physiotherapy students ($n=12$)	Cognitive development theory, Vygotsky's theory of zone of proximal development	To elicit student perceptions of the Reciprocal Peer Coaching process as a formative strategy
Bennett, O'Flynn, Kelly, 2014, UK	Activity System Analysis Qualitative approach, Three focus groups, Two open ended questions,	First year medical students undertaking full time hospital placement ($n=115$)	Activity theory	To determine how PAL transfers to the clinical environment
Bentley and Hill, 2009 USA	Descriptive Survey 15 question using 5 point Likert Scale and one open ended question	First year medical osteopathy students ($n=297$)	None	Assess RPT as a teaching method, compare it with other methods and make recommendations for future curricular changes
Hennings, Wallhead and Byra, 2010, USA	Didactic research methodology using Quasi ethnographic framework Observations, Semi structured interviews	Undergraduate climbing physical activity class students ($n=4$) Student year level is not listed within the article.	Didactics	To address the questions: 1. What (mis)alignment existed between the content intended to be taught by the teacher, and the content actually learned by the participants? 2. What factors operated within the didactic milieu of the reciprocal style episodes to shape the content actually learned by participants?
Kassab, Abu-Hilej, Al-Shboul and Hamdy, 2005, Bahrain	Experimental study Tutor Intervention Profile using 5 point Likert scale Student self-assessment checklist on 5 point Likert scale Tutor evaluation of individual student performance by using assessment checklist Student evaluation of their group function using scale of one to four Academic scores Open ended questionnaires for student perception	91 third year medical students 5 groups each of faculty led and student led tutorials	None	1. To assess if students acting as tutors acquire similar skills as faculty tutors 2. Assess difference in academic performance in students taught by faculty and tutors 3. Gain perceptions of students about peer tutoring

Krych et al., 2005, USA	Descriptive Survey 13 item debriefing survey using 5 point Likert scale Open ended questions seeking feedback	First Year medical students (n=44)	None	Examine acceptability of RPT in learning anatomical concepts and communication skills
Scott and Jelsma, 2014, South Africa	Quasi Experimental Test scores 40 items true/false test to elicit knowledge about health conditions Questionnaire to rate satisfaction about the sessions	Third year Physiotherapy students (n=36) One educator and three peer-led groups	None	1. Compare student test scores following peer led and clinical educator led sessions 2. Elicit student satisfaction for preferred method of learning
Youdas et al., 2007, USA	Descriptive survey 12 item instrument using 5 point Likert scale with three open ended questions	Doctor of Physiotherapy Students (n=27)	None	1. Assess perceived usefulness of RPT as a method for teaching-learning human anatomy in laboratories 2. Determine if exposure to RPT during a semester had an effect on student course grades

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Table 2
Reciprocal Peer Tutoring details within the selected studies.

Article	Use of RPT as Supplemental/ Mainstream activity	Setting of RPT	Impetus to initiate RPT	Facilitated by faculty/ representative	Tools used to capture data	Incentive offered to students for participation	Participants having previous experience with RPT
Asghar, 2010	Mainstream: Students were interviewed after experiencing reciprocal peer skills assessments	Laboratory	Combat alternative method to the stressful and time consuming summative skills assessments	Yes	Individual interviews and focus group interviews	None	No
Bennett et al., 2014	Mainstream: Clinical case presentation	Clinical setting	To explore the transferrable nature of PAL from laboratory to clinical settings	No	Qualitative feedback about RPT sessions and focus groups interviews	None	No
Bentley and Hill, 2009	Mainstream Gross anatomy	Anatomy laboratory	Combat increased students numbers and reduced resources – qualified educators and cadavers.	Yes	Course grades Surveys and opinions	Lesser faculty: student ratio for dissecting during half the term.	No
Hennings et al., 2010, Wyoming, USA	Unclear what learning opportunities were given to the remainder 14 students excluded from this study: Indoor climbing	Field work	To understand how RPT influences the content to be taught and what is actually learnt	Yes	Video recording and semi structured interviews	None	Yes
Kassab et al., 2005, Bahrain	Mainstream: Health conditions using problem based learning in	Classroom	Conserving faculty resources and promoting student skills of leadership, analytical thinking and evaluation	Yes	Tutor Intervention Profile, Likert Scale and Self-assessment checklist.	None	No
Krych et al., 2005	Supplemental Gross anatomy	Anatomy laboratory	To explore effect of RPT on aspects fostering professionalism	Yes	13 item debriefing questionnaire with several open ended questions	Each participant got to practice the skill three to four times.	No
Scott and Jelsma, 2014, Cape Town	Mainstream: Health conditions	Clinical	Increasing student numbers and need to give a broader scope of practice	Yes	Student test scores Questionnaire to seek student satisfaction about peer led and educator led sessions	None	No
Youdas et al., 2007	Supplemental	Dissection laboratory	Authors wanted to explore foremost use of RPT in physical therapy education	Yes	12 item survey with 4 open ended questions	As peer teachers, students received guidance and rehearsal with faculty prior to teaching their peers.	No

Table 3
Results of the selected studies.

Article	Academic benefits from RPT	Generic benefits from RPT	Challenges encountered	Recommendations	Limitations of study
Asghar, 2010	Inculcation of self-regulation to become autonomous learners. Self-regulation is affected by motivation, self-efficacy, time management, goal setting, meta-cognition and associated emotions.	Collaborative learning	Reluctance by students to be a part of the group. Overlooking students who were reluctant to participate in the group.	Being aware of students reluctant to participate. Consider educational needs of diverse students by providing opportunities to engage in variety of assessments.	None listed
Bennett et al., 2014	None	None	Students preferred learning from expert (faculty member) as opposed to from their peer. Students found it difficult to give negative feedback to their peers. Lack of enthusiasm for RPT as students were task oriented focussing to succeed in exams.	Before designing RPT it is important to know how students learn. RPT should be undertaken as a supplemental activity instead of replacing traditional learning. Integrate RPT within the curriculum to recognise it Include RPT in assessments. Have faculty or representative present during the RPT which may influence student engagement with RPT.	No faculty vetting of topics covered in RPT which were selected randomly on clinical placements. While authors acknowledge students had no training in teaching skills; they assert that this did not pose any tensions in their study.
Bentley and Hill, 2009	Perception of enhanced learning of topic. More efficient use of time.	Experience of collaborative learning	Lack of previous teaching experience. Some individuals did not perform to their group's standards.	Orientation to 'tips and tricks' as novice teacher. Weekly assessments to propose solutions for improving group dynamics.	Grade differences (MCAT and GPA) of the incoming classes were not considered due to unavailability. Both class groups evaluated may have had some extraneous variables affecting scores. Not all students responded to surveys leading to possibility of under-representation of the student views.
Hennings et al., USA	Improved performance while learning basic tasks.	Enhanced co-construction of knowledge suggestive of cooperative learning.	Participants were unable to construct complex tasks resulting from deficient observation from peer tutors.	Selection of teaching style should give due consideration to learner's stage of motor development and ability of learner to comply with task. RPT can be used in relatively simple content an when participants have sufficient experience in sharing feedback.	Self-reflection on performance through the simulated video recall done in this study, is not a usual hallmark of RPT.

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Table 3 (*continued*)

Article	Academic benefits from RPT	Generic benefits from RPT	Challenges encountered	Recommendations	Limitations of study
				There could be a faculty-initiated practice style while dealing with difficult content before commencing with RPT style of learning.	
Kassab et al., 2005, Bahrain	No changes in student scores when compared between student-led and faculty-led tutorials.	Relaxed tutorial environment, better perception of decision making and support.	Lack of experience and bias towards fellow students led peer tutors allocate higher scores to peer learners.	Suggest Near Peer Tutoring over RPT. Special tutoring training to be given before students undertake tutoring role.	Examinations scores allowed for assessing the knowledge scores only as opposed to the interaction process.
Krych et al., 2005	Increased understanding and retention of topic learnt.	Experiencing improved communication and teaching skills.	Students were anxious about time management. They found it overwhelming to learn, assimilate and teach new material same day.	More preparation time. Have three to six specific objectives listed for each RPT session.	No objective measures carried out to quantify the increased understanding and retention fo the topic.
Scott and Jelsma, 2014, South Africa	No significant differences in mean scores of both peer led and faculty led groups. However slightly high scores in sections taught by students than clinical educators.	Not discussed	Students preferred to be taught by clinical educator due to inexperienced peer tutors.	None	Not all students within the study got an opportunity to be a peer tutor due to some sessions being taught by clinical educators.
Youdas et al., 2007	Improved understanding and retention of topics. Improved median grades for the anatomy course.	Improved oral communication skills Increased confidence to teach Promoted collaborative learning.	Some group members were inattentive. Not enough time to master material before teaching it to peers	Reducing amount covered in every laboratory session. No recommendations for improving group dynamics.	Absence of randomised student sampling. A pre-test post-test of two group design could be done instead. Small sample size of n=27 to assess perceived usefulness of RPT. Survey instrument not tested outside the given setting. When claiming the improvement in median grades, no consideration to variables like psychosocial factors that could affect the scores of the two independent student groups, besides RPT intervention.

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cognitive development theory and Vygotsky's social development theory while two other studies used activity theory[31] and didactics.[18] Study aims encompassed exploring student perceptions,[15,16,33] effect on academic performance,[15,32,33] factors affecting learning content,[18] examine RPT as a teaching method,[13] application in clinical environment,[31] acquisition of teaching [33] and influence on communication skills.[7]

3.3. The use of RPT

As seen in Table 2, most authors [13,16,31–33] chose to utilise RPT as a mainstream teaching-learning activity, while others [7,15] chose to utilise it as a supplemental strategy. Some [18] employed RPT with four purposive samples, however there is no clarification if the same teaching-learning activity was provided for the remaining 16 students enrolled in their course. It could be considered that RPT was used as the mainstream form of activity since there was no mention of any other form of educational stratagem.

Stimulus for using RPT ranged from exploring application in physiotherapy education,[15] fostering professionalism,[7] identifying links between what was taught and actually learnt,[18] as well as transference of learning to clinical settings.[31] RPT was used as a replacement for stressful summative skill assessments.[16] On the other hand, some reseachers[13] sought to use the approach to combat increased student numbers and diminished educational resources in the form of dissection cadavers and qualified educators. Yet others [32,33] adopted the use of RPT due to similar challenges[13] but additionally explored elements such as enhancing student practice and developing their non-technical skills.

Settings for RPT were mainly laboratories, clinical settings or fieldwork. Most studies were facilitated by a faculty member or tutor, except one [31] which used RPT with students with no faculty presence. Two studies [32,33] had peer tutors closely supported by faculty members in preparing the content to be taught before tutoring their peers. Although most of the studies included participants without prior experience of RPT, some [18] conducted their study with individuals who had previous experience with RPT; the details of this are not elaborated within their study.

Participants from the studies conducted within dissection laboratories received incentive for involvement by getting extra time and opportunity to practise skills,[7] or guidance and rehearsal with a faculty member.[15] They also experienced better than normal faculty-student ratios for half of the academic term,[13] thereby providing more opportunities for faculty interaction. The remainder of the studies did not offer any identified incentives for participation in RPT sessions.

3.4. Benefits gained from RPT

Identified benefits gained from the use of RPT were classified into discipline-specific and generic benefits (Table 3). While discipline-specific benefits comprised discipline knowledge and skills specifically required by the curricula, generic attributes denote transferrable skills, which are different to discipline-specific skills.[34] The transferable skills gained by implementing RPT within this review can be synthesised as improved communication,[7,15] enhanced teaching skills,[7] independent learning and problem solving [13,16] as well as learning and working collaboratively.[13,15,16,18,33] Scott and Jelsma[32] did not identify any transferrable skills within their student cohorts.

Discipline-specific benefits included enhanced understanding and retention of the topic,[7,13,15,32] improved course grades [15] inculcation of self-directed learners [16] and improved knowledge and skills.[18] There was no change in the student scores of peer-led or faculty-led groups.[33]

Claims that RPT was effective in understanding concepts and communication skills[7] were based upon student perspectives and there were no supporting objective measures. Increase in the median scores as a result of RPT was found by comparing grades of students who had experienced RPT with those who were taught traditionally during the previous year.[15] While these researchers admit a limitation of their study design; they did not acknowledge that variables like psychosocial factors could influence academic performance of students.[35] Thus some assertions made about the effectiveness of RPT could be questionable as a broad spectrum of factors that could affect the results have not been considered. Most studies were inclined to rely on the perspectives of students as well as academic staff and have not measured objective changes as a result of RPT. This warrants for further research to objectively measure changes of actual learning.

3.5. Challenges encountered, limitations and recommendations

Students were reported to be anxious and overwhelmed when asked to learn and teach new material on the same day.[7] Some participants reported lack of previous teaching experience,[13] insufficient time to

master content before teaching it to peers,[15] and inability to construct complex tasks due to deficient observations by peers for diagnosing in-task errors, resulting in lack of timely feedback to rectify errors.[18] Some peer tutors assigned more marks to their peer students due to lack of experience or bias.[33] There were also reports of challenging group dynamics and individual differences in learning pace.[15,16] Providing negative feedback was seen as confronting for some participants,[31] while it was reported that some preferred to learn from an expert academic, rather than from their inexperienced peers.[31,32] It is noteworthy that all the seven studies conducted with undergraduate students, generally encountered difficulties by participants like fear and anxiety to embrace RPT, particularly in the first year cohorts. On the contrary, post graduate students [15] generally embraced RPT. This finding possibly highlights the year level of students selected for RPT to be considered for senior year level rather than first year students.

Given the variety of challenges encountered, all studies suggested recommendations for future research. These ranged from allocating more time and specific objectives for every RPT session,[7] orienting participants with preliminary teaching skills[13,33] and reducing teaching content covered in every session.[15] Some[13,16] highlighted the need to be aware of individuals who were reluctant to participate and consider the diversity of educational needs of students. Further suggestions included consideration of teaching styles to suit learner abilities and developmental stage.[18] Some authors[13] suggested RPT is best carried out as a supplemental and facilitated educational strategy, while others [33] recommend replacing RPT with NPT as they identified peer tutors found difficulty in analysing the problems within the problem-based learning program, thereby emphasising previous learnt experience vital to teach peers. On the other hand, they also acknowledge that special training for becoming tutors is imperative for students of the same year level to get successful student learning experience. This was supported by the findings of a study [36] which found training yielded better student learning, rather than spontaneous peer interactions in high school students. RPT had a positive impact on student learning experience.[33] Issues with group dynamics was reported as one of the challenges in their study but did not make any recommendations for overcoming it.[15] Limited resources such as finances, clinical sites and educators were recognised as challenges to optimise student learning on placements.[32] Therefore ascertaining the efficacy of peer teaching with educator teaching in small group settings within clinical placements was proposed.[32]

While most discussed limitations of their studies, three[7,16,32] did not identify any. The authors of this systematic review identified a limitation in one of these studies[32] as not all students had an opportunity to be peer tutors due to some sessions being scheduled to be run by clinical educators. Despite the fact that all students did not get the opportunity to be peer tutors, this study was included within this review due to its participants belonging to the same year and somewhat reciprocal nature of student interactions. Although some authors[13] did not find any significant differences in comparing course grades of a group that used RPT with another that did not, they did not consider differences between Grade Point Average and Medical College Admission Test Scores due to unavailable data. These authors also acknowledged the voluntary nature of student responses towards RPT leading to under-representation of student views. Others [15] viewed absence of randomised student sample selection technique to be a study limitation. They proposed pre-test post-test two-group design instead of their descriptive survey. Moreover, the tool used to collect data was not tested outside their setting so may not have been valid and reliable. In one study,[31] the limitation was identified as faculty not vetting topics included in RPT, instead topics for RPT were randomly selected from placements which varied according to the patients. These authors' recognised students' lack of teaching skills as a limitation, whereas on the other hand they asserted that this information did not lead to participant anxiety in their study. Yet others [18] admitted using a different approach for using RPT in their study by incorporating self-reflection by students on their performance using simulated video recall, which was not a usual hallmark of RPT use. One study [33] acknowledged use of examination scores but limited them to assessing knowledge only and not the student interaction process.

4. Discussion

The purpose of this systematic review was to scrutinise the benefits and challenges of RPT in health professional education. It also aimed to explore how RPT could be implemented successfully within tertiary health education settings. Formal PAL is gaining increasing popularity internationally.[10]

4.1. Need for RPT

One impetus for RPT use has been increasing student numbers coupled with sparse teaching resources,[37] but also experimenting with other gains

such as development of leadership, teaching skills and professionalism.[7,38] The current review also found RPT helped in attainment of metacognitive regulation, which is a set of self-regulatory skills to actively coordinate self-learning. Recent findings [39] also support that RPT is a promising strategy to promote metacognitive regulation. In this study,a quasi-experimental pre- test post-test design was applied by introducing eight RPT sessions with first year undergraduate educational science students. Think-aloud and verbal protocols were used to measure students' metacognitive regulation. Their findings revealed increased metacognition of students through RPT. Metacognition is viewed to be crucial for developing readiness and competence for academic life,[40] as well as for career development.[34] It has been emphasised [26] that despite numerous documented benefits of various PAL forms, it has not been formally integrated into higher education curricula.

4.2. Role of the academic in the use of RPT

Whilst there are merits in applying RPT, the facilitating role of academics remains crucial in ensuring support and guidance to participants which is also seen in other forms of PAL, such as NPT.[11] Being in the same year level can lead to lack of direction [37] and hence it is important to give thought to the manner in which RPT will be carried out. If peer tutoring has replaced the instructor role, caution needs to be given for using structured peer interactions as a means to augment the educator's role, rather than substituting it.[2]

4.3. Aspects to be considered when implementing RPT

There was one study [31] which found RPT use to bechallenging and discovered that students from heterogeneous backgrounds preferred to learn from faculty members as opposed to their peers. The two student cohorts from their study comprised a diverse group: one having prior degrees and the other school leavers with no prior degrees. Several reasons can be outlined for this, including timing and the complex nature of the task for a heterogeneous group with no faculty support despite being undertaken as a mainstream activity. This study also underscored the findings[11] that students could feel unprepared and apprehensive for being responsible for their peers' learning. A recent literature review,[41] found that academics must be mindful that disparate student backgrounds result in different learning styles and preferences. Whilst diversity of student cohorts can be perceived as a strength,[42] dissimilar backgrounds and lack of previous

interactions within the group may perhaps result in awkwardness in providing peer feedback. It cannot be assumed that simply pairing individuals for instructional purposes will yield productive results.[3] Compulsory peer tutor training and support in executing RPT is of paramount importance.[25] Necessity of careful planning and organising will enable good quality student interactions.[43] Prior to introducing a new educational concept, due consideration needs to be given to the complexity of learning environment and tasks undertaken[44] which echoes the findings that students tend to be unsuccessful in performing complex tasks.[18] Using a framework for planning the peer interactions will enable a systematic approach by carefully considering a series of questions. These queries relate to alignment of the peer learning activity with curriculum, assigning responsibilities to academics for specific planning areas, role of staff, piloting the project, timelines and required funding as well as projected outcomes could be beneficial for smooth implementation.[45]

A recent study [38] compared traditional teacher instruction to RPT in the anatomy laboratory. First year medical students ($n = 227$) received traditional teacher-directed instruction in human anatomy dissection during the initial half of their first semester. RPT was introduced in the second half of first semester where student groups of fifteen per table dissected cadavers. To ensure equal opportunities, the head of department prepared a schedule to ensure every student was able to experience peer tutor and peer learner roles. Two students were peer tutors daily and received a forty-five minute pre-laboratory session with faculty to review their dissection knowledge and skills. Following this, they performed peer tutoring for ninety minutes by executing the dissection session. The remaining 30 min of the two-hour session was then utilised by the faculty member to clarify questions from the group. Students agreed through survey that RPT enhanced their interest, enthusiasm and engagement during the anatomy laboratory sessions. These findings were similar to faculty responses who used an observational tool to assess student collaboration, professionalism and teaching. These authors have clearly articulated the manner in which RPT was instigated, recognising the value of planning and academic support during the process. It also brings to light the potential of RPT in learning hands-on motor tasks. This study was not included within this review as it was outside the selected period, emerging after analysis was completed.

4.4. Lack of consistency in RPT terminology

There is a strong prevalence of lack of consistency in terminologies used to describe RPT [11] found in this

systematic review.[16,31] RPT is a form of PAL and is distinct due to the reciprocation of tutoring role among individuals of similar educational backgrounds.[3] This review has found potential equivalence in student outcomes from RPT and NPT, although this requires further exploration. A number of studies have been conducted on NPT and academics continue to use it over RPT.[9] However few studies have been conducted on RPT, which warrants further exploration as not much is known about this enigmatic teaching-learning strategy with potential curriculum benefits.

4.5. Paucity of research that explores RPT use in health professions education

Within tertiary health education, placements form a vital role to consolidate knowledge with practical exposure [2] which could have scheduling implications. Timetabling for NPT can be challenging [26] potentially due to involvement of different year level students. RPT, on the other hand, could possibly eliminate this challenge by having participants from the same year level. This however, requires further testing. It is noteworthy that none of the studies implementing RPT included within this review originated from the disciplines of nursing, midwifery or paramedicine. Applicability of RPT in various learning settings, including classroom, laboratories and clinical placements could be investigated.

5. Limitations

This review included studies published in English language only so studies published in other languages may have been missed. There are challenges in reviewing RPT within health education, which is a relatively new topic in the field. Whilst effort was made in manually checking the grey literature, prevalence of confusing terminologies by academics to describe RPT may have led to missing relevant articles through the search terms used for this review. As an example, an article included within this review,[33] has not explicitly mentioned RPT despite having utilised it to study problem-based learning in medical curriculum. Sometimes, key information about the manner in which RPT was effected was not well described in some of the included articles thus preventing a comprehensive representation of RPT. Selection and inclusion of studies was done to best exemplify the use of RPT within health education in the tertiary sector. All articles meeting the inclusion criteria have been included in this review, despite not qualifying as high quality due to the dearth of literature around RPT within health sciences in recent years.

There needs to be further research conducted to examine RPT in other disciplines and settings. Cost benefit analysis using this approach can be studied to optimise student learning outcomes. Comparision of RPT and NPT could also be undertaken. Furthermore, objective measures to quantify the effect of RPT could be applied. Academic and student perspectives towards RPT experience could be investigated in depth, as well as examination of this strategy in meeting educational outcomes within varied disciplines.

6. Conclusion

This review has explored used of RPT within health science education. A range of discipline specific and generic benefits could be gained through this educational approach. Meticulous planning and preparation of participants for tutoring roles is essential to ensure they have a positive learning experience from RPT. Due consideration to the year level of participants could also be beneficial for optimal outcomes. Although students remain the active participants, academic facilitation is beneficial to ensure ongoing support and monitoring, especially if participants are new to this educational stratagem. RPT remains a promising educational tool, awaiting exploration within tertiary health science educational programs.

One sentence bios

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2.7 Chapter summary

This chapter explored the existing literature in relation to PAL, and in particular, RPT. The discussion in each category commenced with examining historical perspectives of each and spanned from general health professional education to nursing. Tensions in the literature have been presented along with lessons learnt from several studies that have implemented PAL. The theory directing PAL has been discussed, which has also been applied to the current study. This chapter also contained a published systematic review on RPT in health professional education programs. Overall, this chapter provided an understanding of the existing literature and formed the backbone of the current study by locating the knowledge gap. The next chapter, Chapter 3, describes the study methodology.

Chapter 4: Quantitative results

4.1 Introduction

The previous chapter described the methodological aspects for the current study. This chapter reports the quantitative findings obtained from the four surveys administered within this study. The investigations reported in this chapter aim to add to the understanding about RPT in nursing education. The null hypothesis H_0 was 'there was no change in the post-test scores as compared to the pre-test score' in terms of attitudes and knowledge.

4.2 Objectives

The research aim for the quantitative component was to assess the effect of RPT on student knowledge, experience and attitudes, specifically the objectives for this section were:

1. To quantify the effect of RPT on students' self-reported attitude scores in teaching peers;
2. To calculate the effect of RPT on student self-reported competence and confidence to teach;
3. To measure the effect of RPT in terms of skills knowledge;
4. To quantify peer teaching experience after RPT; and
5. To compute the effect of RPT on students' teaching preferences within clinical teaching settings.
6. To compare the demographic attributes with the SRA, knowledge and CTPQ scores.

4.3 Overall design and tools

This study employed a mixed methods approach using a sequential explanatory design (Edmonds & Kennedy, 2017). It used a one group pre-test and post-test design to administer the quantitative surveys. Three surveys were administered in week one to the students who had indicated their consent to participate in this study, after which all enrolled students experienced RPT in the nursing laboratories. Subsequently, the cohort who had initially consented were administered the four post-test surveys.

The first instrument used was a multiple-choice questionnaire to test participants' knowledge about the two nursing skills taught. The second questionnaire was aimed at gathering participants' self-reported attitudes towards the teaching role of nurses and nursing students. The third was the CTPQ (Iwasiw & Goldenberg, 1993) to test nursing students' clinical teaching preference to peers and academics. Finally, the PTEQ (McKenna & French, 2011) was administered after the RPT sessions as a post-test only measure to elicit participants' experiences of peer teachers.

4.4 Sample power of survey

The total available population comprised the total enrolled standard students (n = 132), with a 0% drop out rate of the sample (n = 102). The response rate was 77.3% (n = 102) of the total population (n = 132). Thus, the sample size satisfied all requirements for medium, large and small effect size with a standard deviation (SD) of 0.5 (Daniel, 2013).

4.5 Data management and analysis

4.5.1 Data cleaning

Data cleaning involves identification and removal of unreliable or invalid data (Mertens et al., 2017). No such data were identified; therefore, all data were retained for the statistical analysis.

4.5.2 Descriptive statistics

Descriptive statistics included frequencies and percentages for categorical variables besides means, SDs and ranges for quantitative variables.

4.6 Participant characteristics

The respondents comprised 93 females (91.2%) and nine males (8.8%), indicating a majority of females over males. This trend of under-represented males is similar to that described in the national report by the Australian Department of Health (2014) on students undertaking nursing programs of study to acquire their initial registration in Australia. The Department of Health expects the national nursing workforce to be comprised of 90% females. Although this report included a fraction of overseas students, the general trend prevailed of female students outnumbering males.

Originally, there were six age groups in the tool (McKenna & French, 2011); however, these were merged into three based upon similarities in psychosocial development (Newman & Newman, 2018) to obtain meaningful statistical analysis. The first group was retained as late adolescents (n = 41) from late teens to 21 years; a feature of this age group is the commonalities in ongoing cognitive and nervous system development that can affect educational achievements (Noble, Korgaonkar, Grieve & Brickman, 2013). The second group was classified as early adults from 22–30 years of age (n = 46), as members of this age group share commonalities in the demands of their social development (Blumenthal, Silbereisen, Pastorelli & Castellani, 2015), while participants aged 31 years and over were grouped together as mature adults (n = 15). Although there was approximately equal distribution between the first two age groups, the participants over 31 years of age accounted for the smallest group at 14.7% (n = 15).

Seventy-two participants (70.6%) reported not having prior experience in teaching peers from the same year level, while 70 participants (68.6%) reported not having experience in being taught by peers from the same year level. This indicated that the majority of participants were new to teaching and learning from same year–level peers. As part of the demographic data gathered through the surveys, participants were requested to provide details of their campus and mode of enrolment for their undergraduate nursing studies, because they could change their campus and mode of delivery early in the academic year. However, this information was only used to ensure that participants met the inclusion criteria of being enrolled as standard students at the given campus and was not used for statistical analysis. There were open-ended questions at the end of the surveys; however, none of the participants provided any responses to these.

4.7 Self-reported questionnaire on attitudes to peer teaching

The first questionnaire was aimed at gathering participant attitudes towards the teaching role of nurses and nursing students as well as rating their confidence and competence in teaching their peers. This questionnaire was based upon two existing questionnaires: the Modified Teaching Style Survey (Williams et al., 2015b) and the PTEQ (McKenna & French, 2011). The PTEQ has been adapted from the CTPQ (Iwasiw & Goldenberg, 1993). The first questionnaire comprised 18 items: 11 pertaining to peer teaching preferences, three relating to nurses' attitudes to teaching and four items about self-reported teaching rating, confidence and competence to teach as well as confidence in

providing honest and helpful feedback to peers. Each of these had a six-point Likert scale rating.

These 14 items were analysed together using a paired t-test. The item-wise maximum responses with 'not sure' for pre-test were four. There were no 'not sure' responses in the post-test

4.7.1 Effect size for self-reported attitudes to peer teaching

The effect size for self-reported attitudes (SRA) to peer teaching was computed using Cohen's formula (Hoyt & Del Re, 2018) by subtracting mean paired differences for pre- and post-test SRA and dividing the outcome with pool SD of difference scores. Therefore, $|d| = 3.049/11.867 = 0.26$, which was over 0.2 but less than 0.5 and was, therefore, a small effect size.

4.7.2 Overall changes in attitudes towards peer teaching

The overall changes to attitudes to peer teaching were analysed by applying a paired t-test to the first 14 items on the tool (see Appendix 1). Results showed a statistically significant increase in scores for post-test attitudes compared to pre-test scores (M = 49.2, SD = 10.03 to M = 52.3, SD = 8.17) and $t(101) = 2.6$, $p < 0.05$ as displayed in Figure 4.1. The mean increase in attitude scores was 3.1 with a 95% confidence interval, ranging from 0.7 to 5.4.
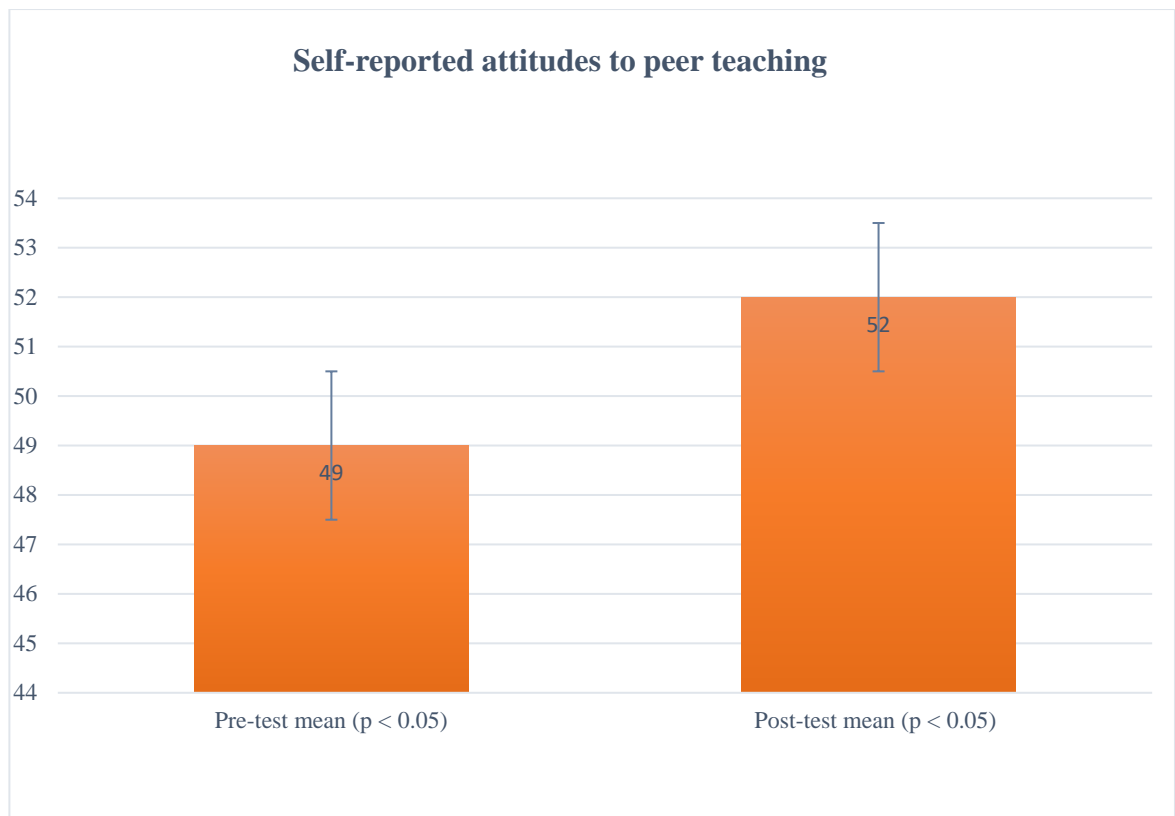
Figure 4.1: Pre- and post-test attitudes to peer teaching

4.7.3 Individual items from self-reported attitudes to teaching

Each of the 14 items was analysed individually using the McNemar-Bowker test, excluding the 'not sure' responses. This answered the question: 'was there a change in the post-test opinions in the respondents with positive neutral or negative opinions?' The null hypothesis H_0 was 'there was no change in the post-test attitude scores as compared to the pre-test scores'. There were only three items that rejected the null hypothesis due to a significant increase in their post-test scores ($p < 0.05$). These items were: 'teaching peers is a good use of time and efforts', 'I understand the principles of teaching and learning' and 'by teaching my peers and I can reflect on my previous learning' (see Appendix 2a–2c). Participants rating these items higher in the post-test demonstrates their increased satisfaction about the underlying principles of peer teaching. It also displays their positive attitudes to RPT by conceding its merits in reflecting on their previous learning. They also expressed a desire for creating more opportunities to engage in this form of learning within the curriculum. 'Teaching is an important role for nurses' was an item replicated in the SRA, CTPQ and PTEQ, however there were no statistically significant changes found

in this item within all of the three tools. Although the item was similar, the scales for SRA and the other two tools were slightly varied.

4.7.4 Self-reported confidence and competence

The final four items in this scale addressed the self-reported confidence and competence of participants. Each of these items had a diverse scale as per Table 4.1; therefore, they were analysed individually.

Table 4.1: Reported confidence and competence scale

Reported confidence and competence of participants						
How would you rate your teaching ability?	Very good	Good	Average	Below average	Poor	Not sure
How <u>confident</u> do you feel now to teach your peers?	Very confident	Fairly Confident	Average	Poorly confident	Not confident	Not sure
How <u>competent</u> do you feel now to teach your peers?	Very competent	Fairly Competent	Average	Poorly competent	Not competent	Not sure
How confident are you in providing honest and helpful feedback to your peers even if it involves providing negative aspects of performance?	Very comfortable	Fairly comfortable	Neutral	Slightly uncomfortable	Extremely uncomfortable	Not Sure

Once again, the 'not sure' category was considered a separate category, including the participants who did not have an opinion. All the other categories were considered to include the participants who had opinions—positive, negative or neutral. Hence, the 'not sure' responses were excluded from the McNemar-Bowker calculation.

There were some contrasting results within this section. For example, although the participants did not rate themselves highly in their teaching ability ($p > 0.05$); there was

an increase in their confidence to teach peers (see Appendix 2d), their competence (see Appendix 2e) and their confidence to provide honest and helpful feedback ($p < 0.05$) (see Appendix 2f). Their low rating of their teaching ability was contrary to their high rating for confidence and competence to teach, thereby underscoring the multidimensional nature of teaching. Also, participants agreed that teaching peers enabled a reflection of their previous learning as well as increased confidence in providing honest and helpful feedback to peers. These findings warrant more peer teaching opportunities in the curriculum to further students' teaching skills.

4.7.5 Gender comparison of attitudes

Both males and females displayed positive changes in their attitudes towards peer teaching (see Appendix 3). Compared to females, the males demonstrated lower initial attitudes in pre-testing but scored higher in post-testing (M = 3.5, SD = 0.17) with a 95% confidence interval ranging from 3.2 to 3.7. This revealed that at the onset of RPT, males were not as enthusiastic about peer teaching as females but demonstrated an improvement at the end of the intervention. The reason for this could be that females were more familiar with some form of peer teaching than males. As a result, the female cohort also showed an increase of 3.7 in their attitude scores towards peer learning (M = 3.7, SD = 0.05, CI 3.6 to 3.8) (see Figure 4.2) in their post-test scores. Considering the small sample of males (n = 9), further investigation is warranted with larger samples.

Estimated marginal means of attitudes
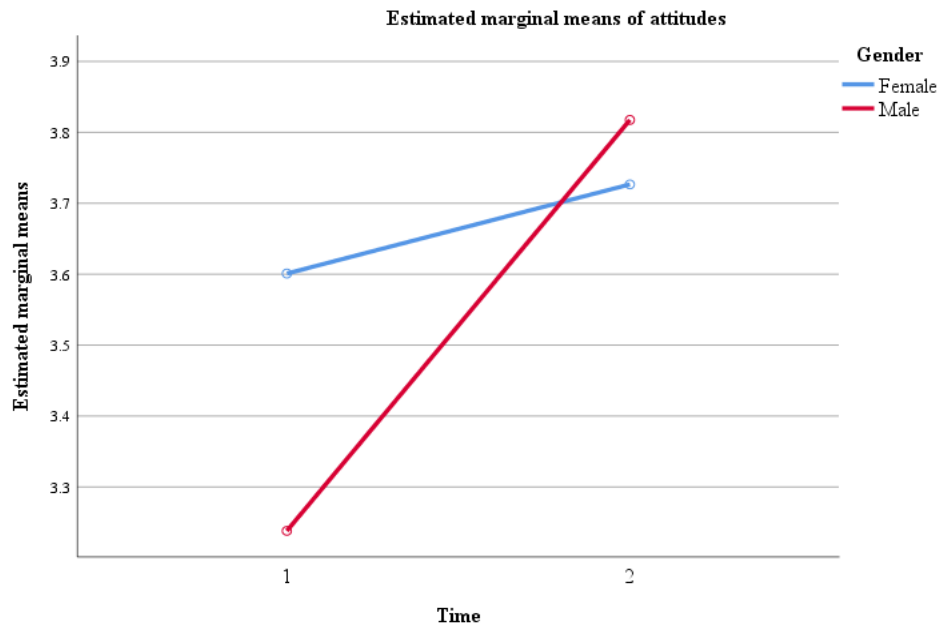
Figure 4.2: Comparison of mean attitude scores (pre- and post-test) with gender

4.7.6 Age group comparison of self-reported attitudes to peer teaching

As discussed in the participant characteristics, all the newly clustered age groups exhibited an increase in attitudes towards peer teaching (see Appendix 4). However, compared to the other age groups, there was a sharper increase in the late adolescent group (M = 3.6, SD = 0.7at a 95% confidence interval ranging from 3.5 to 3.8), as shown in Figure 4.3. This indicated that of all age groups, the youngest participants (17–21 years old) had stronger positive attitudes to peer teaching after experiencing RPT. Mature-age groups had higher pre-test scores (M = 3.9, SD = 0.1 at a 95% confidence interval ranging from 3.65 to 4.15) for their peer teaching attitudes than the other two age groups, indicative of their positive attitudes to peer learning before undertaking the RPT experience. This group was already optimistic towards peer teaching before engaging with RPT, after which their positive attitudes became stronger. However, given the small number of participants in this age group (n = 15), further investigation is warranted with a larger sample size.
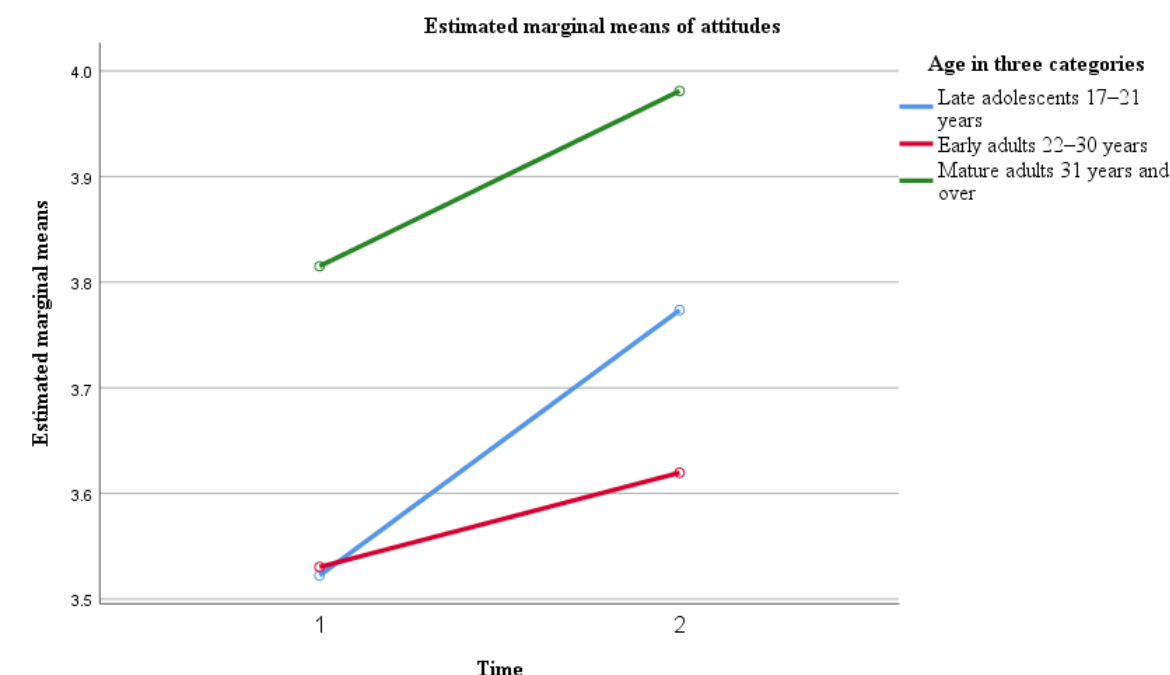
Figure 4.3: Comparison of mean attitude scores (pre- and post-test) of age groups

4.7.7 Previous experience with peer learning and teaching with SRA

To assess the relationship between attitudes and previous teaching experience, as well as experience of being taught by peers from the same year level, a repeated measures analysis of variance (ANOVA) was conducted (see Appendix 5). Those participants with previous experience of learning from peers had high attitudes to peer teaching (M = 53.5, SD = 1.5 at a 95% confidence interval ranging from 50.6 to 56.5) compared to the pre- and post-test attitude scores of those who did not have any such prior experience (M=46.8, SD=1.7 at a 95% confidence interval ranging from 43.4 to 50.1). Those with prior experience of learning from peers scored higher in their pre- and post-test attitudes towards peer learning than those with no similar previous experience in the raw data (see Figure 4.4). This could indicate that familiarity with learning from a peer facilitated an open attitude towards RPT at the beginning, which attitude improved further after personally experiencing RPT. Those with previous experience of peer learning had significantly higher attitude scores at both periods than those who had not been previously involved in learning from peers.
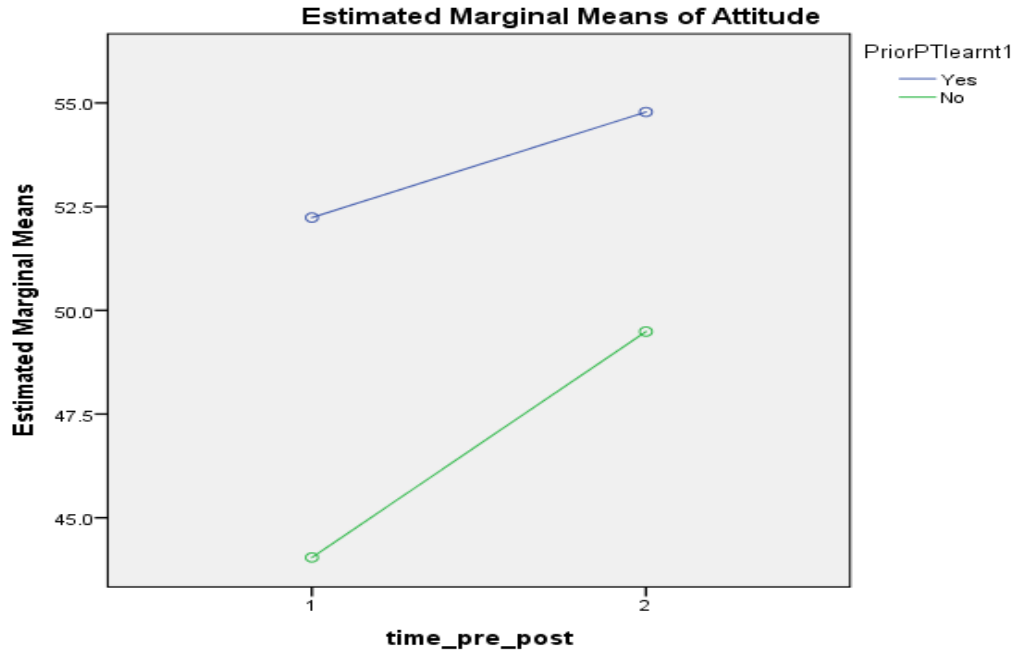
Figure 4.4: Comparison of mean attitudes to peer teaching and prior experience learning from peers

Conversely, those participants who had previously taught their peers acquired a lower score in their pre-test attitudes to peer teaching (M = 49.3, SD = 1.8 at a 95% confidence interval ranging from 45.8 to 52.8), compared to those with no such prior experience (M = 51.0, SD = 1.40 at a 95% confidence interval ranging from 48.2 to 53.8). Nonetheless, those with prior experience of teaching peers displayed lower initial scores but higher final scores than those with none (see Figure 4.5). The lower attitude scores at the onset could be reflective of the challenging nature of peer teaching. Nevertheless, those who had previously taught their colleagues had positive attitudes to peer teaching in their post-test scores.

Previous peer teaching experience was different to previous peer learning when compared to attitudes. This is evident in Figure 4.5; participants with peer teaching experience started with lower attitude scores than those with none and their attitude scores improved significantly after RPT. After RPT, those with no previous experience increased marginally compared to the substantial improvements of those with previous experience.
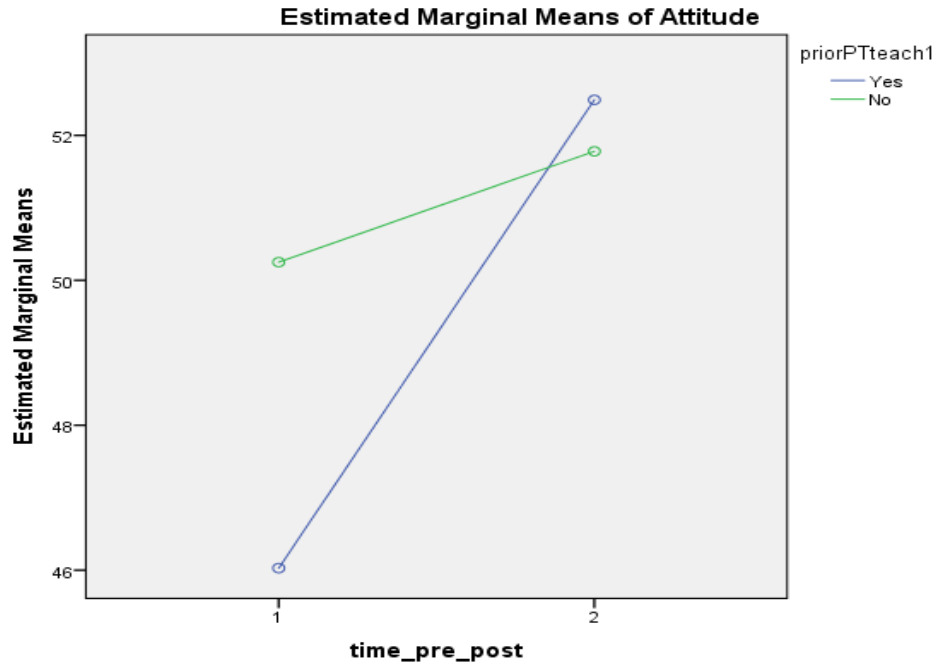
Figure 4.5: Comparison of mean attitude scores and prior peer teaching experience

To summarise the analysis of the attitudes questionnaire, only the responses from those who had indicated positive, negative or neutral opinions about their attitudes to peer teaching were included in the analysis, thereby excluding 'not sure' responses. There was an overall improvement in the attitudes to peer teaching among all participants. Although there was an increase in self-reported confidence, competence to teach and confidence to provide honest and helpful feedback to peers, there was no corresponding increase in participants' rating of teaching ability. This could suggest that peer teaching is a specialised skill demanding further practice to attain dexterity. Both genders demonstrated an improvement in their attitudes to peer teaching after completion of RPT. Although females started with a higher attitude score towards peer teaching than their males counterparts, males had comparatively higher post-test scores. This could suggest that the peer teaching skill was initially popular among females, but males enjoyed RPT more than females. Having previously learnt from peers led participants to favour RPT more. On the contrary, participants who had prior experience in teaching peers liked peer teaching at the end of RPT more than those who had no previous experience.

4.7.8 Individual content validity index of SRA tool

Since SRA had not been tested for content validity, individual content validity index was calculated post-data collection, for SRA questionnaire using existing framework (Polit &

Beck, 2006) (Appendix –23, p.303). Polit and Beck (2006) refer content validity as the degree to which a tool comprises of adequate items for measuring the topic under investigation. They further highlight that there are two distinct ways to determine the content validity of a tool, namely the priori and posteriori efforts. While the former validates a tool before generating the items, the latter determines the relevance of the tool's content by using expert assessment. Six experts with a cumulative experience of 55 years as nurse academics - one with post graduate diploma, two with Master's degree, two PhD candidates and one holding a PhD degree, independently rated the SRA tool on a scale of 1-4. The individual content validity score for all 18 items in the tool were found to be 0.83 and above (Appendix –23a) The experts also found the items to be clear 0.83 and above (Appendix – 23b). When rating the tool feasibility, 83% (n=5) found the scale very easy to complete.

4.8 Knowledge tool

The second tool administered was a short multiple-choice questionnaire aimed at testing knowledge about the two skills that were taught and learnt during RPT sessions at two contact points. There was a total of 14 questions, with seven of these pertaining to each of the two skills: tracheostomy suctioning and intravenous (IV) cannulation. Each question had four options with only one correct response (see Appendix 20a).

4.8.1 Effect size for knowledge

The effect size was calculated to investigate whether there was an obvious effect of the intervention. Cohen's formula was applied (Hoyt & Del Re, 2018) to yield a result of $|d| = 2.755/2.455 = 1.1222$. Since this is greater than 0.8, the results from the knowledge questionnaire signify a large effect size.

4.8.2 Difference between the overall pre- and post-test knowledge scores

A paired t-test was conducted to evaluate the effect of RPT on the pre- and post-test overall knowledge scores (see Appendix 6). There was a statistically significant difference between pre-test scores (M = 6.9, SD = 1.98), t (101) = 11.3, p = <0.05, and post-test knowledge scores (M = 9.7, SD = 1.86). The mean increase in the knowledge scores was 2.8 with a 95% confidence interval ranging from 2.3 to 3.2. These results

suggest that there was a significant increase in knowledge consequential to the RPT intervention.

4.8.3 Relationship between knowledge scores, roles and time

The two nursing skills included for participants to teach and learn using RPT were tracheostomy suctioning and IV cannulation. This section sought to answer the following three questions:

1. Did the participants score better in the IV cannulation skill or the tracheostomy suctioning skill?
2. Did teacher/learner roles for both the skills have any influence on participants' scores for the skill they taught?

To answer this, a three-way ANOVA was used to reveal the interaction between the skills, roles and scores in the pre- and post-tests (see Appendix 7).

As depicted in Figures 5.6 and 5.7, there was an increase in both skill scores. The participants who taught the tracheostomy suctioning skill in the first week had improved scores in this skill compared to the other participants.
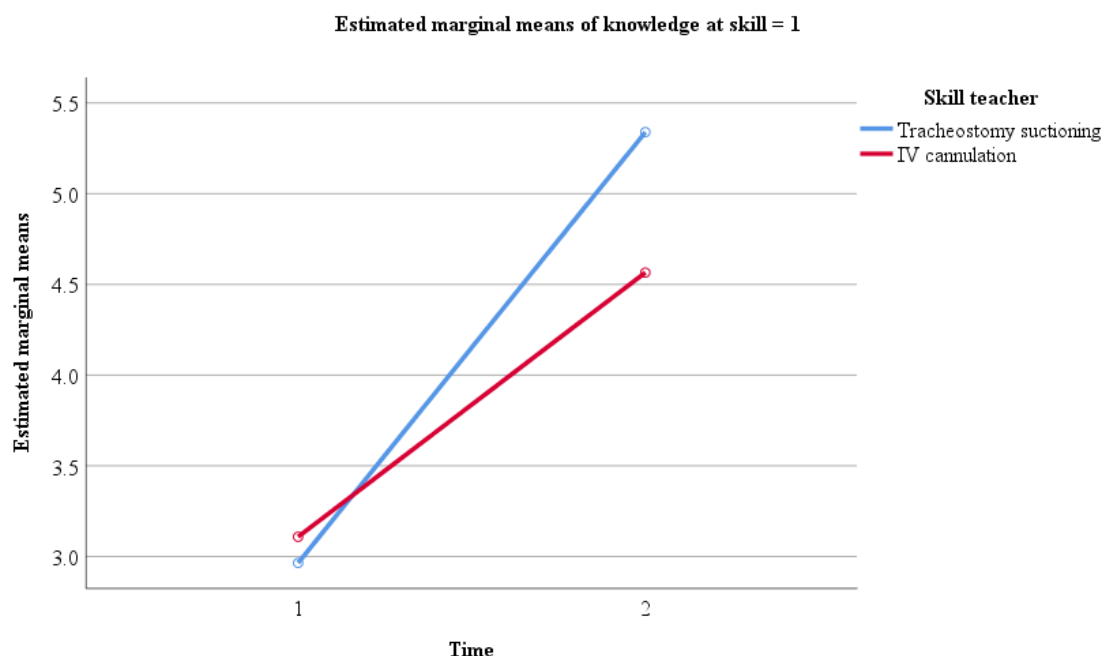
Figure 4.6: Mean knowledge scores and roles for tracheostomy suctioning skill

Legend: Blue = peer tutor, green = peer learner.

Estimated marginal means of knowledge at skill = 2
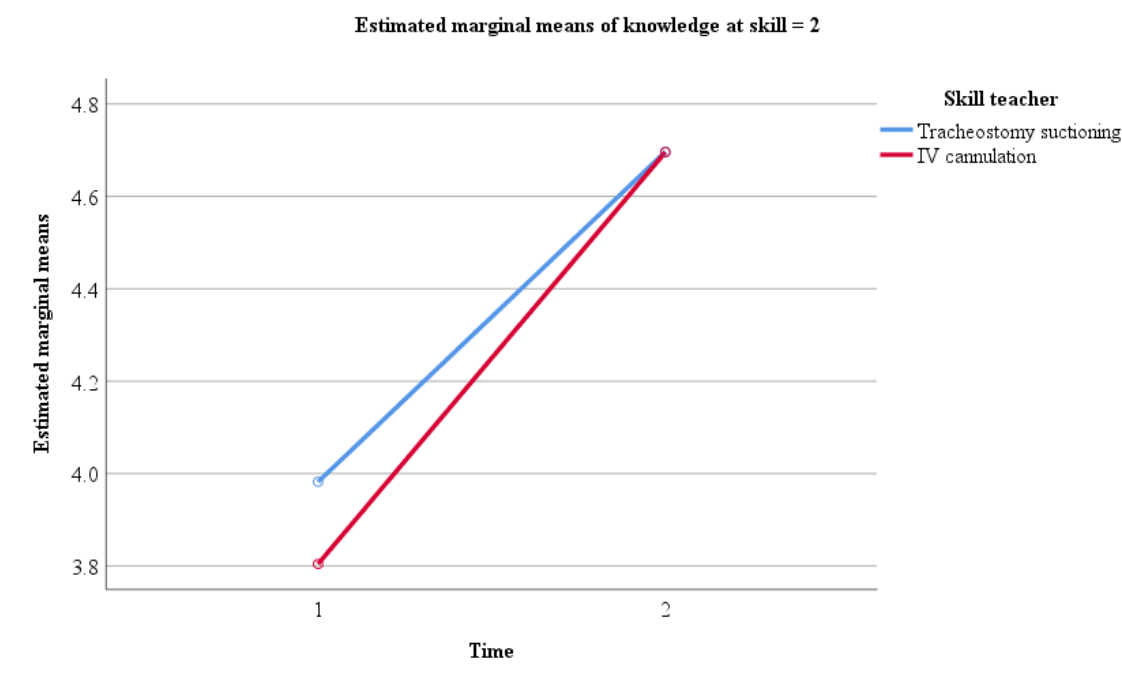
Figure 4.7: Mean knowledge scores and roles for IV cannulation skill

Legend: Blue = peer tutor, green = peer learner.

As shown in Table 4.2, the roles for both skills were compared across two time periods. Participants swapped between the roles of teacher and learner over the two weeks of RPT. Table 4.2 displays the changes in mean pre- and post-test knowledge scores for each role. There was an increase in mean knowledge scores for both roles; however, as depicted in the table, the aggregate knowledge mean increase was greater for peer teachers than learners. This indicated that all participants gained knowledge through RPT interactions, regardless of their assigned roles. However, they retained and comprehended the content more by teaching it to peers.

Table 4.2: Comparison of roles, mean knowledge scores and time

Role	Skill 1 Mean knowledge scores	Skill 2 Mean knowledge scores	Aggregate increase in means
Peer teacher	(5.3 – 2.9) = 2.4	(4.7 – 3.8) = 0.9	(2.4 + 0.9) = 3.3
Peer learner	(4.6 – 3.1) = 1.5	(4.7 – 4.0) = 0.7	(1.5 + 0.7) = 2.2

Thus, RPT had a remarkable effect on the knowledge level of the participants. Teaching the skill to a peer made participants engage more with the content and they were also able to retain it to a higher extent.

4.9 Clinical Teaching Preference Questionnaire tool

The third tool administered was the CTPQ (see Appendix 20), which aimed to identify the participants' preferences regarding being taught by a peer and an academic staff member. Each of the eleven items had descriptive labels of 'strongly disagree', 'agree', 'uncertain', 'disagree' and 'strongly disagree'.

4.9.1 Effect size for Clinical Teaching Preference Questionnaire

Effect size for CTPQ was also computed using Cohen's formula and was found to be less than 0.2; therefore, it did not have a significant effect size.

4.9.2 Aggregate scores of the pre- and post-test scores for the Clinical Teaching Preference Questionnaire

The aggregates of the pre- and post-test CTPQ scores were analysed using a paired t-test (see Appendix 8). Although there was an increase from the cumulative pre-test scores (M = 39.9, SD = 5.1), t (101) = −1.8, to post-test scores (M = 41.2, SD = 4.7) for CTPQ; the change was not significant (p = 0.9, p > 0.05). The mean difference was 1.2 with a 95% confidence interval ranging from 2.6 to 0.1. This indicates that participants did not differ much in their opinions post-test.

4.9.3 Two factors of the Clinical Teaching Preference Questionnaire

The two factors identified for the CTPQ questionnaire were 'peer supervision' and 'instructor supervision' (Williams et al., 2013a). While the former subscale had six items viewing the peer as an instructor, the latter contained four items relating to the academic as the instructor. To make the two factors comparable, each of the subgroups were averaged before computing a t-test.

Both these factors were compared in their respective pre- and post-test scores using a paired t-test (see Appendix 9). There was a significant increase from the pre-test (M = 3.3, SD = 0.7) to post-test peer supervision scores (M = 3.5, SD = 0.7) compared to the t (101) = −2.025, p < 0.05. The mean increase in the scores was 0.2 at a 95%

confidence interval ranging from 0.004 to 0.39. This indicates that the participants commenced RPT with a preference for peer supervision, which only increased after the intervention. However, there was no difference found in the instructor supervision ($p = >0.05$), which remained consistently higher than peer supervision preference. Given that this study did not involve comparison of academic and peer supervision, this lack of change in academic preference was unsurprising. A consistent rating for the academic instructor during both pre- and post-test highlights academic instructors' irreplaceable role in student learning, as demonstrated in Figure 4.8 below:
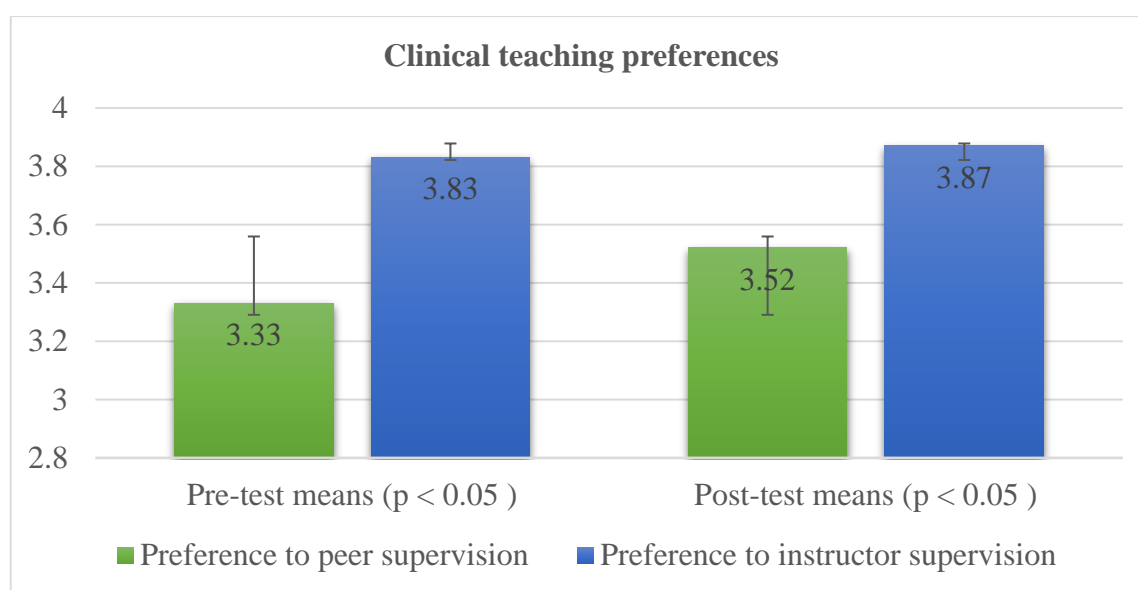
Figure 4.8: Clinical Teaching Preference Questionnaire subgroups

4.9.4 Previous experience with peer teaching and the Clinical Teaching Preference Questionnaire

Previous experience of teaching or being taught by peers was compared with both the subgroups of the CTPQ using ANOVA. There was no statistically significant relation found between the preferences of the two subgroups of instructor and peer supervision with previous experience.

4.10 Peer Teaching Experience Questionnaire

This tool aimed at exploring the experience of teaching peers and was administered once after RPT. Three factors identified using principal factor analysis were peer supervision, teaching importance and peer teaching satisfaction (Williams et al., 2013b). Table 4.3 depicts the means and SDs of the responses for this study, in terms of items within the

three factors. Additionally, residual items, which were found to have inadequate psychometric testing outcomes, have been listed at the end of this table. The Likert scale was scored as follows: 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree and 5 = strongly agree. Negatively worded items, such as 'I felt uncomfortable teaching my peers' and 'I was initially apprehensive about the peer teaching requirement in the nursing laboratory' were reverse coded to enable consistency in the scoring. Given that the means for all items were over 3, peer teaching was, overall, a positive experience for all participants.

Table 4.3: Peer Teaching Experience Questionnaire item-wise results

PTEQ Item	N	Mean	SD
Peer supervision			
Experience with peer teaching will help with my graduate nurse role.	102	4.3	0.78
The peer teaching experience was time and effort well spent.	102	3.6	1.02
The peer teaching experience was personally rewarding.	102	3.6	0.98
I now understand the principles underpinning teaching and learning.	102	3.7	0.77
Teaching importance			
Teaching is an important role for nurses.	102	4.7	0.50
Nurses have a professional responsibility to teach students and their peers.	102	4.4	0.63
Peer teaching satisfaction			
I felt comfortable teaching my peer.	102	3.3	0.96
I have developed skills for teaching basic clinical skills.	102	3.7	0.74
The peer teaching experience allowed me to reflect on my own previous learning.	102	3.9	0.72
I enjoyed working with my peers.	102	4.0	0.66

Residual items in the scale			
I felt uncomfortable teaching my peers.	102	4.2	0.78
I would be more confident teaching a clinical skill after this experience.	102	3.2	1.13
There should be more opportunities for peer teaching in the curriculum.	102	3.7	0.91
I was initially apprehensive about the peer teaching requirement in the nursing laboratory.	102	3.2	0.95

Although CTPQ and PTEQ shared the same rating scale for item 'Teaching is an important role for nurses', the former was administered twice, while the latter was administered once only making this item non-comparable for both these tools. Given the small number of males (n = 9) as compared to female participants (n = 93), comparison of gender with the factors within PTEQ tool was not statistically worthwhile and hence has not been presented.

4.10.1 Comparing 'benefits of peer supervision' factor of Peer Teaching Experience Questionnaire with age groups

A one-way ANOVA was used to compare the age groups according to the first factor of PTEQ (see Appendix 10). This factor was 'benefits of peer supervision' and included four items from the PTEQ tool. Bonferroni correction was performed to avoid type I error in which the null hypothesis is erroneously rejected (Pallant, 2016). While there were no significant findings between late adolescents and the other two age groups, mature adults scored higher than the early adults, as demonstrated in Figure 4.9.
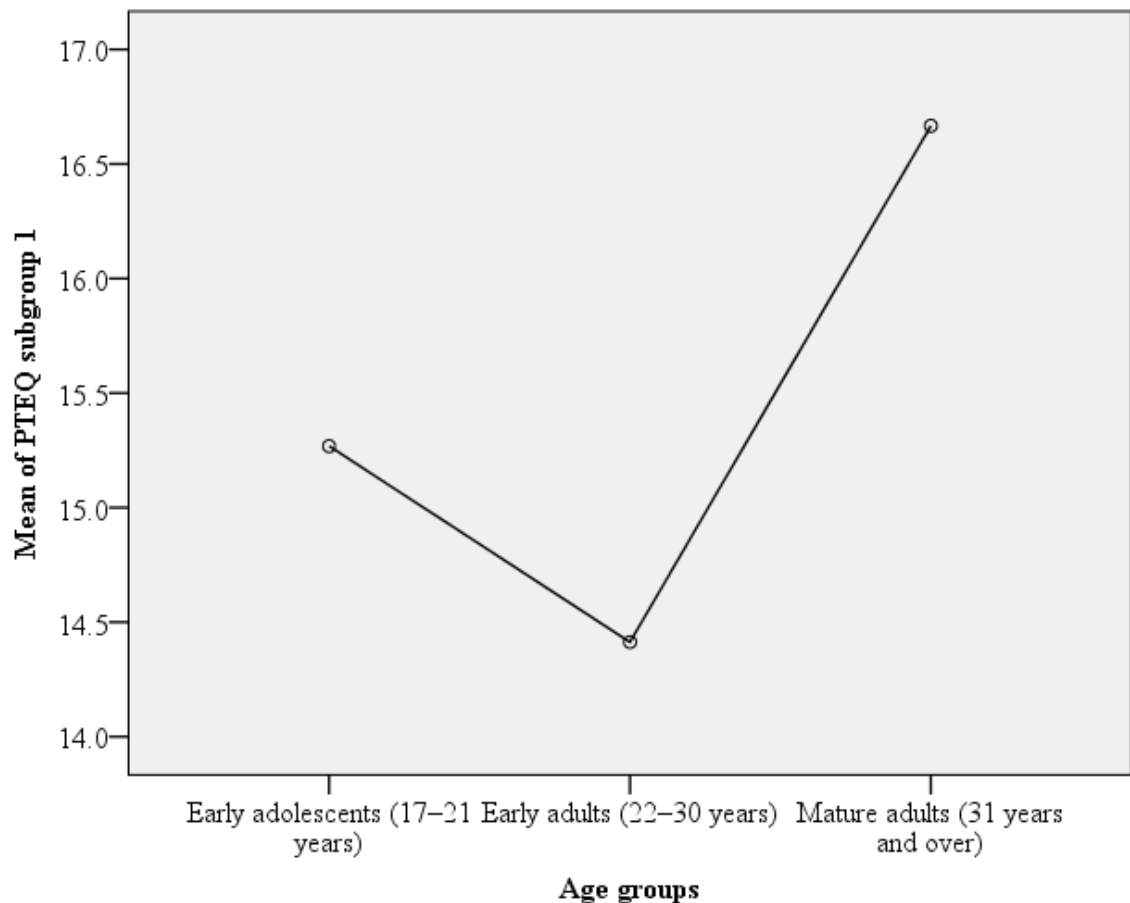
Figure 4.9: Comparison of Peer Teaching Experience Questionnaire Subgroup 1 with age groups

This finding concurred with the suggestion that mature adults had higher attitude scores towards peer teaching than the other two age groups (see Figure 4.3). The comparison between mature adults and early adults was evident (see Appendix 10), with M = 2.3, SD = 0.9 at a 95% confidence interval ranging from 0.2 to 4.3 with $p < 0.05$. Late adolescents did not demonstrate a significant difference in peer teaching experience scores compared to the other two ages. The mature age group comprised a small number of 15 participants, therefore, further investigation is required to compare this group with younger age groups using a larger sample size.

Difference between the three factors of the Peer Teaching Experience Questionnaire tool in relation to gender and age groups

There was no significant finding in the second and third PTEQ tool factors (teaching importance and peer teaching satisfaction) in relation to gender. There was also no relation found between the PTEQ factors and age groups (see Appendices 11 and 12).

4.11 Chapter summary

This chapter reported the quantitative data findings acquired through the four survey tools. The significant findings are as follows:

- There was an overall increase in the attitudes to peer teaching, with a small effect size;
- Knowledge scores increased after implementing RPT with a large effect size, with peer tutors having higher aggregate scores than the peer learners in the respective clinical skills they taught;
- Participants had higher scores in their reported confidence and competence to teach peers;
- There was a significant change in participants' clinical teaching preference for peers after RPT; and
- Overall, peer teaching was rated as a positive experience, being more popular in mature adults than the younger cohort.

The intervention had a significant positive effect on peer teaching attitudes, skills-related knowledge, teaching confidence and competence. The next chapter presents qualitative results from the focus groups.

Chapter 5: Qualitative findings

5.1 Introduction

This chapter reports the qualitative findings gained from the focus groups in this mixed methods study. Focus groups were employed to gain a richer understanding of participants' perspectives and experiences with RPT. They also enabled a deeper comprehension of the quantitative findings. For example, it was interesting to note that participants scored more in tracheostomy suctioning skill than they did in intravenous cannulation skill; the focus groups enabled greater understanding of how the learning took place. Four focus groups were conducted. No further were required as data saturation was attained. Thematic analysis was conducted utilising Colaizzi's (1978) phenomenological framework, which enabled methodical, enriched engagement with the transcripts. This empowered the researcher to scrutinise segments of the whole to illuminate the themes that captured participants' experiences with RPT. There were conflicting findings. Participants found that the experience challenged them, but also spoke of their accomplishments as a result of RPT. They divulged tactics used to learn and teach each other. There was consensus about the practical applicability of RPT, which was evident from all focus groups. All themes capture the richness of participant experience with RPT, as outlined in their verbatim discourses. The three major themes were:

1. Challenging yet a beneficial journey;
2. Learning together—tensions, triumphs and strategies; and
3. Real-world relevance

5.2 Participant characteristics

Four focus groups including 22 third-year undergraduate nursing students were conducted, with two groups of six each, one group of seven and a final group of three participants. All participants had experienced RPT and both taught and learnt a nursing skill with a peer in the clinical practice laboratories. Of these participants, four were males and the remaining 18 were females. The late adolescent age group comprised participants under 21 years of age (n = 9), the early adults group members were aged 22–30 years (n = 6) and mature adult participants were 31 years and over (n = 7). Focus

group participants represented both genders and all age groups from the overall sample (n = 102). One participant self-identified as being experienced in the healthcare sector as an enrolled nurse. No other participant reported experience of working independently in healthcare settings. It was also observed that there were no RPT partners in the same focus group. To protect their identities, all focus group participants were allocated pseudonyms in reporting findings.

5.3 Theme 1: Challenging yet a beneficial journey

Participants echoed this theme by describing their journey with RPT. In the current study, RPT was introduced as a replacement to traditional teacher-led teaching, thereby removing the teacher from being the 'active giver' of knowledge. This altered the students' function from being receivers of knowledge, to each one taking dynamic roles in the teaching–learning process. This learning strategy gave them a myriad of unique experiences during the study period. At the onset of RPT, the experience was perceived as uncomfortable and challenging. However, as they experienced RPT further, their views altered. They began to perceive it as beneficial for learning valuable skills for future nursing. The changing nature of participants' perceptions towards RPT can be explored through their experiences.

The quotation below suggests that concerns arose due to a lack of understanding of the requirements of the unfamiliar experience. The following participant expressed hesitancy and disquiet when students were asked to teach each other. There was a preconceived perception that RPT would be futile and unnecessary, leading to a closed attitude to the new learning strategy. However, despite the challenges posed by this learning strategy, eventually there was acknowledgement of the benefits in developing various skills.

> I think before starting [RPT], I was not keen. I didn't really feel like doing it … but after doing it, I see it was rather helpful. Before coming into it, I wasn't trying to put my heart into it. It was just like 'why are we doing this? ... It is not going to be beneficial, it will not help. I am not going to learn the skill'. But after having actually done it, it does actually help you. It does get us prepared and ready for the real world in a lot of ways. (Donald_FG_4)

This initial hesitancy and later acceptance is also reflected in the statement below, in which teaching skills were identified as essential attributes gained through RPT. Teaching is also a fundamental part of nursing, as nurses are frequently expected to teach their peers or nursing students:

At first, I found it [RPT] challenging … we have to teach as a part of being a nurse. When we are working professionally, we have to actually do that sort of thing [teaching]. Maybe every day teaching each other: peers, younger students, every day. (George_FG_2)

These two quotations reveal that participants shared a changed perception of RPT, with initial reluctance in engaging with RPT transforming into positive attitudes after experiencing the new teaching–learning approach. It appears that something happened during their interactions with each other during RPT sessions, resulting in a turnaround of their negative attitudes towards RPT. It is crucial to understand the reasons that led to this transformation by exploring every segment of this journey—from the onset, to the interactions, and finally, the culmination of the experience.

5.3.1 Initial hesitancy

This first subtheme enabled understanding of the reasons for the initial hesitancy that led to reluctance. Participants pointed out that they had never participated in formal RPT throughout their nursing education until the current study. During their undergraduate curriculum, students had never formally taught or learnt an entire nursing skill from a peer. This made them feel uncertain about the teaching–learning format. They demonstrated resistance towards proposed changes to their usual accustomed manner of laboratory teaching. Having to teach a peer made them step out of their usual comfort zones and they found themselves to be suddenly in charge of not only their learning, but also that of their peer:

In the past, we may have helped one another, but not teach one another. We have never had to teach each other a full skill. It may have been ... informal. It wasn't direct teaching. ... These were [clinical] skills like that we had never done before in the lab [laboratory] or the class. (Kylie_FG_4)

I didn't know how to do the skill [clinical skill] at all. I didn't know, I wasn't sure, I've never heard of it [clinical skill]. Like my plain ignorance that I have never seen anything like that. (Abigail_FG_1)

A selected few reported previously involvement in informal peer support called peer assisted study sessions (PASS) conducted at the given university. Typically, in these informal sessions, students who are senior in their academic year informally mentor junior students who struggle with content. This was quite different to formally reciprocating teaching and learning roles among peers from the same year level, making

RPT an alien experience. The quotations below exemplify this lack of experience with teaching ability and the clinical skills:

> In previous years we haven't done any kind of peer teaching ... Apart from PASS, only if you were in it. That was more informal. (Raymond_FG_2)

Being new to teaching and the clinical skills posed challenges for participants. Another contributor to their initial negative outlooks was their unpreparedness for the new experience. All students enrolled in the clinical course had access to a repository of preparatory information provided through the online learning management system, aimed at equipping them for the new experience of teaching their peers. Only the peer teachers had access to the skill-specific material that they would be teaching their peer, which was selectively released to the entire student cohort after gathering all the quantitative data. Despite a variety of preparative information available to equip students for teaching the new skill to their peer, they did not engage with this material prior to teaching their peer. This put them in a difficult situation, as they were unprepared to teach the content, resulting in both peers having to learn the skill together rather than one teaching the other. The following quotations reveal that by not reviewing the online information to teach, participants did not feel equipped for teaching a skill:

> I was confused then [in the first week of RPT] and I didn't know what was going on… Like even the other student didn't really know what was kind of going on. We were told on the day if we were the teacher or the student. The peer teacher did not realise that they were going to teach. They didn't realise what was happening, because they had not read the lesson plan. (Donald_FG_4)

> I found that we kind of had a week or two's notice of what the [clinical] skill was going to be. But 90 per cent of us did not do the online work [engaging with the preparatory information]. This made us both [peer teacher and learner] learn at the same time. While we were trying to teach our peer, we were learning [ourselves]. It [not being prepared to teach] is mainly our fault ... we were not confident, as we were learning at the same time. (Olivia_FG_1)

While lack of experience with RPT led to challenges, not doing the groundwork and working along an unfamiliar peer added to the unsettled feelings. Participants felt challenged, as they had to teach each other since it was an integral part of their curriculum. They felt challenged to a great extent when their imperfect teaching skills were suddenly going to be exposed in front of an unfamiliar peer, who could be working

closely with them for the very first time. Confusion arose regarding what was happening and why they were asked to teach each other:

> It (RPT) was just a challenge as a whole ... working with people (peers), who I never even knew existed before ... I was one of those people that came in and said, 'what the heck are we doing?'. (Grace_FG_2)

Some had performed the clinical skill on patients but teaching skills to a peer made them feel out of their depth:

> I taught trache [tracheostomy suctioning] skill in week one ... I felt I was all over the place ... I was trying to read [the lesson plan] and teach at the same time. I struggled a lot. I have done tracheostomy suctioning on real people before but when I had to teach it, I struggled. I was focused on teaching the correct way to my peer. (Harry_FG_2)

While reviewing the online preparatory information was entirely within their control, other factors beyond participants' control added to their lack of readiness. Unpredictable resignations of staff who were the academic leads for the clinical course resulted in a lack of academic leadership. Participants feared that RPT was going to permanently replace academic staff, causing them to have a perception of feeling neglected. This consequently magnified the initial challenges faced by the participants. Further, at the time of this study, there were numerous changes implemented in the delivery of the Bachelor of Nursing curriculum. Face-to-face active learning sessions were replaced by online facilitated sessions. This change made them students feel unsettled due to reduced opportunities for interacting with academic staff; the introduction of RPT further added to their distress. Annulment of face-to-face learning sessions resulted in fewer opportunities for face-to-face interactions and reflection:

> I honestly think it [RPT] is important. It is great. But in our final year, it would have been beneficial to have our face-to-face tutorials; which got cancelled ... we could have actually had an opportunity to discuss after doing the skill…We only have the two-hour lab ... After we finish this year, we should be able to do these skills [clinical skills] next year by ourselves [as graduate nurses]. These are the skills that we get a need to do then we become grads [graduates] next year … having those dedicated times [face-to-face sessions] was allowing us to talk about what's going on in our heads. (Eleanor_FG_3)

The above quotation reveals disappointment within the participant in relation to reduced opportunities for joining together. In the final year of undergraduate nursing education, these participants were ready to embark on their careers as registered nurses. They aimed

to perform the skills independently as future professionals and yet feared not being able to do so. They wanted support through this arduous time, which highlights a key element of a perceived lack of support in their journey. However, the following excerpt indicates a fear of becoming neglected and left without academic staff to guide the learning:

> This semester I have had a very big sense of abandonment. I feel like the peer teaching came at the wrong time because I already felt abandoned. I felt like between a rock and a hard place about it. Because I already felt abandoned and all of a sudden, we are teaching ourselves! I was thinking, 'Are they getting rid of teachers? Are we not going to have anyone? Is everyone abandoning us?' Teachers were just dropping like flies at one point in the semester. (Betty_FG_3)

Feelings of abandonment led to fears of the 'expert' being replaced by peer teaching, resulting in perceptions of deficiency in proficient guidance for their learning. The changes in curriculum delivery, the absence of academic staff and the replacement of teacher-led learning with student-led learning increased their anxiety:

> I guess ... my biggest fear, in this peer teaching is—we are teaching ourselves this degree … I hope you don't make us teach each other and get rid of the teachers ... That is about the last thing we have got left. (Rita_FG_3)

Lack of leadership led to unsettled feelings among students and communication breakdowns between the student researcher and final-year nursing students. The research details were conveyed using plain language and posted online on the learning management system, a closed Facebook student group and via an email to individual student inboxes. This largely meant using the online platform to communicate, which failed to work due to several reasons (described in the quotations below). Despite several electronic reminders from the student researcher, participants missed important information outlining the purpose of RPT. All these challenges contributed to some upheaval among participants. The communication failure led to lack of clarity among students, as demonstrated through the following quotations:

> The fact that everything [learning content] is mostly online, even the emails is a smothering of information. Every time you go to check your emails, there are just heaps of emails ... and I just think I will sort them later. So, this has quite a major impact on the notification that 'you have got peer teaching coming up!' sort of fell through the cracks. (George_FG_2)

> Too many emails, too many things to do by ourselves. Even on Moodle [learning management system], they put everything from all over the place, it is too much information in one go. Sometimes we are looking at our computer screens for more than five hours and we kill ourselves looking at the screen! (Harry_FG_2)

> People look at emails which are titled 'research' and just ignore them. They don't even read. (Scarlett_FG_2)

Given the lack of timely information, participants were unaware that they would be undertaking peer teaching in the nursing laboratories:

> I wasn't actually aware that we were going to be doing peer teaching 'til the day. (Kylie_FG_4)

They were uncertain and presumed that RPT, as well as the nursing skills included, were additional to their regular course requirements, rather than part of their core curriculum. These quotations reveal confusion, with the persisting question of 'why was RPT being implemented?'

> I remember having a conversation [with peer], 'why are we doing this [RPT] during our lab [laboratory] time? It is just taking up our time when we should be doing our actual [clinical] skills', not realising that this was what we were supposed to do anyway! (Olivia_FG_1)

> There are probably still a lot of people under the assumption that it [RPT] was an extra work they did. (Emily_FG_1)

Thus, there were several reasons participants refrained from fully engaging with RPT in the beginning.

5.3.2 Changed perceptions

The second subtheme helped to understand the changed perceptions. Understandably, being unfamiliar with RPT posed challenges from the outset. Nevertheless, with most commencing the journey with a negative mindset, participants began to view things differently as they engaged with the RPT experience. This concurs with the quantitative increase in the peer teaching experience scores. By the end of the first week of RPT, initial pessimistic views began to change into optimistic ones, as illustrated from the following quotation:

I wasn't exactly thrilled to participate [in RPT] at the start. I was just like I want to get on with my clinical class and learn the [clinical] skills before I went out clinically placement ... But definitely by the second week, I had a much broader understanding of what was going on—what we were trying to do, why we are doing it, as I could see its benefits in numerous ways for our future nursing life. So, I was much more open to it. (Julia_FG_4)

As the participants started engaging with RPT, they began to understand what it entailed and how it could potentially benefit them. It is enlightening to explore the factors that contributed to this change in their perceptions. In the first week of RPT, peer learners identified challenges faced by their peer teachers in being uninformed and they were determined to not experience the same in the successive week. This led to better preparation and an improved experience in the consecutive week, as described from the viewpoint of one participant:

It [RPT] was like a massive learning experience in itself. In the first week I was being taught how to do trache [tracheostomy] suctioning. I saw that my peer teacher was struggling because she briefly looked over the content on Moodle [learning management system] ... I picked up with what she struggled with. The next week when I was doing the cannulation [intravenous cannulation skill], I knew where she had struggled last week and so I picked up those things when I taught. So, I got online and looked up Moodle [learning management system] and YouTube on how to cannulate [before teaching peer] ... But the whole concept of peer teaching is good. Like I enjoyed it ... It's just basically working on confidence ... It wasn't a bad experience. I didn't cry! (Grace_FG_2)

Being paired with a stranger was confronting, but it also helped participants overcome their personal weaknesses:

If I am with a mate [friend], I am just natural. I am not pushing myself or challenging my weaknesses. Whereas if I am with that someone, who I don't know, I'm like right I have to step up and be mature. Really get into it to portray that I kind of know what I'm doing. So, it is challenging in that sense. It also helps overcome weaknesses. (Layla_FG_3)

Contrary to the above quotations, one participant did not share her peers' initial critical views about RPT. A feeling of being pushed beyond their boundaries made this participant consider her personal potential. She learnt to be autonomous for her own learning by thoroughly preparing for the peer teaching challenge. There was a sense of triumph in being able to become an independent learner, which further bolstered her self-confidence to teach:

But for me, the peer teaching was kind of a distraction from it [changes to curriculum delivery]. It taught me to be independent in the reading up what I had to do and how to teach it [clinical skill] ... I have become a little bit more independent from the peer teaching experience. I think I feel more confident teaching someone else now. (Hazel_FG_3)

By the end of the first week of RPT, participants were more familiar with their peers. They were able to collaborate and work in a way that would suit them to meet their mutual learning objectives. This added to their ease in the following week of RPT:

Even working with someone, whom you didn't know before was tough. But in the second week, we were so much better because we got to know each other by then and how to approach it. The first week was about trying to find out how they were, and you try to teach yourself and there was a lot that didn't work as well. But the IV cannulation was not that bad. (Victoria_FG_2)

Participants reported feeling better prepared in the second week of RPT, as they anticipated the process and were more comfortable with peers. Despite feeling more equipped for the teaching role, their challenges persisted. They articulated feeling pushed out of their 'comfort zone' but this enabled them to explore their optimal individual potentials, which led to fresh perspectives:

We are not always happy to learn with someone we know well, even with someone who has the same learning style as your learner ... So, I think it [peer teaching] forces you to get out of your comfort zone. I think if you are teaching, you might have to adjust the style to someone you are trying to teach. Because what has worked previously might not work all times, or how you would prefer them to work—that kind of thing. (Liz_FG_1)

A shift from initial hesitancy to an acceptance for being challenged revealed a journey undertaken by the participants. It illuminates the 'evolving learner' within the participants; they felt solidarity with each other. They tested their limits by taking on teaching roles. This first subtheme describes the voyage that participants undertook by themselves and alongside each other with RPT. They described the challenges that had an impact on their experience and contributed suggestions for overcoming these difficulties, as outlined in the second subtheme.

Overcome challenges:

Participants were invited to share their suggestions to overcome trials encountered in RPT. These suggestions related to the staged approach to teaching (Bullock et al., 2016) used for this study and are presented below. This approach presents the suggestions in a

logical flow. Specifically, the stages of 'set', 'dialogue' and 'closure' will be explored and include aspects such as communication, the role of the academic, preparing students, and implementation of RPT.

5.3.2.1 Set

'Set' is described as preparation to teach. It is an essential part of a structured approach to teaching (Bullock et al., 2016). Aspects such as communicating expectations and learning outcomes and providing clarity on academic staff and student roles were included in this suggestion. Given the newness of this form of learning, clear and effective communication was a significant factor that the participants felt could equip them for RPT. Being clear about expectations would leave no capacity for speculation and information conveyed would be understood as it was originally intended for the participants. Participants expected communication to be clear and timely, facilitated through their academic staff:

> More warning will help. Like even in the week before starting the peer teaching if a teacher could actually say what was happening the next week. (Olivia_FG_1)

Despite all preparatory material being made available online in advance, participants did not perceive it as timely. Rather than relying solely on online communication about the pre-session groundwork, there were suggestions to have in-person information sessions to clarify the plan:

> I was lucky that I had to teach the second week. Because it [RPT] did not catch me off guard … I didn't scroll down on Moodle [learning management system] and I assumed that all that section was closed. It wasn't until later that I realised that we [peer learners] had been locked out initially in the first week and got access to it later … If there was face-to-face or some form of compulsory information session beforehand could help… where they [students] could know weeks before [the RPT sessions] and I think that the peer teachers have a good amount of time to access the information, may be, could have been a better experience to teach? (George_FG_2)

Greater clarity of the roles of academic staff and students from the outset was vital. The academic's role was quite passive within the entire RPT session. Nonetheless, this does not diminish their crucial role of being embedded within the process by offering leadership, communication and facilitation. The academic leader could liaise with other teaching members involved in the course to ensure the entire team was well informed

about the RPT plan. In the current study, RPT replaced the original academic demonstration to peers teaching each other, within the same time limit. The following quotation indicates that the academic teaching team may not have been fully aware of the implemented plan:

> I remember my lab [laboratory] teacher saying that she did not have enough time [as a result of laboratory time allocated to RPT] to teach us what she wanted to teach us. (Olivia_FG_1)

Suggestions included asking the academic to go through the lesson plan or demonstrate the clinical skill in advance. This could be either in person or through the online learning management system and would allow the student to visualise the correct way of doing the skill within the nursing laboratory context:

> If the clinical teacher going through the sheet [lesson plan] quickly or just doing the procedure [nursing skill] ... or a five-minute video [of the skill], to summarise the steps ... Just that so even though you have still got the sheet [lesson plan] there, you have got in the back of your head: yes, I know how to do it. Like doing it [the nursing skill] before, rather than trying to read off the sheet. (Donald_FG_4)

Yet another suggestion was to organise the peer teachers to group together before RPT for hands-on exposure to the particular clinical skill. This could enhance their confidence in teaching the new clinical skill, as exemplified in this quotation:

> Whoever is going to be the [peer] teacher [should] have some time where just the [peer] teachers alone get in a group to learn the skill? Then they feel confident enough instead of just reading off a sheet of paper [lesson plan] ... This will also ensure that we are doing it right as well. (Julia_FG_4)

Finally, to overcome the unfamiliarity arising from the random pairing of nursing students, there was a suggestion to have icebreaker activities to help familiarise partners with each other before commencing sessions:

> I would just like to say that if we are able to know the pairs we will be [working] in the week before, it will help us to know each other. Perhaps an icebreaker activity? (Victoria_FG_2)

5.3.2.2 Dialogue

'Dialogue' is referred to as the chief component of the planned learning experience (Bullock et al., 2016) and entails the interfaces between peers during RPT. Aspects within

the RPT sessions were reportedly appreciated by participants. These included the extensive online preparatory material about the clinical skill and the teaching theory, which were both found to be adequate. The lesson plans, which clearly outlined steps for the two nursing skills, were also declared worthwhile in guiding skills teaching:

> Its [online preparatory material] all in there. I saw it afterwards. But for me, I found that written script [lesson plan] very helpful ... I could read through that and go, 'okay this is what I have got to do.' If we hadn't had that [lesson plan], I would have been totally lost. (Mia_FG_3)

A modified four-stage approach to skills teaching (Bullock et al., 2016) was used, enabling each participant to have two chances each for hands-on practice for each skill, irrespective of their role as peer tutor or learner. This approach aimed to encourage autonomous practice of the clinical skill and was appreciated by participants seeking practical exposure to the nursing skill. Thus, confidence in the skill demonstration was boosted, as related by one participant:

> I am quite a visual learner too. I prefer to see a video of the skill or someone actually doing it rather than just reading it [skill steps]. Doing it [nursing skill] twice was good because I got to do it again. After reading it once I was able to do it confidentially the second time. I find that aspect good. (George_FG_2)

Although an hour was allocated for each RPT session, this was found to be inadequate. Participants suggested that longer RPT sessions could provide opportunities to clarify if the learning was accurate:

> We actually only got to do it to once each, as we just had to take time to ensure that we got it right and we ran out of time. (Victoria_FM_2)

> It [RPT] was a bit rushed. Like trying to squeeze it in our lab time … Like figuring out what you actually missed ... [Allocate] more time [for RPT] maybe? (Olivia_FG_1)

One suggestion was to allocate extra time after the RPT session to consolidate learning:

> I like the idea of having more time in the labs [laboratories]. Like four hours in a row with a little break in the middle. And have a tutorial and the practical together. So, we do get to do peer teaching and we also get to talk about scenarios in those four hours. Each week if I left knowing that I had four hours in that lab, I would feel so much [more] comfortable. You could be so creative in your learning in that time if you can bring in peer teaching every week. (Rita_FG_3)

5.3.2.3 Closure

This is the final stage of the structured approach to teaching (Bullock et al., 2016), which includes offering the opportunity to clarify doubts and conclude the learning session. Participants provided suggestions for this. The following participant proposed offering reflection opportunities after completion of the RPT activity by allocating additional time. This would allow an expert to facilitate the closure of the session:

> Or even just the lab teachers or coordinators just doing like a debrief session after every lab class for half an hour. Just to talk about it [RPT experience] I think that would be really good. ... [Currently], the whole capping off of two hours lab on a Monday and getting an hour on a Thursday for the tute [tutorial]. That loses the continuity. (Betty_FG_3)

Thus, participants suggested constructive changes for the future in overcoming hurdles and aiding smoother experiences. Challenges and achievements gained from RPT were perceived as two sides of the same coin. While the above focused on challenges and ways to overcome them, the final part of this theme covers gains from RPT.

5.3.3 Academic benefits

This final subtheme specifically explores the academic benefits attained as a result of RPT, while non-academic gains are presented in Section 6.5. Participants recalled the clinical skills at a later time, which they either taught or learnt from their peer during RPT sessions. Most participants who had completed their clinical placement after the RPT experience recollected either one or both skills included in the RPT experience while on placement. Increased knowledge scores for all participants from the quantitative findings concur with the academic benefits. Various reasons for skill retention were discussed. Some participants pointed to other aspects that aided skill retention, such as linking the lessons to previously learnt knowledge, being mentally prepared for learning, personal interests and familiarity with the nursing skill and teaching the skill to a peer. Despite a lack of confidence, both clinical skills were reportedly retained weeks after RPT:

> I did find it [RPT] useful when it came to actually doing the [tracheostomy suctioning] skill on a real patient in the hospital setting. Because I had read all the information, the procedure, the equipment needed. And so, I kind of just remembered that. I did it according to what I did [the nursing skill] in the labs but had someone watch me do it [on clinical placement]. But I did get the registered nurse to show me how to do it [the clinical skill] first. Just so that I see it myself.

After seeing the registered nurse perform it in the hospital, I felt that I had taught my peer learner the right way. It was a validation that I was right, a lot of weeks later [after completing RPT] ... I remember the [intravenous] cannulation as well. I don't know why but it stuck with me a lot more than a teacher [academic staff] teaching ... I think it [intravenous cannulation] was easier to retain as well. (Betty_FG_3)

Linking the clinical skill to previously learnt similar content aided retention:

I actually retained a lot more information in the IV cannulation than the tracheostomy suctioning; even though I taught the tracheostomy suctioning [to my peer]. But with the IV cannulation, I was able to relate it to venepuncture which I had done before. It is sort of a similar technique to find the vein and put the needle into the vein. So, I think I retained more information because I was able to relate it to what I have learnt before. Whereas the tracheostomy was a totally new skill, I had to teach it. Because I was so focused on teaching the skill, I don't think I absorbed as much information as I should have. (Hazel_FG_3)

The process of teaching a clinical skill requires complete content comprehension before instructing someone. Hence, the responsibility for teaching a peer made participants engage with the content on a deeper level than they normally would have. This concurred with the quantitative findings of peer tutors obtaining higher scores for skill knowledge than their learners did. Engaging with the content not only enlightened them with the skill knowledge, it also made RPT a gratifying process:

I also think teaching the skill of tracheostomy suctioning helped me to remember the [clinical] skill as well. But then, I enjoyed both weeks of peer teaching. (Rita_FG_3)

Apart from retaining the skill, there was deeper learning and engagement with the content. Participants found that they did not merely imitate the skill they were teaching or learning from a peer; as a pair, both partners engaged deeply with the skill to better understand it. The focus was not simply on the 'what' of the content, but rather 'how' things were done and 'why' they were done in a certain manner:

By teaching it [nursing skill], it was giving me a greater understanding than what it would be to just learn it [from an academic]. Because you have to understand it in order to teach it. (Kylie_FG_4)

Despite not being experts, participants worked together to learn from their errors. Mistakes provided the opportunity to learn and made participants plunge deeper into what

was being learnt. They chose to work their way through by figuring out the rationale for doing things with mutual discussions:

> It [teaching a peer] was less intimidating. You could do more like 'I do the same as you' ... we still helped each other. But it was more of a trial and error rather than to straight away remember what the teacher had demonstrated and getting that [the nursing skill] perfect. That is probably my biggest thing that we were able to work out how to do it rather than follow the perfect example. We may do things wrong but then we worked out how to do it right. There was less pressure. (Haylee_FG_3)

Some participants did not find the assigned hour sufficient to undertake the four-stage approach, as they spent time questioning and searching for answers together. In doing so, they were able to relate to each other by supporting each other's learning. Therefore, it was no surprise that they found the interactions fruitful:

> I felt that I learnt a lot through this experience. I found it easy talking to my peer a lot more. We were both on the same page; she had done the prior readings to teaching. We were able to discuss things. We were able to discuss, why we do certain things. That's what why we didn't get time to do it four times. (Victoria_FG_2)

Thus, RPT enabled participants to go beyond emulating the skill to collaboratively ask questions and seek answers. This enabled deeper engagement and knowledge retention. The first theme entailed the various challenges and benefits encountered by participants in their RPT learning journey. This was obviously not a solo experience; it involved their peer partners learning alongside them. The learning was collective but was not always a smooth experience. Various strategies were applied to create a fertile environment in which to develop oneself and peer, as revealed in the next theme.

5.4 Theme 2: Learning together—Tensions, triumphs and strategies

The participants did not feel isolated from each other in RPT, rather they shared their experience together. The allocation of pairs for this experience was random. Thus, participants were not privileged to choose a person they knew or were comfortable to learn with. This led to some hardships while working together, but it did not impede students from working alongside each other successfully. They used various strategies to overcome the barriers and meet their educational objectives by the end of the learning

sessions. The following subthemes—tensions, triumphs and teaching–learning strategies—expand the overarching theme of 'learning together'.

5.4.1 Tensions

Tensions between participants arose due to being paired with a uninterested peer. This caused interpersonal clashes and a lack of engagement in the learning process. Some individuals were perceived as neither interested nor committed to the learning, causing the other peer to feel unsettled and isolated in the learning process. This was evident in the following quotation, in which a participant concurred with their fellow contributors about the benefits of RPT, but also discussed the nonchalant behaviour they had to face:

> I didn't particularly enjoy the peer teaching. It was possibly due to the fact that I hadn't had the chance to be prepared for it ... But also due to my peer not being able to work as a team. That's mainly why I didn't enjoy it, because of the person that I had been paired with [for RPT session] ... The other person [peer] didn't say much at all, like I couldn't get much out of her. Even in week two [of RPT]. She just came in, did her job [clinical skill] and said 'you got to do this, this and this' [descriptive talk rather than two-way discussion]. That is all I got out of her. It is possible that she wasn't interested. I ask questions all the time ... but I got a shrug of shoulders [from the peer], her body language and the way she dealt with me was not good ... but I think it [RPT] is a very worthwhile experience. Even at the end of it, I can see how beneficial it is, despite the worst emotions like being anxious and having a bad time due to lack of pre-preparation of what we are about to be exposed to, as nurses. (Raymond_FG_2)

The above extract clearly indicates tension within and perhaps among the participants. Although it does not describe the second nursing student's side of the story, it presents a testimony from this participant's perspective. He was ready to try the new learning strategy, despite being aware of the general challenges it posed in terms of generating anxiety. He was paired with a person who did not reciprocate his interest and consequently did not commit to the process. He perceived his peer to have one-sided learning with non-verbal cues suggestive a lack of interest. Subsequently, this soured his experience. This highlights that learning in RPT is a two-way street and requires equal input from both individuals paired for the experience. Being randomly paired for RPT restricted participants from choosing their peers. This presented the risk of being paired with someone who was not only uninterested, but a total mismatch in terms of other parameters such as age; this potentially led to conflicts in learning styles. Some identified the random allocation as potentially problematic:

I can only imagine the fear that it [random peer allocation] would instil upon myself. I am a fairly dominant mature-aged person but if my peer was a younger vulnerable, like 20-year-old student, she would die! ... I think it is okay for us mature-aged students ... But it would make her [younger peer] nervous and take over the whole experience [of learning]. It could be very disadvantageous to the younger students if they got there with mature-age students. (Rita_FG_3)

Another participant dismissed age difference as being unfavourable and felt personality misalignment was more challenging for her:

I think with my age, when it comes to other people my age, I would be the dominant person. [Laughs] I am 22 [years old]. I feel I am drawn more towards assertive personalities. I actually get more intimidated by someone who is shy or can't be assertive or can't take charge. I find that a harder situation than being with someone who is dominant. (Haylee_FG_3)

While differences in age and personalities were identified as challenges in working together, one participant described her frustration when her peer teacher did not show involvement in her (the learner's) learning:

I felt like she [peer teacher] didn't care whether I understood. She was just too busy doing the skill. Not that she didn't care. (Annie_FG_1)

Although Annie partially agreed that her peer teacher's attitude was not intentionally uncaring, she felt neglected as a learner in the learning process. Tensions among participants in the form of a perceived lack of role commitment, differences in terms of age and personality revealed one potentially negative factor of learning together. These undoubtedly pushed participants out of their comfort zone, yet participants demonstrated an ongoing interest with RPT. Conversely, another side of the learning process was identified through the notable achievements discussed in the next subtheme.

5.4.2 Triumphs

Through RPT, participants were granted the opportunity to acquaint themselves with peers who were previously not in their social circle. Unfamiliar individuals came together to discover each other as peers and worked cohesively to meet their learning objectives. The first excerpt below exemplifies the change from unfamiliarity into camaraderie, with the participants enjoying the comfort of knowing that neither individual exceeded, nor fell behind the other. The second quotation illustrates the relevance of learning to work with

unknown individuals in professional settings. Considering the challenges in random pairing for RPT, this was a positive accomplishment by the participants:

> I think both of us [peers] were in the same boat. We were at the same level. So, we did not worry about what we did and didn't know ... I had never met my peer before, had only seen her a couple of times ... we were not friends when we first worked together in the peer teaching. But now we are good friends. (Harry_FG_2)

> I don't mind the random pairing in a way because clinically we can be working with people we don't necessarily want to, all the time, or that we don't know. (Scarlett_FG_2)

RPT provided an opportunity for every participant to practise their teaching skills. This did not evoke negative feelings in all participants:

> I was feeling hesitant first, as I had to teach someone how to do the skill. You know like a lot of people, with no teaching experience whatsoever. But I was surprised that I wasn't as anxious as I thought when I was in the labs [laboratory] doing it [teaching], which was, I suppose a nice feeling. (Liz_FG_1)

It was a challenge to teach and simplify the skill for teaching. Although gradual, the move from a lack of self-confidence to certainty in performing the skill was an accomplishment:

> I enjoyed it [RPT]. I am a bit more confident in trache [tracheostomy] suctioning than IV [intravenous cannulation] ... I taught the tracheostomy suctioning in the first week. In my first round [of four-staged approach], I was so slow ... I realised that I wasn't actually teaching, I was too busy looking down at the notes [lesson plan]. ... But second time [of the four-staged approach], I was more quick and I was teaching more than the first time ... I felt more confident [to do the clinical skill] the second time round. (Abigail_FG_1)

The following quotation indicates that there was no hierarchy between the pair, as neither person was more credentialed than the other. Interestingly, confidence gained through RPT exposure was not contained to the clinical skills and the nursing laboratories; it percolated beyond into the clinical placement. The participants were able to assertively participate in peer teaching:

> I didn't feel the hierarchy [between the two peers] ... it was good because we [peers in RPT] both had similar questions to each other. So, you didn't feel below your peer teacher. But when I went out on clinical placement, I actually found myself in a position where there was peer teaching. So, having had that done gave me the confidence in the clinical placement to do that [peer teaching]. (Eleanor_FG_3)

Despite the challenges encountered, the learning experience was found to be positive. Although initially anxiety provoking, RPT was perceived as a constructive experience that helped students discover their personal potential:

> It was a positive learning experience. That is because we got the opportunity to kind of feel that anxiety in the beginning and then overcome it. This really challenged us in a positive way. (Grace_FG_2)

One participant discussed her openness to trial RPT. She thought that changes to the usual learning stratagems taught her to be adaptable and build a supple attitude:

> I think we are really flexible [to try out RPT]. I think it helps us to adapt ourselves and build resilience in the face of change. (Olivia_FG_1)

The ability to perform a new skill and teach it to someone was considered a triumph, as noted in the following statement:

> We sort of put confidence in ourselves because you read something and then you're doing it. And she did it the same way. I felt a sense of achievement that I did it [clinical skill] and also taught someone else how to do it. So, it boosts up the confidence, that you can do a skill even though you don't know it. (Hazel_FG_3)

5.4.3 Teaching–learning strategies

This subtheme explores the strategies adopted by participants relating to their teaching and learning. Although a lesson plan was provided to each peer tutor to ensure the delivery of consistent and correct content, participants devised their own improvised tactics to enhance learning for themselves and their peers. Several strategies emerged from the focus group transcripts, which were individual as well as common to learning and teaching. In the quotations below, the teaching strategies are discussed first, followed by the learning approaches, in addition to the common tactics for both teaching and learning.

5.4.3.1 Teaching strategies

Readiness for teaching was a distinctive precursor to successful teaching. Noting the fact that peer teachers were unprepared and inexperienced for their new task, they devised ways to enhance their teaching. Believing in oneself as being capable to teach was a paramount antecedent to readiness for the role:

You … just had to deal with the lack of confidence. You had to just think that you were confident in the skill, just so that the other person [peer learner] felt the confidence in you. It was just like 'act confident' ... even though you are not really confident. I mean it happens all the time. You have to still feel the confidence, even though you're not, so that other person feels assured in you. (Donald_FG_4)

Timely immersion with the online content was not possible for some due to either technological glitches or ignorance of its existence. As such, participants resorted to strategies of rapid self-preparation just before the RPT session. This was done by reading the lesson plan closely:

I just read through the sheet [lesson plan] a couple of times and then I did the skill. (Donald_FG_4)

Yet, others resorted to more spontaneous methods, opting to teach themselves before teaching their peer:

I think it [teaching peer] was a positive experience ... when we walked in the class [laboratory], we [peer teachers] taught ourselves and then had to teach someone else [peer learner]. There was a bit of pressure, but I liked the idea [of peer teaching]. (Betty_FG_3)

The following participant shared his tactic of drawing upon previous experience, having been exposed to the skill formerly due to repeating the academic year for the second time. The strategy used here was unique to this person, as he had previous experience with the clinical skill, which was not the case with most of the population:

I failed the second-year comprehensive nursing [course]. I think trache [tracheostomy suctioning] was in second year when I did it [in the previous curriculum]. I remember doing something like it ... So, when I did that one [tracheostomy suctioning], I kind of knew little bit about what was to be expected ... that is only because I had previous experience in it [tracheostomy suctioning] ... that helped it [teaching the skill] a little bit. (Donald_FG_4)

Teaching responsibility was embraced by some participants with full commitment to the peer's learning. Instruction was tailored to the peer learner's requirements, with a genuine interest in their learning and maintaining checks to ensure that learning transpired:

I picked up from stuff that she [peer] kind of demonstrated in the first week. As I was teaching through the cannulation [IV cannulation] in the second week, I said, 'Ok! What is the danger of aspiration?' It was embolism. But she didn't know what any of the dangers of air getting into the veins were. I said all right if you could remember this one that's good: its embolism. So, as we went through I

asked, 'ok what is the danger?' We went from not knowing anything to knowing it. That was constant asking questions and that's how I gathered she learnt. Because she was able to tell me at the end, which she couldn't at the start. (Grace_FG_2)

Apart from the readiness check by both individuals, the peer teacher simplified the skill steps to enable ease in comprehension for both peers:

I was reading it [lesson plan] but also thinking about how to do the step in the skill. I had to explain it to my peer in a way that we both understood, and it made sense [to us]. So, I was reading it differently than if I was reading it with a teacher. (Betty_FG_3)

Being a type of learner who likes to see things visually, I can get things in my head. So, while teaching [peer learner], it is just a matter of talking my way through it and explaining what I'm doing, why I am doing it. (Grace_FG_2)

Using a structured approach and following the lesson plan as a guide worked well as aids to enhance teaching. A guided structure allowed standardising how the experience consistently unfolded for every student. The statement below reveals that the modified four-staged approach provided opportunities to rectify errors while performing the tactile skill for the first time. Moreover, watching the peer perform the skill twice in the third and fourth stages, gave both participants more opportunity to retain the content:

Being able to go through the skill a couple of times each allows us to improve the way we did it [the clinical skill]. In the first time [first of the four-staged approach] talking through, it helped me to identify what I was doing and if I was going it right, the way I should be doing it. If I did something wrong, I was able to change it the second-time round [of the four-staged approach]. When we did it the second time, without talking through it, we were able to focus on the steps that we weren't able to do right before. Then when our peer did it twice [third and fourth stages], we were able to watch the skill again and it made everything concrete in our minds. (Scarlett_FG_2)

Each participant watched and performed the skill twice, offering equivalent opportunities to give and receive feedback. Providing feedback on the clinical skill required closely observing how the skill was demonstrated. Once again, this concurred with the quantitative findings, which revealed increased confidence scores for providing honest and helpful feedback. This again involved deeper engagement with the skill by identifying omitted steps and receiving feedback:

> I think doing it [clinical skill] more than once and watching the person you were teaching, you are able to pick up on that things you might have missed. Things that should be included but they have actually missed. So, you are able to sort of give and get feedback about the skill which was helpful I think. (Kylie_FG_4)

One of the safety factors to ensure consistent and correct learning was the provision of the lesson plan, which was aptly used as a guiding tool for teaching:

> At first, I thought it [peer teaching] was really daunting because I did not know the skill that I was going to teach. But once I sort of started getting into it, it was good to have the 'cheat sheet' over there in the lesson plan. I was a bit more comfortable because of that [lesson plan]. (Hazel_FG_3)

Every learner is unique in their learning pace and needs. It is important to regularly check with the learner if they comprehend the taught content. Annie expressed her desire for additional opportunities for peer teaching. Again, this concurred with the quantitative findings of increased scores for the demand for more opportunities for peer teaching in the curriculum. Nonetheless, teaching was tailored according to the learner:

> Double check whether, if she [peer learner] understood what I was teaching her. Just to be on the same page that we understand each other, ask 'Are you [peer learner] getting this or not?' So, I think, putting that aside, just when you do teach people, asking them, 'Do you understand that what I am teaching you?' is important ... I think I enjoyed the teaching ... [Peer] teaching though, I think, should be done more often. (Annie_FG_1)

Rita underscored the importance of applying teaching–learning principles to teaching. She drew attention to the uniqueness of every learner, seeking a tailored teaching approach with a firm grasp of the underlying teaching principles. Dovetailing teaching–learning principles by exploring the learner's previous knowledge—going from what is already known to the learner, to what is unknown—will engage the learner, enabling gradual scaffolding of the learning:

> It is really important with teaching, which I got out of this [RPT] experience but also from the teaching course: already knows first. Because you lose them as soon as you assume they know nothing. So, in combining what I learnt from the 'teaching, learning and leadership course' about peer teaching, I would always, next year when I become a grad [graduate] nurse, find out where my student or peer is at. That is really very important. And find out what their preferred way to learn is, in teaching a skill. To me, it's not just 'one fit for all' ... It is really important that you teach someone in a manner that they like to learn. If something works for me, it obviously may not fit you. (Rita_FG_3)

This highlights the importance of continually checking with the peer learner to ensure they are able to comprehend the content. Applying principles of teaching learnt from the *teaching, learning and leadership course* to the current learning in the *clinical course* ensured educational synergies. Using these principles provided personalised teaching for every peer learner, thus, enhancing engagement for all individuals:

> I suppose engaging your student [peer learner] is important because if you don't, that doesn't help them [peer] learn ... no one is perfect ... you need to be able to acknowledge what is right and what is wrong in terms of teaching. (Liz_FG_1)

As they were at the same academic level, peers did not hesitate to question each other to seek solutions. Victoria explained the differences between learning from a peer and learning from an academic. Her preference for peer teaching concurred with the high scores for peer teaching preference in the CTPQ results. Clarity on content to be taught necessitated understanding it firsthand. It also nurtured inquisitiveness:

> I think it [RPT] was good because we [learning pair] got to talk about it. When a [an academic] teacher teaches you, you can ask questions, but some can be kind of stupid questions, which are really like at a beginner level. You feel kind of silly to ask those to the teacher; but you ask them to the peer. I found the actual teaching to be as good for me. Because I had to learn the skill as well as teach it. (Victoria_FG_2)

Participants were able to reassure each other, allowing the support and encouragement of the peer learner to boost the peer teacher's teaching confidence:

> I think that peer teaching is really fantastic ... I had a really good peer [learner] with me. She was really good. She said 'Don't panic!' It was great having her. (Layla_FG_3)

Learners are in a vulnerable position, as learning incorrect practices can have harmful implications for patients in healthcare settings. However, it is imperative to correct learners' mistakes in a supportive manner to avoid discouraging them or affecting their learning. Being a learner and a teacher enabled an understanding of both roles. Rational application in the real world of being supportive, yet safe, is expounded in the following statement:

> It is important to put yourself in that situation first before reacting to it. As an example, if the student is doing something wrong and if it is harmful to the patient you need to stop them at once. But if it is not harmful, you don't want to correct them [student] in front of the patient. Or scare them. Nurses can be really rude

while correcting students; they don't care the effect this would have on the students. (Harry_FG_2)

There was broad recognition that all learners are distinct; each learning at a different pace. This also enabled participants to distinguish that learners are also humans who are not always perfect. Adopting a tolerant stance towards other learners, as well as oneself, was considered to complement learning. It was considered acceptable to admit not knowing something and seeking clarity, even if it was sought repetitively:

> It [RPT] kind of changed my thought patterns, like we don't all know the same things. Like we all soak in different things. So, to be more lenient [with the learner] I guess. Whereas, definitely in the past I have said we have already done this [content] so you should know this. But I have never said that aloud. And even on myself—not to be harsh with myself because if I have not fully retained something, I need to ask the question. So, like if someone comes to me with the question I take the time to go over it [learning content] all over again. (Olivia_FG_1)

Having experienced being learners, participants identified preferences for a variety of teaching approaches; hence, they realised that the same would be expected when they taught their peers. This made them identify with the learner's needs and as peer teachers, they sought to nurture supportive future attitudes. All individuals learn differently, demanding due consideration be given to their unique learning style. The diversity in learner preferences was illuminated, compelling the use of diverse teaching approaches:

> If I become a grad [graduate] nurse, I should be able to use different ways to teach: visual, auditory for example. Having done the peer teaching, we should be able to understand that there are different ways that people learn. Because of their position of being a student, I do understand how they [learners] feel and I might make it easy for them [learners] to learn. (Roxanne_FG_1)

5.4.3.2 *Learning strategies*

In addition to the teaching strategies outlined in Section 6.4.3.1, participants also shared the learning strategies they used in RPT. This commenced with readiness to learn. A mindset for learning was considered vital to be facilitate the absorption of information. Some participants preferred learning from a peer than sharing an academic teacher with 24 other students:

I felt a bit more relaxed having another student teach me how to do it [the clinical skill] than if I had a teacher for 25 students. It was just easier to get a grip on it. (Betty_FG_3)

Linking current learning with previous learning was a strategy adopted by peer learners. This validated their engagement with the teaching–learning principles of linking existing knowledge to current learning. Concepts were clarified and retained for later recall:

I remember more of IV [intravenous] cannulation than trache [tracheostomy suctioning] care because we have done the venepuncture before to take bloods [blood samples for investigation]. So, I remember more ... about IV cannulation than the other one. (Roxanne_FG_1)

Some learners prefer learning by using their capacities to see, hear and perform skills. This was also true for the participants. Some learnt by listening to the peer's instructions, others by watching their peer and others by performing the skill firsthand. Learning occurred from using these strategies exclusively or in combination. Participant statements revealed that having a receptive state of mind is a precursor to effective learning:

I was able to listen and take it all in. I don't just listen to what is being said but I need to do it [the skill] in my own way ... I felt very comfortable to absorb the information. (Rita_FG_3)

I think because I wasn't mentally prepared the first week, so I didn't retain as much then. I was teaching in the first week. In my head I was constantly thinking, 'How the hell am I going to do this?' That's all I focused on! But by the second week, because I was prepared mentally that I was going to be learning from a peer, I really wanted to listen to my peer. I wanted to give her the chance to teach. So, the second week when I learned cannulation, it stuck with me more than the first week tracheostomy skill. (Eleanor_FG_3)

Learning not only took place while observing the peer perform skills correctly, it also occurred through witnessing errors. Apart from observation, there were other skills such as identification and rectification of incorrect aspects:

Watching the other student do the skill was good ... As I was watching the peer [teacher] do the skill, I think I was picking up a lot more just watching, than doing it. I was absorbing a whole lot of information and being able to see her do it and pick up on her mistakes that sort of taught me again. (George_FG_2)

Repeating the clinical skill was also considered beneficial to the permanence and retention of the learning:

I find that [doing the skill twice] it is a lot [more] beneficial to learn than doing the skill only once. (Haylee_FG_3)

Careful observation by the peer learner enabled error identification by the peer teacher; this learning tool prevented the repetition of mistakes. Learning was not confined to only what was demonstrated; rather, it also went beyond to what was shown incorrectly or even not displayed at all. The learner used higher-order thinking skills to discern what was being taught and was constantly engaging with the content:

I found that when I was doing the teaching, I felt that the other student was not picking up the things that I had done wrong. So, when she had her turn, I felt she was not making the same mistakes as I was. She was observing the teaching I was doing. I feel like that she was picking up a bit more than what I was teaching ... But when I was observing her [demonstration], I felt like she was showing some steps that I had missed showing her. (Abigail_FG_1)

5.4.3.3 Common strategies

Apart from strategies specifically used to teach or learn, there were common approaches applied for both learning and teaching tasks. Given that every student had an opportunity to teach and learn from a peer, each participant had direct involvement with both roles. Despite the allocated roles, it was sometimes difficult to differentiate between them, as both individuals could be teaching and learning at the same time. This led to rapid switching between the strategies to teach and learn. Students did not perceive assigned roles for one individual as the provider and the other as the receiver of knowledge. As opposed to one person being responsible for learning of the other person, there was shared accountability in the learning process. Despite sharing the responsibility to teach each other, there was mutual accountability and ownership, which maintained the participants' commitment to their learning. The reciprocal nature of learning in RPT was said to be pertinent to nursing, identifying it as safe and useful beyond the contained learning milieu. The following quotation indicates that learning was mutual rather than one-sided:

I suppose the person I was buddied up with, the way she did the things was really good, like we learnt together. You can apply this to practice too. Like if you are unsure about something, you can learn it together because you both have prior knowledge to skill or whatever you are doing. And you can kind of bring that in together and complete whatever task you are doing. The two of you learn as you go ... Like it's not necessarily just one person will always have the knowledge; you might need two people to complete something. I don't think there is anything wrong with that. In fact, I think it is safe. (Liz_FG_1)

You just nut it out together. Both people are accountable [for the learning]. (Julia_FG_4)

Being in the same year level made participants feel comfortable in accepting each other's strengths and shortcomings. They did not feel threatened by having to work under someone with greater experience or knowledge:

The whole time, I really liked watching the demonstration from a peer. This was really new to me. I just found it to be a very comfortable forum to nut it all out together, even though effectively we were being taught by a peer. It wasn't a top-down approach. (Rita_FG_3)

Both peers were able to share what they knew or thought about the clinical skill and felt safe to do so. Allowing mistakes by offering a safe environment is essential to inculcate safe delivery of care to real patients. Committing mistakes was found to be a means for learning, rather than an end to it. Rather than following a perfect example demonstrated by an expert, RPT enabled participants to seek their goals by using trial-and-error methods. The benefits of identifying their own errors or the mistakes of their peers were discussed by participants:

I think peer teaching taught us a lot of trial and error in a safe environment, where you couldn't hurt someone. As much as you were allocated the teacher's role, you are still the student. Because you both the kind of work it out together. Like oops, 'can't do that!', or 'don't do that!' I think this was good. (Betty_FG_3)

We still helped each other. But it was more of a trial and error rather than to straight away remember what the teacher had demonstrated and getting that perfect way. That is probably my biggest thing that we were able to work out how to do it, rather than follow the perfect example. We may do things wrong but then we worked out how to do it right. (Layla_FG_3)

Thus, errors did not intimidate or deter participants from trying the skill again. In fact, they felt comfortable making mistakes and performed the clinical skill in the right manner at their next attempt. In this process, they felt secure in admitting and pointing out mistakes. The learning became pragmatic, rather than replicating the perfect way of doing things. Performing the clinical skill firsthand enabled a deeper understanding of what it entailed:

If we did a silly mistake, we just laughed and then re-did it. Doing mistakes wasn't scary. (Kylie_FG_4)

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Participants were able to seek their peer's feedback in discussing their ideas about the clinical skill. This was essential to a participatory approach rather than an isolated one. Seeking feedback from others is vital to appreciating another person's viewpoint. This peer feedback was constructive to learning:

> Seeking feedback and clarification like, 'What do you think of this?' or 'Do you think I did that?' That was good about it [RPT] that you got feedback from your peer. (Emily_FG_1)

Interestingly, while RPT was viewed as confronting, being challenged was identified as a critical part of learning something new. Instead of becoming intimidated by trials, challenges were actively pursued by the participants, thereby pushing their limits. This enabled personal growth as a learner. It allowed for the discovery of participants' own capacities:

> You got to be ready [being challenged] certainly. You can't just be comfortable all the time because you will not learn anything. You need to be challenged. (Olivia_FG_1)

Participants worked their way through the skills using a collaborative approach that was found to be advantageous:

> I feel I have always been good at problem-solving. But I think I had it more so with the peer teaching in the labs. It changed my mindset and made me want to problem solve with the peer ... it was really helpful. (Victoria_FG_2)

Being at the same educational level enabled participants to be patient in their attempts to learn the particular skill. Patience was imperative for engaging with learning, as solutions did not easily appear by themselves. This distracted participants from impatiently seeking an instant solution to a problem. Instead, they worked their way through together at a comfortable pace, using a logical manner:

> It [being at the same year level] helped a lot. Because it changed my mindset by being more patient, taking it step by step and figuring it out together. (Olivia_FG_1)

More importantly, RPT enabled participants to be respectful and supportive of peers. They were able to empathise with each other as they experienced both being a learner and a teacher. The ability to place themselves in the other person's situation enabled them to relate to the predicament of their peer, thus aiding in the development of healthy

professional relationships. It also helped sharpen participants' reflective skills, which are indispensable to nurses. Listening to the learner and tailoring teaching style according to their needs was vital in ensuring a successful experience for both teacher and learner:

> It [RPT] definitely made me feel more open to the fact to teach. I feel this experience can help me reflect back on the emotional side of being a student or the teacher as well … being respectful of whoever you are teaching and think about what they're thinking and how they are feeling. Try and be supportive. You can reflect back on this kind of situation. Try and adapt your teaching style rather than being authoritative. (Julia_FG_4)

Thus, the theme of learning together incorporated the subthemes of tensions, triumphs and strategies used to teach and learn. The interchanging nature of learner and teacher roles enabled common strategies to be applied to both teaching and learning. It also highlighted the unique nature of RPT in removing hierarchy between peers from the same academic year level, thereby making the learning mutual. Participants acknowledged the longitudinal application of the skills learnt through RPT experience, which is presented in the final theme in Section 6.5.

5.5 Theme 3: Real-world relevance

This theme depicts the resemblance of RPT experience to the real world of nursing. It also explores the applicability of the skills gained from this experience to professional nursing life. The RPT experience was found by participants to relate to the real world in numerous ways; despite the unpredictability, one must face reality and exert their best efforts. There is no control over how things happen in the 'real world' of nursing, making it unpredictable and constantly dynamic, demanding readiness to adapt while working with random peers. Obviously, it was no surprise that being unaccustomed to RPT induced nervousness. For one participant, an initial lack of awareness about RPT was compared to the unpredictable nature of the real world, in which a cardiac arrest does not occur with prior warning. Such situations demand nurses to be able to handle the situation, rather than sitting back and contemplating why they were not prepared:

> You can't say 'Hey, you didn't tell me that there was going to be a cardiac arrest!' That is the real world. (Eleanor_FG_3)

The next two quotations outline the tactics adopted by participants to counter unpreparedness or inexperience in RPT sessions and clinical placement. The first extract

presents the RPT situation, while the second describes the similarity to clinical placement, where taking charge of the situation was achieved by independently seeking relevant resources:

> I just worked through the sheet [lesson plan] and followed the steps for the skill. (Kylie_FG_4)

> When I was on placement I did have the experience where a [registered] nurse had to perform a procedure that she wasn't 100 per cent sure of, as she had never done it before. So, she had to just go, print out the guidelines and then go and do it. She basically had to teach [the clinical skill to] herself from a bit of paper [clinical procedure guidelines] and then go and do that skill [clinical skill]. (Scarlett_FG_2)

A feeling of being 'out of their depth' can challenge a person's potential. However, this can be managed through self-directed learning and taking charge of unexpected situations. In the following participant statement, analogies were identified between nurses taking charge of unfamiliar situations to make decisions and the impromptu teaching in RPT. This in no way suggestive of overstepping the professional scope of nursing practice. Rather, it indicates taking charge in adverse situations when no other senior qualified person could be accessed:

> It [RPT] would have been very difficult ... I can realise that's [being unprepared] the reality ... we need to be skilled up. For a regional setting, there is no other nurse to do it [the skill]. We have to learn on the spot, we have to learn the skill, we have to read online and there might be other nurses we have to actually show [the skill] as well. So even though it [RPT] was really challenging, I found that it is probably appropriate for some places we work. (George_FG_2)

Initial unfamiliarity of a new clinical placement can evoke feelings of discomfort, but after a preliminary encounter, there is gradual acceptance of the situation. The daily routine and expectations of the setting can be predicted, leading to easing of discomfort. This resonated in the RPT experience, which was unsettling in the first week due to lack of familiarity but turned around in the second week:

> It's [RPT experience] like going on placement. The first day or two is nerve-wracking because you don't know where you are going or what it looks like. But as soon as you have been there, done it once, you get more comfortable. (Olivia_FG_1)

I think the second week [of RPT], I knew what was going to happen. Like in the first week, I had no idea of what this lab was going to be like. I don't know that I liked it then. But the second week it probably looked better. (Liz_FG_1)

The resemblances identified between RPT and the real world enabled participants to view their learning experience through a different lens. They perceived the value of partaking in RPT by preparing them for their future professional lives. After having completed their RPT experience in the nursing laboratories, most participants had undertaken partial or entire clinical placement for their academic semester. Having recently experienced the clinical placement, as well as RPT, they regarded their experience with the new learning strategy from a different vantage point, by identifying the applicability of this learning style to the real world. They utilised similar approaches in facing RPT as they did in their approach to their clinical placement. For example, there is a possibility of not coming across the same skill, the same type of patients or the same ward for a long time. This can either cause an experienced nurse to feel unprepared or make a newcomer feel empowered to teach. Nonetheless, as the situation demands, there should be willingness to learn from peers or teach them:

If I did telemetry skill as an example, I will not get to do the skill for four to five months. Even if I work on the stroke ward, the patient may already have telemetry attached. The [clinical] skills that I get to do are totally different as compared to the permanent staff from a particular area. This is where peer teaching comes into action. The patients are not specific to the ward. For example, you may get an orthopaedic patient even though you are not an orthopaedic ward. Due to the lack of beds, patients are sent all over the place. So sometimes even a nurse with 30 years of experience may not be comfortable doing the [clinical] procedure. A casual newcomer [nurse] will end up teaching the skill to an experienced nurse ... We do peer teaching every single day, even on the ward. If someone asks us a question where to go or what to do about a skill, we show them what we already know. This happens on the ward [clinical settings] all the time. (Harry_FG_2)

In nursing, there is a likelihood that the need to teach or learn from peers will arise in varying clinical situations; this was beneficial for the individuals involved. The following example from Kylie demonstrates that RPT principles applied to passing on patient care information from a nursing student to a professional nurse:

I have had that [passing on patient care information] several times. I got to know these four patients I had to look after the previous day. I passed on the care to my RN [registered nurse] ... that worked really well. (Kylie_FG_4)

Individuals who played a part in RPT found that they were able to learn together on their clinical placement by using the same learning strategies they used in RPT. In the following excerpt, two peers at the same year level in their final year came across each other on their clinical placement, in the capacity of enrolled nurse and nursing student. However, knowing that they were peers from the same educational level made them engage with their learning using the same strategies they used for RPT:

> It was on one of my shifts, I got paired with an EN [enrolled nurse]. I know this person. Even when I was with him it was just like a bigger peer teaching because he was teaching me but I was able to help him as well. Although he is an EN [enrolled nurse], we are also peers at the uni [university], so we are sort of at the same level. We learnt together and went aha! This is a really helpful thing ... I thought, 'I am in your class clinical course. I know just the same as you know'. But it did help because I knew what he was [my peer from university] beforehand. So, we did help out each other. He was more than happy to help teach me the skills. I told him some things I had learnt the previous week. (Donald_FG_4)

Thus, by identifying similarities between the two settings, participants saw the applicability of RPT learning strategies to the real world. This process involved applying various subtle skills. Participants learnt numerous intangible skills during their RPT experience, which they continued using later (as explored in Section 6.5.1). The following quotations acknowledge the complex nature of teaching, recognising it as an elementary skill to nursing, which although challenging and distinctive, was a skill that nurses could not evade in their professional life:

> But it [peer teaching] is definitely much harder than what I had thought about it. I had thought it would be so casual to teach someone ... you don't know how well. You don't know how that person would pick up the skill. You don't know how many times you will have to run over it. So, it has definitely opened my eyes up to what to look out for and how hard it is going to be. (Julia_FG_4)

> I think it [RPT] has opened my eyes to how much teaching is involved in nursing. Because you don't think about the stuff you get taught on placement unknowingly. But when you're peer teaching someone else, you think, 'This is something I am probably going to have to do a lot when I have got students!'. Someone said to me on our placement that we have got the updated knowledge as students. Whereas everyone else has knowledge when they went to [nursing] school but ours is the most up-to-date. So even though we were students, we were teaching the nurses, our peers, as well as other students. So, you are kind of teaching everyone. Everyone teaches each other. (Betty_FG_3)

5.5.1 Essential Lifelong skills

This subtheme reveals a range of essential skills that were useful for participants' personal and professional lives, in teaching a skill to a peer and mutually reciprocating the role to a learner. Although these skills are not tangible, they are essential to thrive and excel as a professional. Within this theme, participants indicated not concluding a journey with RPT at the end of the two weeks within the nursing laboratories, but its extension beyond, to their clinical placements and perhaps future professional lives. Five key skills were identified by participants: developing self-confidence, communication skills, undertaking independent learning, collaborative learning and 'buoyancy' (a metaphoric term indicative of victory over adversities; it encompassed resilience, adaptability and perseverance).

5.5.1.1 Development of self-confidence

The first major lifelong skill consistent across all focus group transcripts was developing self-confidence. This newly acquired skill was applied in various instances, not limited to nursing laboratories, but extending beyond to clinical placement:

> Sometimes on placement we can be a bit more reserved. Because we are sitting under the nurses who teach us. I guess peer teaching helped me to build that confidence to speak up. It improved my knowledge as well, that I was learning stuff and I knew things that other people didn't. (Scarlett_FG_2)

Freshly attained self-confidence to teach enabled participants to feel comfortable teaching a new skill, even to experienced professionals. This built their confidence further:

> In my placement just gone, I felt really good because I got to teach a registered nurse a skill that I had just learned. It was peritoneal dialysis. I had been looking after this patient [on peritoneal dialysis] and doing it with another nurse, who showed me how to do it ... the next day, I was partnered with yet another nurse who hadn't done it before. He said, 'I really don't know what to do here'. I said 'I do! I can show you if you like?' He checked if it was okay with the nurse I was with the previous day. She said, 'Yes, that was fine, she can show you because she will know exactly what to do'. So, the clinical educator came over to watch me show the skill to the registered nurse. (Eleanor_FG_3)

After having practised RPT, there was a newly developed boost in self-confidence to teach others. The tangible result of this confidence was found in the clinical environment, in which confidence to teach stemmed from the RPT experience. RPT was found to have

a significant impact in the workplace, which demonstrates a strong argument to make it an integral part of the undergraduate nursing curriculum:

> I work as an enrolled nurse at the hospitals most of the times. I have to deal with students all the time. When I first started as an enrolled nurse, it was daunting to teach Div [division] 1 [registered nurse] students. I felt fearful to teach them. I felt that I did not know much more than them. So, I was not confident to tell them anything. However, when I taught my peers here [in RPT sessions], who are future Div 1 nurses as well as my classmates, I felt very comfortable. Consequently, when I was with my peers in the ward [healthcare environment], in the capacity of an enrolled nurse and them as my students, I felt quite comfortable working with them. I think this [RPT] was a good opportunity and experience ... we are required to teach our students. So, if I lose my confidence to teach, students will not learn much. But if they did any mistakes [in the healthcare setting], it can cost someone's [patient's] life. So, therefore my experience of teaching my peers has been absolutely amazing to build up my confidence ... I feel that the peer teaching in the labs [nursing laboratories] was a great opportunity. I think it needs to be made compulsory for the nursing students as it is one of the major skills to move forward. (Harry_FG_2)

Undertaking self-regulated learning to embark on the teaching role enhanced self-confidence to teach peers. The self-instigated preparation developed qualities of a self-directed learner to engage in the preparative information for successfully teaching their peer. The following quotations reveal that intrinsic motivation to teach came with the realisation of the responsibility it carried for the learning of both participants:

> I think it taught me general preparedness because I didn't have access to the material before I went into the labs [laboratories] ... due to IT [information technology] issues. (Mia_FG_3)

> I learnt the preparedness to be the peer teacher. Because I knew I was going to be teaching the following week. I actually looked up my week for information. I just took a quick glance through that module [on learning management system]. I understood what I was going to do and not getting thrown into the deep end. But even then, you want that confidence when you are teacher. If you are not confident as a teacher, then the students may not learn as much maybe. Because they may think that my peer teacher is trying to learn at the same time. But even like you being confident that you are doing it right. (Donald_FG_4)

Participants identified the applicability of skills learnt from the RPT experience to other settings:

> I reckon I can apply peer teaching, like when you are on placement you might be having one buddy nurse with two students. And sometimes you find yourself talking about a patient—just the two students. You bounce off ideas with each

other ... like you are looking at the same things and you have conversations about it, as you are both in the same boat. Whereas you couldn't have those conversations with a registered nurse coz [because] they would think you are an idiot ... it is sort of good that you can have the conversations with the peer without feeling guilty ... It is good that you can talk to your peers to learn things. (Roxanne_FG_1)

In the following quotation, the participant recounted an experience she had on her clinical placement. She recognised that the patient had frail skin, which made it highly susceptible to easy damage when using the usual adhesive remover to remove the adhesive. She was able to review other options for minimising the hazard of impairing skin integrity. Having witnessed a different method of removing the adhesive, she was able to apply the same to her current situation. Further, she was also able to present her ideas confidently to an experienced nurse. She eventually managed to solve the problem in a confident and independent manner, thereby providing high-quality nursing care:

I saw that he [patient] was in pain and asking for something to be used for taking the sticky stuff [adhesive] off when removing his PICC [peripherally inserted central catheter] line, which we did not have. I thought, surely there was something else we could use instead? I was probably more confident [than before doing RPT] to point out on the ways to do things ... He was quite frail. His skin was at higher risk for tears. The nurse was taking the sticky stuff off and it was really hurting him. He asked for one of those sticky wipes to be used, but there was none around. I suggested they use an alcohol swab; that's what we have used before, when I was in medical day unit. The nurse said that would dry his skin out. I said I was just going by what I have done previously. She ended up using it [alcohol swab] in the end and the patient thanked me because it worked … I was more confident to say that there are other ways to do things ... I guess peer teaching helped me to build that confidence to speak up. And improved our knowledge as well that we are learning stuff and we know things that other people don't. (Scarlett_FG_2)

Thus, attaining self-confidence to teach was a significant turning point in cultivating teaching skills. Again, this self-confidence was not just contained within the clinical laboratory but extended to the clinical environment.

5.5.1.2 Independent learning

The second lifelong skill was independent learning, which arose from the lack of a perfect learning environment. Again, it is necessary to note that this was the first time the participants had been involved in RPT; nonetheless, it offers valuable information about the potential offered through this strategy. While one participant encountered an

uninterested peer, another faced a technological glitch, making the preparatory material unavailable in a timely manner. Although these instances do not reflect good RPT, they do reflect the imperfect real world, in which solutions to all problems are not always freely available. This demands the autonomous seeking of solutions. Every individual had to take responsibility for their own learning in RPT, enriching their independent learning skills. Even if participants were paired with an impassive peer, self-initiated steps needed to be undertaken to ensure their own learning needs were met. For example, in the RPT, one participant encountered an uninterested peer whom he perceived as not committed to the learning. Although his independent approach to learning was the result of not having an effective RPT partner, it is useful due to its applicability to any learning setting:

> I basically had to do it [the nursing skill] myself. She did her part and she walked off and went to talk with other student friends. I did try to ask questions to my peer [but] she did not engage with me. I don't know if she was not interested. So, I had to go and pick up the paper [lesson plan], read it and as soon as the session was over ... I did not leave the lab [nursing laboratory] without learning what I was there for because that would have been a complete waste of time. (Raymond_FG_2)

One peer teacher was unprepared for teaching due to difficulty accessing the preparatory information. However, she counteracted this by autonomously seeking firsthand information to understand the topic and teach it in a better manner. She also queried the ways of performing the skill and did not stop learning, even at the end of the RPT session:

> I am not really ok with [teaching] tracheostomy suctioning ... I think if I had had the opportunity to go through the clinical module online, I don't think I would have had a problem. Once I had access to it, I was ok. But I was able to go through the paper [lesson plan] and do the [clinical] skill then ... So, for me it was like I went to grab my phone and I googled whatever I needed to find out [about the clinical skill] before commencing RPT ... but I had these questions [about the clinical skill] as I was going along ...I couldn't go like, 'Well if I didn't do it this way, did they do that instead? Am I going to endanger my patient?'... These were just the questions popping in my head as I was teaching my peer ... I had these nagging little questions in my head, could I do it [step in the clinical skill] this way or that way instead? ... I did end up finding the answers to my questions after completing the [RPT] session. (Mia_FG_3)

It is not always possible to have someone help find the answers. Taking the initiative to seek information independently initiates yet another skill of lifelong learners.

5.5.1.3 Collaborative learning

The third lifelong skill—collaborative learning—complements independent learning. As professionals, the nature of working with others underscores symbiotic learning. Collective learning produces mutual benefits for all individuals involved in the process. In the following extract, the participant found a pragmatic application of RPT by extending it further in the hospital setting, making learning comfortable and mutually beneficial:

> Actually, I have very positive experience with this [RPT] ... at work while working on the ward as an enrolled nurse, I had students assigned to me ... this year after my peer teaching experience, I got students to supervise again on the wards. These students were actually my peers from the university. We worked as a team and had fun learning together. We said, great, this is another aspect of peer teaching! We actually used the word 'peer teaching' and felt fairly comfortable [to learn together]. (Harry_FG_2)

In this study, although RPT sessions were designed for student pairs, in one instance there were three participants learning together due to one student's absence from the compulsory laboratory sessions. In the following scenario, the participant had to teach two peers instead of just one. Rather than proving to be detrimental, the situation provided an opportunity for collaborative learning. This indicates that RPT could be applicable for more than two individuals learning together:

> I have always understood that peer teaching is an integral part of nursing ... I had to teach two people [peers] as we had an odd number of students in the labs [laboratory]. It [RPT] wasn't a one-on-one thing for me. I guess from my perspective, I have established a more collaborative approach to peer teaching as opposed to one-on-one, not where I am the teacher and you are the student. But let's work together. (Mia_FG_3)

One participant shared her clinical placement experience of not finding support due to a nursing staff shortage. This resulted in work needing to be done with limited staffing resources. Having both engaged with RPT in the nursing laboratory, the peers had direct exposure to working collaboratively. They applied the same strategy to working in partnership within their scope of practice for attending to things that needed to be done. They were able to recognise their scope of practice to define boundaries within which they could work safely:

> It [working collaboratively] took a bit of initiative. Although things were not good, we [peers] said 'We are ok!' Like they are the things that we could do and

not get into trouble for. We didn't really need supervision for some things and so we got them done ... I suppose, it [RPT experience] has helped. (Annie_FG_1)

Collaborative work requires taking ownership of and responsibility for individual and collective learning. It also has practical applications for working in a synergistic manner and is another essential skill for healthcare team members.

5.5.1.4 Communication skills

The fourth skill was communication. Verbal and non-verbal skills are equally imperative for effective communicators. Working with a variety of people in healthcare can result in working with complete strangers, necessitating use of clear communication. This vital skill was acquired in RPT interactions:

> I learnt to communicate well, through this experience [RPT] ... Sometimes when I was explaining something and with her [peer learner's] facial expressions I understood she didn't get it, so I thought it was easier just to show it to her and guide her through it. So, it [learning the skill] was a lot easier for her. (Kylie_FG_4)

At the start of each skill, there were some questions in the lesson plan to build knowledge of the skill. It also provided an opportunity for the peer teacher to gauge the existing knowledge of the peer learner. The following quotation describes how Hazel used the initial theory questions pertaining to the skill listed on the lesson plan to start talking with a stranger; she simultaneously began decoding the non-verbal messages of her peer learner:

> I think it [RPT] was a bit of a challenge but it improved my communication because we got there in the end. Well, you know like how you had the initial questions at the start to gauge what their knowledge was? ... My peer learner was looking around the room. I dropped her the hints you had written down on the lesson plan. She said, 'Oh yes! But how does that work?' Then we were trying to work out the answer together to our 'how?'... Then when I was doing the skill, I could see her and if she was giving me the same look that she gave me when she didn't know the answer, I was like, 'Do you want me to redo that again so you know what I'm doing?' ... If she did not the answer, I knew the face expression. (Hazel_FG_3)

Communication skills acquired in the process of RPT were again extended to clinical settings. The ability to communicate effectively with a peer in a learning environment equipped George to be assertive, confident and relate to graduate nurses on clinical

placement. He understood the collaborative nature of learning, which involved discussions, challenging what was known and accepting that not all information is known. Communication has wider applications not contained to just working as a team, but also learning:

> We have had two weeks [of RPT]. I actually found a good connect to peer learning … I found myself in situations [on clinical placement] probably with the younger nurses—the grads [graduates] … They understand what we are going through. So, we chat a lot. But now, when we are doing skills, I am more inclined to offer something that I may have learnt and we have a chat about it. Rather than I just say 'Teach me', I am more involved in the conversations and I am willing to put myself out there more; even with the things that I am not sure about or things that I may not have been willing to do before. Doing peer teaching, I understand those communication skills going back and forth in peer teaching. I found that quite beneficial. (George_FG_2)

When asked about the skills gained from the RPT experience, two participants stated that good communication was critical to ensure all parties involved in providing patient care were on the same page. There needed to be clear understandings of why, what, where, when and how things were being done. She emphasised that RPT provided her with the opportunity to sharpen her communication skills:

> Communication definitely. That's the key to good care because the chances of discrepancy are so high ... I had no experience with the traches [tracheostomies] before. So, I asked my peer … 'Am I allowed to touch the wall suction, how far do I go into the trachea?' So, in that way, my communication was really good. (Grace_FG_2)

> I definitely think we have learnt communication skills [through RPT experience] ... we may not have felt comfortable [talking to random person]. Like not having the confidence to initiate conversations with any random person. We learnt a lot of communication through this peer teaching. (Betty_FG_3)

Clear and effective communication is an art that improves with practice. This crucial skill for the nursing profession was yet another skill gained by participants through RPT.

5.5.1.5 'Buoyancy'—Resilience, adaptability and perseverance

The final lifelong skill was an amalgamation of resilience, adaptability and perseverance, depicting survival. Participants needed to overcome numerous hurdles during the initial period of RPT. This can be compared to the analogy of buoyancy, which is the tendency of any object when dropped in water to bounce back to the surface, preventing it from

sinking. Similarly, in this study, participants managed to survive the challenges posed by being unprepared and inexperienced for undertaking a new form of learning, by being resilient, ready to adapt and persevering. Being paired with an indifferent peer did not impede the participant's learning. Rather, pressing forward with determination and resilience was a strategy learnt that could be applied to overcome adversities in the clinical environment:

> I learnt to be resilient ... Persistent in a way to make sure that the care is done for the patient, even if my teammate was disengaged. (Raymond_FG_2)

The inability to access online information in advance to aid teaching made Mia mentally open to accept unfamiliar situations, and boosted her ability to adapt and determined approach to not give up:

> We [both peers] went in [the laboratory] and when I was told, this is the skill I was teaching, I read through the lesson plan and went: 'Okay, I can do this!' Based upon what was written in front of me … Through the experience [RPT], [I realised] if I don't have the given direction or the resources [to solve a problem], I will always find and utilise what I have got to press forward. (Mia_FG_3)

However unfamiliar the situation may have seemed, it evoked an unwavering attitude to persist and keep pressing forward:

> I think you just have to go on. ... Yes, I nearly cried! I was reading [the lesson plan] and going: 'Oh wow! What do I do?' But I knew I just had to push on ... I think you can achieve anything if you press on. (Eleanor_FG_3)

This final subtheme describes the individual and communal qualities gained as a result of engaging in RPT. These qualities are foundational to working as a nursing student and future nursing professional. Despite their uniqueness, they are interconnected. RPT offered a safe arena in which to practise these skills in concomitance. These same skills were later applied by participants during their clinical placements. Considering the transferrable nature of these skills, there is a likelihood that they will continue to be applied in their professional lives too, emphasising their long-lasting nature. The coexistence of these skills nurtures a lifelong learner, who strives to continually pursue excellence in providing quality care as a cohesive part of the healthcare team. Thus, this final theme depicts how RPT was found to be beneficial through its relevance to the real world along with nurturing numerous transferrable benefits that are also essential for participants' current and future professional roles.

5.6 Chapter summary

This chapter presented the qualitative findings obtained through focus groups. Significant findings are listed below:

> Three major themes arose from the transcripts.

1. The first theme identified the RPT experience as a challenging, yet beneficial journey. Three subthemes of initial hesitancy, changed perceptions and academic benefits, enabled understanding of this theme;

2. The second theme was learning together—tensions and triumphs. Again, subthemes of tensions, triumphs and teaching–learning strategies assisted the exploration of this theme; and

3. The third major theme was real-world relevance. It contained a subtheme of essential lifelong skills. These skills included self-confidence, independent and collaborative learning, communication and buoyancy.

The journey embarked upon by participants did not culminate at the end of RPT. Rather, it continued through to gaining the mindset of lifelong learners. A summary of the findings from both qualitative and qualitative data was presented in the final report to Ethics committee of the given university (see Appendix 13b), which was duly accepted (see Appendix 13c). Chapter 6 presents an integrated discussion of the results obtained from both components of this study.

Chapter 6: Discussion

6.1 Introduction

While chapters 4 and 5 presented the quantitative and qualitative findings of this study, this chapter presents an integrated discussion of the key findings in light of the contemporary literature. This chapter commences with a brief summary of the study, following which the key findings are presented in consideration of the current literature. Finally, the significance, limitations and future recommendations are presented. The current study aimed to explore the effect of RPT on student learning. The overall research question explored was, 'What is the effect of RPT on undergraduate nursing students' learning in clinical skills settings?' To answer this question, an explanatory sequential mixed methods design was used to replace traditional teaching with RPT for final-year undergraduate nursing students at a regional Australian university. Within this design, qualitative data enabled explanation of the quantitative findings; the findings from both have been interpreted. Phase one involved gathering quantitative data through surveys using a one group pre-test–post-test design and implementing the RPT intervention. In all, 102 participants completed the surveys. Phase two commenced after eight weeks of completing the post-test surveys. It continued evaluation of the intervention using focus groups to further understand participants' perceptions and experiences with RPT.

6.2 Comparing RPT with NPT

This section will link what is known about PAL form with the new knowledge revealed about RPT from the findings of the current study. Considering the contemporary literature on NPT in nursing and other health professional educational programs and the somewhat related to NPT with the exception of involving individuals from the same year level to learn from each other, making it a distinct form of PAL. This discussion will compare and contrast these two forms of peer learning. This section reflects the underlying processes in learning using RPT compared to NPT. It will discuss power play, accountability and learning between NPT and RPT.

Within the current study, the mutual nature of learning was appreciated as conducive to learning by the participants. Findings revealed that peer tutors gained higher cumulative aggregate scores than peer learners did. This was also discovered through the qualitative

results in which benefits in peer teaching were identified; teaching a skill required understanding of the concept being taught. Since the teaching was reciprocal, both peers empathised with and supported each other. In a qualitative study, third-year outdoor environmental education undergraduate students taught first-year students using NPT (Bester et al., 2017). The authors argued that the process of teaching enabled learning for the near-peer teachers. Further, the peer learners perceived their near-peers as role models, who although were senior, were students themselves. There was advantage for one party; the near-peer teachers had supremacy over their learners by virtue of their greater knowledge and experienced. In NPT, there is a potential to vest authority in the senior individual over the junior due to the higher level of knowledge. The senior student is of higher rank in terms of knowledge and experience. NPT can inadvertently assign authority to the senior peer during the interaction, with the junior peer being a passive participant. Contrarily, in the current study, peers were able to empathise with each other, offering mutual support to learn. Boud (2013) argued that the issue of domination in RPT is diminished due to the mutual nature of learning. This is not the case in NPT because there is distinct allocation of control granted to the academically senior individual who teaches the junior. The current study adds new knowledge by discovering that RPT eliminates the power play by removing the power allocation based upon academic experience.

In the current study, there was largely no power play between peer learners and teachers, as they came with similar knowledge levels and were both equal in academic level. It also revealed that individual personalities could overpower the other peer, regardless of age and experience. Participants expressed being able to learn together through mutual support. They felt safe to commit mistakes, as both could empathise with the other, each recognising teaching to be a complex and demanding skill. McAllister (2011) highlighted the necessity of allowing students to make errors and learn from them. Williams and Reddy (2016) conducted a scoping review to scrutinise 22 studies using PAL; they identified that student teachers benefited more than student learners. However, in the current study, the same-level participants did not perceive power dynamics. The mutual nature of learning was empowering. They were open to learning together rather than one peer being assigned the role of peer teacher, as in NPT. Despite the assigned roles, the peer teacher continued to learn from the peer learner. In RPT, both peers received simultaneous experiences in teaching and learning from each other. There is shared

accountability for meeting learning goals for both parties, leading to motivation and ownership of learning.

Some undergraduate nursing programs (McKenna & French, 2011; Owen & Ward-Smith, 2014) and other healthcare curricula such as medicine and paramedicine (Ramani et al., 2016; Williams et al., 2015a) report using NPT to prepare graduates for undertaking teaching roles by instructing a junior peer. While there are numerous reported benefits of students engaging in NPT, including practical applicability in their graduate period (McKenna et al., 2018), there are some tensions between individuals involved in NPT. Bester, Muller, Munge, Morse and Meyers (2017) highlighted the potential complex power interplay between the near-peer teacher and learner to be one of the drawbacks of this form of learning. They argued that although learning with a peer can be more relaxing than learning from an academic, it could also make the learners feel inhibited in their learning. Contrarily, findings from the current study found that being from the same year level gave an equal power status to both peers in RPT. They did not feel subdued, intimidated or inhibited in any way. The responsibility to teach a peer inspired most participants to make every effort to do their best to teach correct information. This also made them accountable for their own learning experiences as well as that of their peers. Further, designing NPT within the curriculum is resource-intensive in terms of planning and organising two-year level cohorts to come together (Boud, 2013). There are abundant benefits for the near-peer teachers but not as many immediate reciprocal gains for their learners. The current study differed from this and enabled RPT to be relatively easier, as peers were from same year level and thereby shared the same timetable. It also revealed the immediate reciprocal gains for both peers involved in RPT. Undoubtedly, NPT is an effective way of learning, but RPT offers yet another form of peer learning.

Despite being assigned the roles of teacher and learner, the pairs worked together to meet their session objectives. They collectively devised learning and teaching strategies to ensure optimal gain for both the peers involved in RPT. Instead of emulating the clinical skill, they discussed why things had to be done in a certain manner. This indicated a deeper engagement with the content. Results from both datasets in this study concur with each other, as demonstrated by the rise in knowledge scores for all participants indicating retention of the content. This concurs with Manyama et al. (2016), who found that RPT enhanced medical students' enthusiasm and engagement. Kantar (2014) argued that implementing learning-centred approaches stimulates higher-order thinking skills,

resulting in deeper engagement with learning. Thus, the current study adds new knowledge by uncovering gains in nursing students similar to those identified in other health professional students.

Apart from teaching skills, the current study revealed unplanned learning opportunities that helped participants grow professionally and personally. In a qualitative study using separate focus groups with near-peer teachers and learners, McKenna and Williams (2017) concluded that NPT offers unique unintended learning opportunities. The same was found in the current study, in which participants' encountered unintended learning opportunities such as working together, independent learning and learning to teach. During the process of teaching, students work independently and collaboratively, using their higher-order thinking skills to understand and then to teach the concept to a peer. This concurs that PAL forms provide learning opportunities separately from teaching skills. However, it specifically highlights the suitability of RPT in nursing education to prepare students for practice, since nurses generally work with similarly experienced peers and may not always find a senior person to seek solutions.

In the current study, participants did not find attending the RPT sessions to be cumbersome, as the sessions were timetabled during their regular CSL sessions. Further, they shared similar clinical placements and were able to extend the skills acquired through RPT from the CSL into the clinical environment. Although not part of this study's intervention, it gave them an extension of the experience in a different setting, since they shared a similar timetable. In an integrative literature review of NPT in undergraduate nursing education, Irvine et al. (2018) identified timetabling cross-year students as one of the challenges faced by nursing educators implementing NPT. Students from different years differ in their curriculum requirements, leading to changing emphases on the content to be undertaken. While the junior group may have simpler content and intended learning outcomes, these are more complex in the senior year level. For example, final-year nursing students could have more clinical placements than their first-year peers, who could be just embarking on the clinical requirements. Conversely, junior students may require more foundational theory classes than their senior counterparts would, thereby leading to differences in timetabling. However, RPT involves same year level peers, making it relatively easy to organise sessions with fewer timetabling issues (Boud, 2013; Tai, Molloy, Haines & Canny, 2016).

In the current study, peer tutors acknowledged the efficacy of teaching preparatory material that was provided to them. This material was developed and peer reviewed by the student researcher. All peer tutors had a copy of the standardised lesson plan made available to them during the RPT session. This ensured support and guidance to enable teaching of current content in a simplified manner, which generated worthwhile discussions among the RPT pair. This highlights the importance of the preparation of peer tutors. Contrarily, Kalsi (2018) argued that peer tutors in NPT can pose a risk of thwarting the inquisitive and academic minds of their learners by oversimplifying concepts. In an editorial letter, as an experienced near-peer tutor himself, Kalsi warned of the onerous nature of preparing teaching material for peer tutors. Further, the author highlighted the risk of providing dated information that could be hastily put together to save time. In a study using NPT to learn clinical skills in nursing students, Brannagan et al. (2013) argued that preparing peer tutors is of prime importance to enable a beneficial learning experience. In the current study, although peer tutors were not prepared in the first week, the peer tutors from the second week came prepared.

In the current study, RPT was trialled as a replacement for traditional teaching. Participants were able to relate to each other from similar levels of academic and clinical placement undertakings, as well as a lack of formal teaching experience. They felt inadequate and challenged to teach a new clinical skill to their peer, leading to mutual learning through feedback and self-monitoring (Topping & Ehly, 2001). Further, they also found comfort in teaching a skill to someone who had a similar level of experience in teaching. They felt comfortable in revealing their shortcomings to their peer. This comfort level was enhanced due to the reciprocal nature of teaching and learning, making them support each other. Each individual immediately sharpened their teaching skills due to swapping teacher and learner roles. This finding was contrary to Tai et al. (2014), who contended that PAL did not aid in providing peer feedback and could evoke unhealthy competition among peers and endanger collegial relations. Conversely, in the current study, participants—in both datasets—expressed a growth in confidence in providing peer feedback in RPT interactions. They also found the theory on teaching principles to be helpful in aiding their teaching. Cushing, Abbott, Lothian, Hall and Westwood (2011) argued that acquainting students with principles of feedback provision can improve peer feedback. The current study also identified camaraderie with their peers as resulting from RPT interactions. This was similar to the findings of an interpretative analysis study of

medical students from Manchester by Tamachi, Giles, Dornan and Hill (2018), which asserted that participants felt socially supported through PAL. These authors individually interviewed eight medical peers, who perceived their interactions to be safe and unrestricted due to the strong sense of camaraderie. Although the peers in their study were a mix of third and fourth years, the findings are congruent with the current RPT study.

In summary, despite the challenges outlined relating to NPT, literature confirms it to be an effective PAL form in a variety of learning settings, including undergraduate nursing (McKenna & French, 2011; Owen & Ward-Smith, 2014). This section highlights the advantages that a comparable peer learning strategy like RPT could offer over NPT, although there have been no real comparative studies to objectively compare these PAL forms. However, there are comparable studies in utilising students to teach students and research that indicates that NPT has numerous proven benefits. RPT is yet another effective way of student learning and is unique, as it involves individuals from the same year level and has potential career benefits (as discussed in Section 7.3).

6.3 Suitability for the profession

Results from the current study acknowledged the nature of nursing involving diverse sets of people working together to deliver quality patient care. Participants drew parallels between RPT and the nursing profession in the form of challenges faced working independently and collaboratively, demanding adaptability to work with variety of individuals, who were sometimes unfamiliar with each other. Situations in clinical settings and work colleagues do not remain the same in nursing. Participants connected this state of ongoing change with the performance of new clinical skills using RPT. Despite being unfamiliar with each other, the pairs worked collaboratively to meet their learning objectives and developed collegial relationships by the end of RPT. Nurses operate in a range of healthcare settings, working with a variety of skill sets. Changing work environments the constant demands of evolving healthcare trends require nurses to adapt rapidly (Hughes, Stewart & Davies, 2017). While acute care facilities may be well equipped with access to specialists and resources, this may not be the case in community health settings. With growing global awareness of disease prevention, nurses are involved in a spectrum of care provision (Freund et al., 2015). This demands that nurse educators prepare students with skills beyond acute care settings. Readiness to adapt and execute diverse tasks and work alongside diverse individuals are necessary skills for nurses.

Results of the current study demonstrate that random allocation of pairs for RPT was not initially received favourably, due to the requirement of working with an unknown peer. After successfully establishing working relationships with their allocated peers, participants were able to apply similar collegial approaches to their clinical placements. Working with unfamiliar individuals was also identified by participants as an inherent requirement in nursing. Topping and Ehly (2001), in their PAL framework, contended that while peer interactions challenge the cognitive element, the affective component is also positively influenced, resulting in trusting relationships between the individuals. This aids in mutual acceptance of shortcomings by recognising and rectifying inadequacies. Further, peers positively influence each other's enthusiasm and motivation, thereby enhancing self-confidence. The current study concurred with this theory.

Findings from the current study identified benefits of the transferrable skills gained as a result of RPT, which extended into their clinical placement. RPT developed transferrable skills such as autonomous and cooperative working. Nursing faces numerous challenges, as nurses are inclined to leave the profession due to a lack of support from managers and colleagues in clinical settings (Tuckett, Winters-Chang, Bogossian & Wood, 2015). Reasons for nursing shortages are multifaceted, escalating as a local and global crisis that threatens the stability of healthcare environments worldwide (Marć, Bartosiewicz, Burzyńska, Chmiel & Januszewicz, 2018). Apart from these challenges, graduate nurses are reportedly dissatisfied in obtaining support during their role transition. This makes them vulnerable to leaving the profession (Phillips, Esterman & Kenny, 2015). Other challenges are higher workloads, staff shortages (Boamah, Read & Spence Laschinger, 2017), unreasonable demands from healthcare organisations, not being work-ready, social isolation (Walker, Costa, Foster & de Bruin, 2017), and limited support and skill mix (Lea & Cruickshank, 2015). These challenges require nurses to possess skills that are beyond their discipline. The current study found that RPT fosters transferrable skills that could potentially help develop a resilient future workforce. It is essential that educators recognise the issues prevailing in practice to educate nursing students about future professional challenges. However, longitudinal research is required to understand how RPT could support the transition of nursing students into the workforce. In a quasi-experimental study by Pålsson, Engström et al. (2017), 10 newly graduated nurses were allocated into pairs to share similar clinical shifts. They were jointly responsible for a group of patients over three weeks. Additionally, they also regularly reflected as a pair for

three months. This arrangement of working and reflecting together was termed a peer learning intervention. Using semi-structured interviews and surveys, the authors found that the graduate nurses could work together to critically reflect and communicate. Moreover, they were also able to manage their learning with self and peer assessment. Thus, newly graduated nurses discovered benefits in learning from and with each other, underscoring the benefits and applicability of RPT principles. However, this requires further investigation.

The current study also found enhanced confidence and competence to teach. Nonetheless, participants also conceded the complex nature of teaching. However, commencing RPT with little to no self-confidence and yet being able to undertake informal teaching during clinical placements was commendable. In a mixed methods study using RPT with 30 English language teaching students at a United Kingdom university, data were collected using focus groups and a questionnaire to measure teaching confidence (Kneen & Pattison, 2012). Two student groups alternate teaching each other in the form of drama workshops. Findings indicated enhanced confidence levels, enhanced self-efficacy and collaboration. Students found RPT to be helpful in applying the theory to practice. These authors suggested prior training of peer teachers to be beneficial for smoother experiences. Although this study was non-health-related and conducted with small groups rather than one-on-one, their findings are similar to the findings of the current study. Working collectively with self-confidence and efficiency are all necessary traits for nurses, making RPT suitable for nursing profession.

The current study was conducted in a regional Australian university. Participants identified unique demands placed on nurses working in regional/rural healthcare settings in Australia that they had observed in their clinical placements. They identified RPT to be relevant in such situations, with scarcity of experienced staff and availability of peers with similar levels of experience. Given this study was an isolated intervention, further research is warranted to compare regional and metropolitan student cohorts. The challenges facing nurses in non-metropolitan Australian healthcare settings are unique, as there are fewer qualified nursing personnel and lower nurse–patient ratios than in metropolitan areas (Bennett, Brown, Barlow & Jones, 2010; Lea & Cruickshank, 2017). Lea and Cruickshank (2017) argued that one of these challenges includes employer expectations that graduate nurses practise independently using their problem-solving skills to take on administrative and leadership roles. These authors further highlighted that

although being unprepared for undertaking such tasks, with minimal experience, new graduates are required to undertake workload responsibilities earlier in their graduate year, with limited supervision or direction from experienced staff. This leaves inexperienced new graduates with only each other or even just themselves. The current study identified that, in the healthcare settings, peers with similar levels of training and experience do not always have immediate access to experienced professionals. In such instances, they found RPT a useful way to learn. This study also identified that in the workplace, nurses teach peers (Irvine, Williams & McKenna, 2018), as experienced staff may not always be accessible. Hence, RPT has relevance beyond classroom learning; this is echoed in the findings of Pålsson, Engström et al. (2017). Overall, RPT was identified as suitable to the real world of nursing due to the assorted challenges faced collaboratively by individuals with similar experience and qualification.

6.4 Learning outcomes

There were distinct gains noted in this study as a result of RPT. The current study found that RPT had a greater effect on knowledge than it did on attitudes. Participants realised the benefits of RPT more so after undertaking their clinical placements. While some benefits were immediate, others were realised later.

6.4.1 Knowledge

Intravenous cannulation and tracheostomy suctioning were the two chosen clinical skills for RPT. Participants verbalised being somewhat more familiar with the former clinical skill than the latter due to undertaking the venepuncture skill in the second year of their nursing program. Blohm et al. (2015) found intravenous cannulation to be one of the most commonly taught clinical skills using PAL. They surveyed 36 German medical faculties to document the clinical skills being taught using structured PAL. Intravenous cannulation and venepuncture were two of the common skills taught using PAL concepts. Although Blohm's study involved scrutinising international non-nursing students, it highlights that intravenous cannulation is a clinical skill suitable for being taught using peer learning and warrants further research into its applicability in the undergraduate nursing curriculum context.

To understand the RPT experience in terms of knowledge retention, comparisons of both skill knowledge scores revealed differences. Tracheostomy suctioning was the clinical

skill taught in the first week of RPT, while intravenous cannulation was taught in the second week. Despite being unfamiliar with tracheostomy suctioning, peer tutors surpassed the learners in week one as compared to the second-week peer tutors. When comparing knowledge scores with the roles, there was gain for all, but more so for the peer teachers than for the learners. This finding showed that despite being unfamiliar and more challenged in the first week, peer tutors gained higher scores than the learners did. The act of teaching enabled peer teachers to retain taught content more than the peer learners did. There was also an increase in self-reported confidence and competence to teach. Focus group findings revealed retention of the skills at a later period, which is suggestive of skill retention. This resonates with the findings of Fiorella and Mayer (2014) that being prepared to teach, coupled with the act of teaching, enables long-lasting learning. These authors argued that one of the ways to learn something new is to teach it to somebody. They studied undergraduate psychology students and compared preparing to teach with actual teaching to determine the effect on learning. Their findings indicated that although preparing to teach someone could result in short-term learning for the teacher, actually teaching someone resulted in long-term comprehension and retention of content. In the present study, teaching a skill to a peer resulted in participants becoming engaged with the content at a greater depth. However, this needs to be investigated further using a longitudinal study.

In this study, students who had little teaching experience were challenged to teach each other unfamiliar clinical skills. With mutual support, they were able to successfully teach the clinical skills to each other. They identified challenges and devised strategies to overcome them. Having to work together created some tensions but these were overcome using a collaborative approach. Thus, the current study supports use of RPT as a learning tool, with benefits for both the peer teacher and learner.

Williams and Reddy (2016) found that although PAL forms could improve student performance, they did not improve learning outcomes. They warned about a lack of deeper understanding of PAL and contended that peer learning strategies do not benefit peer learners, as compared to their peer tutors. Contrary to their findings, the current study revealed statistically significant increases in knowledge scores after using RPT intervention. There was improvement in knowledge scores for both peer learners and tutors. However, when comparing the roles with knowledge scores, there was more gain for peer teachers than there was for learners. Once again, this suggests a need for a

longitudinal study to investigate this further. In the current study, participants identified RPT to extend beyond robotic emulation of clinical skill. They deeply engaged with the content learnt using the active discussions between participants, thereby demonstrating active and deeper engagement with the content. Thus, the learning went beyond the saying 'to teach is to learn twice' (Topping, 1996, p. 324). In a narrative review of peer-assisted learning, which included NPT and RPT within medical schools, Benè and Bergus (2014) argued that by teaching, peer teachers enjoy deeper engagement with the content through a range of self-modulated skills such as self-monitoring of comprehension, integrating new knowledge with previous learnings and organising content in a manner to simplify the teaching of concepts. Vygotsky (1978) argued that by challenging zones of proximal development, learners learn above their level of development with the assistance of others. Although Vygotsky argued the individuals referred as others, to be more capable peers, in the current study these comprised same-year-level peers. Peer tutors gain cognitively by developing monitoring skills to observe peer learners' performance by detecting errors and offering appropriate feedback. Since RPT involves both individuals becoming peer tutors, cognitive elements of both participants are challenged to scaffold each other's learning. This suggests RPT is a beneficial tool in learning clinical skills for nursing students.

Some focus group participants of the current study claimed to have not retained the clinical skill despite teaching it. By being unprepared in the first week of RPT, they faced more challenges than peer teachers did in the second week. Interestingly, the quantitative data negated that peer teachers in the first week of RPT did not retain the skill theory. However, this study also revealed that peer teachers in the first week of RPT outperformed their peers in their knowledge of the skill they taught. Despite being unprepared, they were able to demonstrate knowledge gain, thus highlighting their engagement with, and comprehension of, the taught content. This could also indicate that the challenge of being unprepared caused positive stress in developing the potential, which may remain undiscovered otherwise. It is equally important to note that the stress experienced by peer teachers was not left unsupported; comfort was found in the peer learner. Given the reciprocity of teaching, both peers supported each other. Thus, the stress faced by the peer teacher was transformed into a positive outcome. Brannagan et al. (2013) explored anxiety in peer learners using NPT for teaching clinical skills to undergraduate nursing students. In this US study, 179 first-year students and 51 third-year

students were assigned to control and intervention groups. Within the control groups, first-year students were taught by academic staff, while members of the intervention group received additional third-year peer instruction to teach surgical wound care. They found that the intervention group did not have reduced anxiety compared to when being taught by an academic, although this is contrary to the findings of Bester et al. (2017). However, it is vital to note that Brannagan et al. (2013) did not separate the NPT from academic instruction. It is unclear in their article, if both near-peer tutors and academics taught the first-year students or whether it was purely NPT. Being taught by a near peer as well as an academic could increase anxiety levels for peer learners. Therefore, this study could not be compared with the current study. Moreover, the current study used RPT exclusively, with academic staff as passive observers.

Participants from this study reported not feeling apprehensive about the teaching requirement before commencing RPT. In fact, they reported feeling comfortable teaching their peer. The experience was perceived as enjoyable and beneficial. They found safety in working with each other, and viewed RPT as a safe and supportive way to learn. This finding concurred with Miravet et al. (2014), who found a similar solidarity in Spanish teacher trainees using RPT. Wolf, Stidham and Ross (2015) argued that social support was a positive strategy to cope with stress. Using a mixed methods study to identify stressors and coping strategies, they studied 210 third- and fourth-year undergraduate nursing students from the US. Emotional support gained from peers was found to help these participants manage their stress levels. Thus, there is merit in creating learning environments that nurture peer interaction. In the given study, being from the same year level, with similar academic demands and no formal teaching experience, participants were able to support each other to manage the stress of teaching. Flinn et al. (2016) suggested that stress could range from challenge to threat. They used an experimental design with 40 medical students from various year levels to study the effect of stress on trainee interaction while learning laparoscopic surgical skills. Participants were randomly allocated to four groups: control, observed, encouraged and criticised. Although this study reported compliance with internal ethical requirements and informed consent principles, the criticised group was subject to harsh and condescending critique, which appears to be detrimental to the learners, particularly since the actor playing the expert surgeon was not formally introduced to the groups until after gathering baseline data. While the control group completed the prescribed procedure, the remaining three groups received feedback

from the expert. All participants viewed a two-minute video and practised for five minutes, after which they began the procedure. They were simply observed by the expert in the observed group, while they were either supported or criticised by the expert in the encouraged and criticised groups. The stress was measured in the form of salivary cortisol, blood pressure, heart rate monitoring and self-reported stress levels. The researchers found that all participants experienced initial anxiety due to learning a new task, which subsided for all groups except the criticised group. This study shows that receiving support while learning a new skill reduces stress levels and supports learning. While this study suggests that performing before an expert can evoke anxiety, it raises some ethical concerns and did not provide participants with adequate preparation time and resources before commencing the procedure. Hence, results of this study may not be reliable, as stress can increase with limited preparation (Wolf, Stidham &Ross, 2015). Nonetheless, it also suggests the merits that having an empathetic supportive peer can have in reducing anxiety. The current study concurs with this final finding of Flinn et al. (2016) that empathetic peer support fosters learning.

6.4.2 Attitudes

An open attitude to learn can aid learning. The current study found that regardless of age differences, inconsistencies in openness to learn together could undermine the experience. Participants who were paired with a peer who was not committed to mutual learning did not find the experience worthwhile. In such situations, the participant resorted to independent learning to meet learning objectives. McKenna et al. (2018) argued that positive attitudes of peer teachers towards teaching causes an inspirational boost and propels peer teachers to continue engaging with peer learners. However, learning to work with any peer is an essential learning curve for evolving as a nursing professional, as was identified in the current study. Nurses must work with a variety of random and diverse healthcare members. This suggests a need to make students more aware of all aspects before commencing a new teaching–learning approach. There was no statistically significant changes found in the item 'teaching is an important role for nurses', used in SRA, PTEQ and CTPQ tools. This indicated that although RPT did not influence participant rating for this item, they consistently considered teaching to be an essential requirement for all nurses. This study also revealed that peers who had never experienced learning from a peer did not achieve high scores in their attitudes to peer teaching.

However, this could indicate that they require more time to engage with this form of learning. Conversely, those who had experienced teaching a peer before had higher attitude scores to peer teaching. However, since no follow-up studies were done with this cohort to observe the effect of RPT in repeated sessions, further investigation is warranted.

Little is known about using RPT in nursing CSL environments. This study indicated it to be potentially a good learning strategy for undergraduate nursing students to learn clinical skills. The current study revealed increased understanding of the content and improved communication skills, which were helpful for future professionals. In yet another successful execution of RPT with medical students in an anatomy laboratory, Krych et al. (2005) organised for students to be given interactive lectures by academic staff on the anatomy dissection for the day. Small student groups were selected to practise dissection with academic staff before demonstrating the dissection to their fellow peers with a total of 33 RPT exercises. Ten per cent of students practised with the academic staff until they felt confident to teach their peers through a set of peer demonstrations. Despite being a non-nursing study, there is congruence in undergraduate medical and nursing education, due to the emphasis on laboratory learning. Hence, medical students' laboratory learning can be applicable to the development of tactile skills in nursing students. Although the current study did not involve offering practice sessions for peer tutors with staff members, this could be considered in future for using RPT, especially in complex clinical skills.

The current study revealed an increase in the students' confidence to provide honest and helpful feedback to peers, including negative aspects of performance. Participants felt comfortable with each other to be able to give authentic feedback. Tai et al. (2016) undertook a narrative review of 43 medical clinical placement studies to determine the effect of same-year-level peer learning on medical students. Their findings were similar to the current study—RPT developed the confidence to provide peer feedback. They also highlighted that immediacy of peer feedback brings greater benefits than the usually delayed feedback from academics.

6.4.3 Experience

The current study found that peer learners in the first week of RPT carefully observed their peers' teaching. On observing the peer tutors caught unaware in the first week, the peer learners learnt their lesson and were better prepared when they taught in the second

week. Subsequently, this resulted in both peer teachers and learners having better experiences in learning the content in the second week. Meanwhile, as discussed previously, being unprepared for teaching led to lack of self-confidence in the peer teacher. Unpreparedness can cause reluctance in peers to teach (Brannagan et al., 2013; McKenna & French, 2011). McKenna and French (2011) emphasised the necessity to equip peer teachers with the skills and knowledge required for teaching. In the current study, negative effects of the peer teachers' lack of preparation in the first week of RPT extended to their peer learners. Watching their disorganised peer teacher adversely affected the peer learner, who discerned that the peer teacher did not care about the learner's knowledge gains. There was an expectation that the peer teacher be accountable for their allocated peer's learning and a slackness in this responsibility was not viewed favourably by the learner. Rutt (2017) produced similar findings. The usual method of teaching clinical skills was replaced with a blended e-learning approach. In this study, the usual face-to-face method was augmented with online resources to teach clinical skills in the undergraduate nursing curriculum. Rutt concluded that despite making academics and students aware of the new approach, further preparation for both is essential when embracing change. This highlights the importance of better preparation of all students before commencing any new teaching approach.

Participants from this study rated their overall peer teaching experience to be positive, recognising it as helpful for their graduate role. They felt the experience was personally rewarding. Through the RPT experience, they developed skills for teaching basic clinical tasks and were able to understand teaching and learning principles. Thus, their overall experience was positive and they found working with peers to be beneficial. Meanwhile, with the clinical teaching preference, they scored higher for peer teaching preference, thereby displaying a liking for RPT. Scores for learning from an academic remained steadily much higher than peer teaching preference, indicating they did not change their preferences about learning from academics. Thus, academics cannot be totally removed from their learning experience. Although passive during RPT, the role of academics was important during the planning phase and they could not be completely removed from the experience. This finding concurred with Hallin (2014), who determined that nursing students preferred to work with their peers. However, they did not want to remove their academic instructor from their learning experience. This highlights the crucial role of nurse educators in planning and facilitating the learning process of collaborative learning.

In a cross-sectional non-experimental descriptive study in a higher education setting using discussion groups, Miravet et al. (2014) found that by reversing teaching roles, 39 primary teacher trainees were able to empathise with each other resulting in solidarity between the peer tutors and learners. This was similar to the findings of the current study in which participants supported each other to learn together, acknowledging that teaching was a complex and new task for them.

6.4.4 Lifelong skills

Albert Einstein believed that 'The value of education … is not the learning of many facts, but the training of the mind to think …' as quoted in (Calaprice, 2011, p.100). Obtaining an undergraduate degree in nursing will not be the end of learning for this study's participants. Instead, they will be expected to continually learn and update their knowledge by using various lifelong learning skills. In the present study, peers were able to work together to learn, by trial and error in a supportive environment, rather than by following a perfect example. They were able to manage their zones of proximal development (Topping & Ehly, 2001) by detecting errors and correcting them. In doing so, they were able to engage with the content. This concurs with Stigmar (2016), who performed a critical literature review of 30 published international studies using both NPT and RPT. The review identified that peer teaching fosters generic skills such as self-efficacy, reflection and organisational skills. This new finding about RPT in the nursing context has merits in considering it as a teaching strategy in undergraduate nursing education and requires further longitudinal investigation.

The current study identified the acquisition of transferrable skills, such as self-confidence, independence, collaborative learning and perseverance, as integral to lifelong learning. These are some of the essential skills for sustaining the registered nurse. Factors such as diverse healthcare clients, dynamic health environment and a shortage of experienced nurses have increased industry expectations of nursing graduates to possess transferrable skills rather than discipline-specific knowledge (Cabellero & Walker, 2010; Kenny, Nankervis, Kidd & Connell, 2012; Woods et al., 2015). McAllister (2011) argued that transferrable skills, such as communicating and working along with diverse individuals, are not inherent qualities but need to be nurtured by nursing educators, by providing students with a safe environment in which to learn. The current study identified RPT interactions as nurturing to learning.

In the current study, resilience and adaptability were skills acquired by participants through RPT through their determination to persevere with the process. These gains countered the lack of preparedness and formal teaching experience. McEwen, Gray and Nasca (2015) defined resilience as acquiring a positive outcome despite adversities. The current study also uncovered communication as one of the gains achieved through RPT. Topping (2005) argued that peer interaction involves more than a single individual and thereby stimulates communication skills. Effective communication in teaching demands simplifying concepts by explaining them to the learner and crystallising it into language. Participants had to use non-verbal language through visual cues and oral communication to explain the concepts to peers. This concurs with the PAL theory proposed by Topping and Ehly (2001) that the listening, explaining, querying, summarising and speculating learnt during peer interaction are all transferrable skills that can be applied to other situations by the peer participants. The current study concurred with Topping's (2005) PAL theory in terms of how learning occurred.

6.5 RPT is new to nursing education

The researcher aimed to understand the effect of RPT on undergraduate nursing students' learning. While the PAL form of NPT has been widely used in nursing education, not much is known about RPT use in nursing education. RPT has been tested in various health education programs such as physiotherapy and medicine (Hennings et al., 2010; Manyama et al., 2016). Despite numerous benefits (Asghar, 2010; Bentley & Hill, 2009; Iserbyt et al., 2010; Lueg et al., 2015; Youdas et al., 2007), as outlined in the ensuing discussion, RPT is underutilised to date in higher education programs, especially in non-metropolitan learning environments (Lin et al., 2016). Further, there is limited contemporary research in nursing education (Gazula et al., 2017). Thus, the current study has added new knowledge by providing a contemporary context of RPT in nursing education. It also concurred with PAL theory (Topping & Ehly, 2001) about RPT positively affecting the five group processes to influence effectiveness. These groups are organisation and engagement, cognitive conflict, scaffolding and error management, communication and affect. These processes synergistically worked to enable surface learning to become deep learning. Thus, yet another new knowledge arising from this study is that PAL theory, which has been commonly used for NPT, is also effective for RPT in the context of nursing education.

Findings of the current study reveal that RPT was instrumental in enabling participants to work independently and collaboratively. Despite facing unfavourable circumstances such as unpreparedness or unengaged peers, participants were able to overcome the adversities to meet their learning objectives. Encountering unplanned circumstances resembles the unpredictable nature of what nurses witness in their daily lives. This renders all these qualities essential to professional nurses. In one Australian study, Missen (2016) surveyed 245 qualified registered nurses to seek their perceptions of newly graduated nurses' abilities. Her research findings showed perceptions of paucity of skills such as independent working, problem-solving and critical thinking among new graduate nurses. Some have argued that there are insufficient opportunities to nurture these skills in the undergraduate nursing curriculum (Rebeiro, Evans, Edward & Chapman, 2017). Thus, using RPT for learning was found to create opportunities to develop transferable skills that are reportedly poorly represented in nursing graduates (Missen, McKenna, Beauchamp & Larkins, 2016). Considering the benefits of RPT, there is merit in embedding it as a learning strategy in undergraduate nursing curricula. While the current study offers new knowledge about using RPT in CSL, it could be applicable in other areas. This requires further investigation.

It is vital to note that although the original Peyton's four-stage approach to teaching clinical skills is a proven approach in medical education (Bugaj & Nikendei, 2016; Münster, Stosch, Hindrichs, Franklin & Matthes, 2016), the current study used it in a modified form by replacing the instructor and candidate with third-year nursing peers. Each peer was given equal opportunities to perform the clinical skill and the sequence of the initial two stages was swapped. Thus, this made the modified approach different to the original model and context, thereby demanding further investigation. The modified four-stage approach to teaching clinical skills (Bullock et al., 2016) was found to be beneficial by both peer tutors and learners in the current study. Similarly, a staged approach to teaching was also found to be beneficial (Bullock et al., 2016). A well-structured approach to teaching is imperative to maintaining high quality and is ultimately a successful teaching–learning interaction in peer learning approaches (Herrmann-Werner et al., 2017). A methodological approach enabled systematic planning for learning (Bullock et al., 2016). In 'set', students were prepared for learning by providing the online preparatory resources. Next, 'dialogue' included the actual RPT session, which commenced with an academic staff member displaying unfamiliar articles used for the

specific clinical skill to ensure safe sharps handling before commencing RPT. To facilitate this stage, a standardised lesson plan with preliminary theory questions and answers were provided to the peer tutors. Finally, the stage of 'closure' involved a planned termination of the RPT session by prompting the peer tutor to summarise the learning session through the lesson plan. Students liked the structure in their learning and it also enabled all students to have overall standardised sessions. Additionally, the modified four-stage approach to teaching clinical skills (Bullock et al., 2016) provided each participant with an equal opportunity to master the clinical skill. Each participant had two opportunities to view their peer perform the task and two chances to practise the clinical skill. Although prevalent in medical education, this approach has been found to scaffold learning of clinical skills (Bugaj & Nikendei, 2016; Münster, Stosch, Hindrichs, Franklin & Matthes, 2016). A narrative literature review of six medical studies was performed by Bugaj and Nikendei (2016) to explore CSL training in medicine. They found that the four-stage approach fostered professionalism and communication. Further, they argued that CSL learning must not be exclusively academic-led; incorporating PAL strategies can aid long-term benefits. Although this involved medical students using NPT, the current study has concurred that using RPT to learn clinical skills also yields long-term benefits for the nursing peers.

Reported benefits of RPT for non-nursing students were improved understanding and retention of content (Bentley & Hill, 2009), better skill retention (Iserbyt et al., 2010), improved communication (Youdas et al., 2007), deep learning (Lueg et al., 2015) and greater self-direction in meeting learning objectives (Asghar, 2010). Although these benefits were found in non-nursing health education programs, findings of the current study concur with such gains for undergraduate nursing students. This is an important finding that has not been previously described in nursing. Further, the current study found that RPT had a range of student benefits that extended beyond the CSL, simultaneously benefiting both peer teachers and learners. Waltz, Jenkins and Han (2014) argued that there is a need to conduct robust research to support the usefulness of active learning approaches in nursing and other health professions. This further underscores the need for future probing with this approach in nursing.

6.5.1 Countering challenges within nursing education

Globally, nursing roles are expanding in terms of expectations due to ever-evolving healthcare systems. Therefore, it is essential to tailor the nursing curricula to equip nurses to work in dynamic work environments. Miller and Cooper (2016) performed a scoping review of undergraduate nursing programs offered in the United Kingdom, South Africa, New Zealand and Australia to explore the prescribed clinical hours for undergraduate nursing degrees. They identified that Australian nursing graduates were not adequately prepared to meet ever-demanding challenges within the workforce. In light of the challenges posed by the scarcity of qualified nursing educators (McAllister, 2011) and concerns about the inadequacy of clinical training in Australia (Miller & Cooper, 2016), CSL have a wide-ranging scope to offer learning opportunities (Haraldseid et al., 2015). Nurse educators need to creatively use CSL to offer not only technology, but also human interactions among peers to scaffold learning. Christiansen, Jacob and Twigg (2018) argued that undergraduate nursing education needs to urgently consider graduates who will be able to work autonomously and collaboratively in diverse healthcare settings, partnering with well-informed consumers and healthcare teams. Nursing educators need to creatively explore incorporating teaching–learning approaches that will encourage students to reconsider their potential. The current study utilised a non-traditional approach to teaching clinical skills and discovered numerous benefits in terms of transferrable skills that could be applied to clinical situations. Thus, it strongly supported the notion that RPT is a creative approach in CSL learning.

6.5.2 RPT potential in nursing education

Nursing is a practical profession involving working with other individuals. It is important to provide opportunities in the curriculum for collaborative work. The NMBA provides final approval of all educational programs that lead to professional registration as a nurse or midwife within Australia. The NMBA sets the minimum standards and expectations of registered nurses in Australia. Every practising nurse within Australia is required to achieve the practice standards mandated by the NMBA, including all graduating nursing students. As part of the NMBA standards of practice, nurses are expected to use their instructional skills to educating themselves, peers and patients (NMBA, 2016), highlighting teaching as a core requirement of all registered nurses. Despite this, only a small amount of contemporary literature has focused on the teaching roles of nurses.

Apart from NPT research, few studies have explored other ways to nurture this skill in undergraduate students. Hence, this study adds important knowledge to the literature base.

The current study has demonstrated that RPT improved knowledge, retention and engagement with the content. This concurs with findings of other health professional educational programs (Bentley & Hill, 2009; Manyama et al., 2016; Youdas et al., 2007). While other forms of PAL, such as NPT, have been trialled and efficaciously incorporated into nursing education (McKenna & French, 2011; McKenna et al., 2018), there is insufficient contemporary literature relating to the use of RPT in nursing education. The current study has thereby enabled a greater understanding of the experiences and effects of RPT on the learning of undergraduate nursing students.

Findings from the current study also indicated statistically significant improvement in participants' understanding of the principles of teaching and learning after experiencing RPT. This was supported by the qualitative findings, in which the strategies used by participants were aligned with the principles of teaching–learning (McKenna & Stockhausen, 2013). This suggests that embedding teaching principles explicitly in the syllabus has merits, as was observed in the current study. This concurs with the suggestions of McKenna and French (2011). The current study produced contradictory findings in participants rated highly for their ability to teach basic clinical skills to their peers after engaging with RPT and poorly for their teaching ability. Although starting as novice teachers with minimal exposure to teaching foundations, being able to comprehend teaching–learning principles and teach basic clinical skills after applying RPT was an achievement. Conversely, conceding the complexities of teaching, they rated themselves low for teaching ability, thus demanding more opportunities for peer teaching in the curriculum. With the prospect of being able to learn from and teach peers at the same time, RPT provides immediate unique opportunities for the professional growth of all participants, making RPT different from all other forms of PAL (Boud, 2013). This could be considered an initial stepping stone to further teaching capabilities if nurse educators in higher education and clinical settings can continue to offer opportunities and support.

Both formal and informal teaching are integral parts of nursing (McKenna et al., 2018). Nurses are expected to educate patients (Beta, 2013), thereby empowering them

(Crawford, Roger & Candlin, 2017). In recently released standards for proficiency for registered nurses in the United Kingdom, all registered nurses are expected to supervise nursing students and engage in patient health promotion; teaching is explicitly highlighted as a core activity (Nursing and Midwifery Council, 2018). Although teaching is a core requirement for Australian registered nurses, it is implied, rather than being explicitly stated, by the expectations set out within the standards of practice (NMBAustralia, 2016). Researchers have argued that undergraduate nursing students are not sufficiently prepared for practice by the end of their education program (Missen et al., 2016; Walker, Earl, Costa & Cuddihy, 2013). McKenna et al. (2018) contended that graduate nurses are expected to possess teaching skills. They used a qualitative descriptive approach to follow six graduate nurses who had undertaken a teaching course and taught junior peers using NPT in their undergraduate nursing. These graduates were taken aback by the amount of formal and informal teaching involved in nursing immediately after becoming registered nurses. They also acknowledged having confidence to teach due to the preparation in their undergraduate program. This highlights the applicability and importance of visibly embedding teaching experience in the curriculum. Nurse educators need to explore how students are becoming prepared for the teaching roles that are essential in their professional lives. Findings from the current study concur with the wide applicability of PAL for nurses and nursing students alike and add RPT as an alternative approach to traditional PAL approaches. Since nursing involves teaching peers, patients and self (NMBA, 2016), RPT can help prepare nursing students for their professional roles.

The current study has demonstrated that RPT has short- and long-term benefits for students. Undoubtedly, independent learning is vital in the learning process, but as professionals, the nature of working with others underscores symbiotic learning. Collective learning helps to gain mutual benefits for all individuals involved in the process. Participants in this study found a pragmatic application of RPT by actively participating in the learning, making it comfortable and jointly beneficial. This study indicates that while participants did not have prior experience of formal peer teaching, at the end of the RPT experience, they reported higher self-confidence to teach. This finding concurred with Manyama et al. (2016), who also reported increased confidence to teach in medical students after experiencing RPT. The current study adds new knowledge by confirming that RPT can increase confidence to teach in nursing students, similar to students undertaking other health professional education.

To enable student engagement with peer teaching and create an optimal environment for their gains, just like NPT (McKenna et al., 2018), an important aspect in designing successful RPT is to seamlessly embed it within the curriculum. This will enable students to gradually become familiar with peer teaching from first year of their undergraduate nursing degree, thus enabling a scaffolded experience. Wide applicability of this teaching-learning form could enable its use in other forms of learning, such as group activities, and not limit it to the laboratories. Results of the current study identified RPT as much more than simply a clinical skill learning tool. There was deeper consideration of what was being learnt in active discussions between participants, thereby demonstrating active and deeper engagement with the content. This finding concurs with Lueg et al. (2015), who also found that RPT fostered deep learning by active participation, in 64 Danish students from a postgraduate management course. Therefore, findings of this study suggest distinct benefits for the curriculum and student learning.

The current study also indicated some subsequent applications of RPT by students in clinical settings. A quasi-experimental study was conducted by Pålsson, Mårtensson et al. (2017), with 70 first-year Swedish nursing students during their four-week clinical placement, to investigate peer learning effects in clinical practice education. All students received traditional supervision from a clinical instructor in the first two weeks. During the final two weeks, the comparison group continued with traditional supervision, while the intervention group engaged in peer learning with passive supervision from their clinical preceptor. Within the intervention group, student pairs enrolled in the same course worked together by sharing the workload, acting collaboratively to plan care for a group of assigned patients, sharing ideas mutually and delivering care after the approval of their preceptor. Self-efficacy was found to increase to a greater extent in the intervention group than it did in the control group. Despite gathering data from only one university student cohort, this fairly recent study highlights the applicability of peer learning involving same-year-level nursing students in clinical environments. This study demonstrates benefits similar to the current study and shows applicability for first-year nursing students. Undoubtedly, further research is warranted in this area.

The current study also revealed initial misconceptions held by students about RPT. This was largely due to the change in staffing responsible for coordinating the clinical course, which incorporated RPT. Reflections of the student researcher in implementing the current study indicate the need to involve more staff in the planning and implementation

of RPT. It is necessary for all teaching staff involved in the execution of RPT to be open for critical evaluation of their practice to apply the lessons learnt in consecutive planning. Tai et al. (2016) found that same-year-level PAL also helped educators by aiding the development of their lesser-used facilitation skills. Thus, there are benefits for academics facilitating peer learning; this requires further research. The emerging role of academics is changing from that of instructional expert to a more collaborative role (Debowski, 2014). Academics have the power to be change agents within higher education. Debowski (2014) further challenged academics to radically transform their roles from expert to co-learner. By adopting openness to reflect and critically self-evaluate, academics need to continually learn from their practice. They need to challenge mundane traditional methods and explore innovative teaching–learning methods to elicit active learning among students. The facilitative role of academics in peer learning is highlighted by Topping (2005).

Academics are challenged to address international concerns about nurse attrition (Pasila, Elo & Kääriäinen, 2017), particularly among newly graduated nurses (Labrague & McEnroe-Petitte, 2017). This is destabilising and costly for healthcare providers (Phillips et al., 2015). While there is considerable discussion of how changes to nursing practice and policy can better support new nursing graduates (Labrague & McEnroe-Petitte, 2017), nurse educators should take proactive measures to prepare their students for their transition into registered nursing. They must provide opportunities in the curriculum to challenge students in a supported manner by creating prospects to develop transferrable skills that extend beyond the technical know-how of nursing. These skills could provide a foundation for new graduates to manage challenges in the dynamic healthcare environment. Nurse educators need to challenge the traditional educational approaches to develop a future workforce that is resilient, adaptable and able to withstand the unpredictable challenges imposed by the dynamic healthcare system. The current study has demonstrated the suitability and merits of using RPT within undergraduate nursing education. Thus, it has provided valuable information for incorporating this form of learning in curriculum. Given that little is known about RPT in nursing education, it is essential to adopt an open approach to evaluation and change.

6.6 Study strengths

This study explored RPT's effect on the learning of undergraduate nursing students in CSL, which has not been previously studied. Therefore, the results offer new knowledge

that is unique to nursing education and informs educators with some background to further explore and implement RPT. The systematic review on RPT in health professions' education programs offered contemporary insights about the practices used by academics in their educational contexts. There have been no similar contemporary studies describing the implementation of RPT in nursing education. Using mixed a methodology approach, the current study enabled broader understandings of the effect of RPT on student learning. This study was conducted within the nursing laboratory context. Hence, it provides a fresh insight into designing a form of active learning strategy. It revealed benefits for students such as content-related gains, and cultivating a mindset of teaching and learning together to foster lifelong learning.

6.7 Study limitations

It is important to acknowledge the limitations of this study. The study sample and setting included one student cohort from one campus of an Australian university that offered a Bachelor of Nursing program. Although the sample size was reasonable (n = 102), it is relatively small and includes one study setting only. This limits the generalisability of the findings. Additionally, the mature-age group was under-represented in this study, comprising only 14 per cent of the total sample (n = 15). Thus, further investigation is required with greater representation of the older age group. This study provides a snapshot of the student experience in RPT participation. However, it does not offer longitudinal data on if and how they used the skills gained through this experience in their graduate year.

The structure of the RPT experience was embedded in the first semester for third-year students by dovetailing two courses. The teaching–learning theory offered in one course, preceded the timing of the RPT sessions in the clinical course. This limited the selection of clinical skills to be taught in the sessions, as they had to be new clinical skills that were not formally taught before in the curriculum. However, it is difficult to comment on whether the choice of tracheostomy suctioning and intravenous cannulation was the best to uncover RPT, so trialling other skills will be important in the future. Although the online preparatory material was largely acknowledged to be adequate in guiding the new teacher, there could be variations used to prepare students. This could include hands-on sessions for peer teachers to practise the clinical skill before teaching it to their peers, perhaps with academic facilitation. Alternatively, online facilitation could be considered

to prepare the two separate peer teacher groups. This study has specifically explored the knowledge, attitudes and experience of students with RPT. However, other areas must be explored in detail, such as RPT's impact on decision-making, providing feedback and metacognition, which includes self-monitoring and regulation.

Of the four survey tools used in this study, although there were two with notable validity and reliability (Williams et al., 2013a; Williams et al., 2013b), SRA tool was tested for content validity index. There could be a potential that the self-report attitudes towards peer teaching and knowledge questionnaire were not statistically robust. This can only be confirmed with further research. SRA tool included items from the PTEQ and both these tools were administered after RPT intervention, which could potentially influence the findings. However, this study used the two tools for distinct purpose, to compare changes before and after RPT intervention, while the other tool as a one-off post-test only measure, making both tools non-comparable. Although the mean score of the 14 post-test SRA items taken from PTEQ (52.28) are fairly close to the post-test-only PTEQ score (53.5), further investigation is required in comparing these two tools.

The student researcher was the academic tutor for some of the participants in the previous academic year. Despite measures to ensure removal of power as described in the ethical considerations for this study, potential biases towards the student researcher—both positive and negative—could have affected students' perceptions of RPT.

The effect of RPT on student learning has been measured on the basis of self-reported attitudes, experiences, clinical teaching preferences, changes in knowledge scores and participant perspectives. While participants have revealed the strategies they used to teach and learn, how the actual clinical skills were performed has not been investigated in this study, which requires further research.

6.7.1 Methodological limitations

Quasi-experimental designs pose plausible threats to internal validity, history, maturation, pre-test sensitisation, instrumentation, testing, selection bias, statistical regression, attrition and sequencing effects (Edmonds & Kennedy, 2017; Sapp, 2017). There is a possibility of Type I errors when null hypothesis can be erroneously rejected while it is true. Despite the high participation rate of 77.3 per cent, non-probability convenient sampling could have excluded participants with

unknown biases towards peer teaching. However, this cannot be confirmed until a further study with a larger, more diverse sample is undertaken. Similarly, although there were 22 participants in the focus groups, qualitative results may not capture the experiences of non-participants. It is possible that students with particular viewpoints agreed to participate in the focus groups, with other perspectives not being heard.

6.8 Chapter summary

This chapter presented the integrated key findings from both qualitative and quantitative datasets to offer a detailed encounter of participants partaking in RPT and positioned this in the context of existing knowledge. The study has provided new information about RPT and its potential use in nursing education to teach clinical skills, as well as other areas. It can be used as a resource to enable nursing educators to plan student-centred learning strategies. The knowledge gained through this study may encourage nursing academics to develop transferrable skills in students that will help them transition to graduates. Chapter 7 provides a synopsis of the implications of this study and offers recommendations for further research and education.

Chapter 7: Conclusion

This study aimed to explore the effect of RPT on undergraduate students' learning by using a mixed methods approach. As revealed from the key findings discussed in relation to contemporary literature in Chapter 6, this study has revealed new evidence for the use of RPT in nursing education in clinical skills settings and beyond. In this concluding chapter, the researcher offers the implication of these findings and recommendations for nursing education, policy and practice, and research.

7.1 Implications of findings to nursing education

The integration of the approach into curricula may be beneficial in both undergraduate and postgraduate settings. In summary, the following represent the key findings of this study in relation to the broader literature:

- This study adds new knowledge by identifying RPT as a useful learning strategy for nursing students. There is shared power, accountability and mutual learning among peers during RPT interactions;
- RPT is suitable to the nursing profession due to the peers of similar levels of experience facing unplanned challenges; and
- Learning benefits obtained through RPT include increased knowledge, enhanced attitudes towards peer teaching and the valuable experience obtained, with lifelong skills applicable to clinical settings.

7.2 Recommendations

7.2.1 Policy and practice

- To obtain a unified understanding in designing RPT, it is important to develop a policy framework that includes planning, implementation, evaluation and curriculum considerations. This will ensure transparent communication and broad ownership across the teaching team;
- Healthcare organisations offering clinical placements need to collaborate with education providers to offer supported opportunities for RPT in clinical settings; and

- Graduate nurse programs could potentially integrate RPT opportunities to extend the experience beyond student life.

7.2.2 Recommendation for education

- Nursing academics should undertake facilitative roles for creating opportunities for students to develop teaching skill proficiency through adopting RPT as an active learning approaches to prepare future nurses;
- RPT needs to be embedded throughout the undergraduate nursing program to offer varied learning opportunities; and
- Although this study was conducted with nursing students, other disciplines can draw from it to plan RPT sessions.

7.2.3 Recommendation for research

- Considering RPT is in its infancy in undergraduate nursing education, there is a need for further research to examine various facets of this approach. Longitudinal investigation is required to investigate how an RPT approach can nurture and sustain the transferrable skills for graduate nurses;
- There needs to be further investigation to explore if RPT in clinical skills learning results in better performance of those skills in the clinical setting;
- Considering RPT's prospects, it is essential to trial it with larger and diverse cohorts with a range of clinical and non-clinical topics; and
- Since RPT has mutual benefits associated with working together, it may be valuable to trial it in interprofessional education.

7.3 Chapter summary

This sequential explanatory mixed methods study identified that RPT has merits as an active learning strategy in the context of final-year clinical skills teaching. The quantitative surveys identified improvements in student knowledge, attitudes and positive peer-teaching preferences. Focus groups identified that RPT was found to be initially challenging but with benefits in fostering transferrable skills such as teaching, self-confidence, communication, resilience, adaptability, independent and collaborative learning with participants sharing strategies used to teach and learn.

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Appendices

Appendix 1: SPSS Output- Paired t-test between overall pre and post attitudes (Items 1-14)

T-Test

Table A1.1: Paired samples statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Attitude total: Post-test from items 1 to 14	52.28	102	8.168	.809
	Attitude total: Pre-test from items 1 to 14	49.24	102	10.029	.993
Pair 2	ATTOns	3.73	102	.583	.058
	ATTns	3.57	102	.693	.069

Table A1.2: Paired samples correlations

		N	Correlation	Sig.
Pair 1	Attitude total: Post-test from items 1 to 14 & Attitude total: Pre-test from items 1 to 14	102	.166	.095
Pair 2	ATTOns & ATTns	102	.198	.046

Table A1.3: Paired samples test

		Paired Differences						
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pair 1 Attitude total: Post-test from items 1 to 14 - Attitude total: Pre-test from items 1 to 14	3.049	11.837	1.172	.724	5.374	2.602	101	.011
Pair 2 ATTOns - ATTns	.166	.812	.080	.006	.325	2.059	101	.042

Appendix 2: SPSS Output- McNemar outputs for items showing significant results in self-reported attitudes to peer teaching

2a. Teaching peers is a good use of time and efforts:

Crosstabs

Table A2.1: Cases

	Valid		Missing		Total	
	N	**Percent**	**N**	**Percent**	**N**	**Percent**
Teaching peers is a good use of time and efforts_Pre-Test * Teaching peers is a good use of time and efforts_Post-Test	99	97.1%	3	2.9%	102	100.0%

Teaching peers is a good use of time and efforts_Pre-Test * Teaching peers is a good use of time and efforts_Post-Test Crosstabulation

Table A2.2: Teaching peers is a good use of time and efforts_Post-Test

			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Teaching peers is a good use of time and efforts_Pre-Test	Strongly disagree	Count	0	0	2	0	2	4
		% within Teaching peers is a good use of time and efforts_Pre-Test	0.0%	0.0%	50.0%	0.0%	50.0%	100.0%
		% within Teaching peers is a good use of time and efforts_Post-Test	.	0.0%	8.3%	0.0%	7.7%	4.0%
	Disagree	Count	0	1	1	2	1	5
		% within Teaching peers is a good use of time and efforts_Pre-Test	0.0%	20.0%	20.0%	40.0%	20.0%	100.0%

	% within Teaching peers is a good use of time and efforts_Post-Test	.	20.0%	4.2%	4.5%	3.8%	5.1%
Neutral	Count	0	2	3	3	2	10
	% within Teaching peers is a good use of time and efforts_Pre-Test	0.0%	20.0%	30.0%	30.0%	20.0%	100.0%
	% within Teaching peers is a good use of time and efforts_Post-Test	.	40.0%	12.5%	6.8%	7.7%	10.1%
Agree	Count	0	2	12	22	8	44
	% within Teaching peers is a good use of time and efforts_Pre-Test	0.0%	4.5%	27.3%	50.0%	18.2%	100.0%
	% within Teaching peers is a good use of time and efforts_Post-Test	.	40.0%	50.0%	50.0%	30.8%	44.4%
Strongly agree	Count	0	0	6	17	13	36
	% within Teaching peers is a good use of time and efforts_Pre-Test	0.0%	0.0%	16.7%	47.2%	36.1%	100.0%
	% within Teaching peers is a good use of time and efforts_Post-Test	.	0.0%	25.0%	38.6%	50.0%	36.4%
Total	Count	0	5	24	44	26	99
	% within Teaching peers is a good use of time and efforts_Pre-Test	0.0%	5.1%	24.2%	44.4%	26.3%	100.0%

% within Teaching peers is a good use of time and efforts_Post-Test	.	100.0%	100.0%	100.0%	100.0%	100.0%

Table A2.3: Chi-square tests

	Value	df	Asymptotic Significance (2-sided)
McNemar-Bowker test	15.973	8	.043
No. of valid cases	99		

2b. I understand the principles of teaching and learning

Crosstabs

Table A2.4: Case processing summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
I understand the principles of teaching and learning_Pre-Test * I understand the principles of teaching and learning_Post-Test	102	100.0%	0	0.0%	102	100.0%

Table A2.5: I understand the principles of teaching and learning_Pre-Test * I understand the principles of teaching and learning_Post-Test Crosstabulation

			I understand the principles of teaching and learning_Post-Test					
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
I understand the principles of teaching and learning_Pre-Test	Strongly disagree	Count	0	0	1	1	4	6
		% within I understand the principles of teaching and learning_Pre-Test	0.0%	0.0%	16.7%	16.7%	66.7%	100.0%
		% within I understand the principles of teaching and learning_Post-Test	.	.	4.8%	1.8%	16.0%	5.9%
	Disagree	Count	0	0	4	2	3	9
		% within I understand the principles of teaching and learning_Pre-Test	0.0%	0.0%	44.4%	22.2%	33.3%	100.0%
		% within I understand the principles of teaching and learning_Post-Test	.	.	19.0%	3.6%	12.0%	8.8%
	Neutral	Count	0	0	6	14	3	23

	% within I understand the principles of teaching and learning_Pre-Test	0.0%	0.0%	26.1%	60.9%	13.0%	100.0%
	% within I understand the principles of teaching and learning_Post-Test	.	.	28.6%	25.0%	12.0%	22.5%
Agree	Count	0	0	5	30	10	45
	% within I understand the principles of teaching and learning_Pre-Test	0.0%	0.0%	11.1%	66.7%	22.2%	100.0%
	% within I understand the principles of teaching and learning_Post-Test	.	.	23.8%	53.6%	40.0%	44.1%
Strongly agree	Count	0	0	5	9	5	19
	% within I understand the principles of teaching and learning_Pre-Test	0.0%	0.0%	26.3%	47.4%	26.3%	100.0%

	% within I understand the principles of teaching and learning_Post-Test	.	.	23.8%	16.1%	20.0%	18.6%
Total	Count	0	0	21	56	25	102
	% within I understand the principles of teaching and learning_Pre-Test	0.0%	0.0%	20.6%	54.9%	24.5%	100.0%
	% within I understand the principles of teaching and learning_Post-Test	.	.	100.0%	100.0%	100.0%	100.0%

Table A2.6: Chi-square tests

	Value	df	Asymptotic Significance (2-sided)
McNemar-Bowker test	19.816	9	.019
No. of valid cases	102		

2c. By teaching my peers, I can reflect on my previous learning

Crosstabs

Table A2.7: Case processing summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
By teaching my peers, I can reflect on my previous learning _Pre-Test * By teaching my peers, I can reflect on my previous learning_Post-Test	100	98.0%	2	2.0%	102	100.0%

Table A2.8: By teaching my peers, I can reflect on my previous learning _Pre-Test * By teaching my peers, I can reflect on my previous learning_Post-Test Crosstabulation

			By teaching my peers, I can reflect on my previous learning_Post-Test					
			Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
By teaching my peers, I can reflect on my previous learning _Pre-Test	Strongly disagree	Count	0	1	0	1	2	4
		% within By teaching my peers, I can reflect on my previous learning _Pre-Test	0.0%	25.0%	0.0%	25.0%	50.0%	100.0%
		% within By teaching my peers, I can reflect on my previous learning_Post-Test	.	25.0%	0.0%	2.0%	5.7%	4.0%
	Disagree	Count	0	0	0	2	3	5
		% within By teaching my peers, I can reflect on my previous learning _Pre-Test	0.0%	0.0%	0.0%	40.0%	60.0%	100.0%

								Total
		% within By teaching my peers, I can reflect on my previous learning_Post-Test		0.0%	0.0%	4.1%	8.6%	5.0%
	Neutral	Count	0	2	2	2	2	8
		% within By teaching my peers, I can reflect on my previous learning _Pre-Test	0.0%	25.0%	25.0%	25.0%	25.0%	100.0%
		% within By teaching my peers, I can reflect on my previous learning_Post-Test		50.0%	16.7%	4.1%	5.7%	8.0%
	Agree	Count	0	1	10	33	16	60
		% within By teaching my peers, I can reflect on my previous learning _Pre-Test	0.0%	1.7%	16.7%	55.0%	26.7%	100.0%
		% within By teaching my peers, I can reflect on my previous learning_Post-Test		25.0%	83.3%	67.3%	45.7%	60.0%
	Strongly agree	Count	0	0	0	11	12	23
		% within By teaching my peers, I can reflect on my previous learning _Pre-Test	0.0%	0.0%	0.0%	47.8%	52.2%	100.0%
		% within By teaching my peers, I can reflect on my previous learning_Post-Test		0.0%	0.0%	22.4%	34.3%	23.0%
Total		Count	0	4	12	49	35	100
		% within By teaching my peers, I can reflect on my previous learning _Pre-Test	0.0%	4.0%	12.0%	49.0%	35.0%	100.0%

% within By teaching . 100.0% 100.0% 100.0% 100.0% 100.0 %
my peers, I can reflect
on my previous
learning_Post-Test

Table A2.9: Chi-square test

	Value	df	Asymptotic Significance (2-sided)
McNemar-Bowker test	17.593	9	.040
No. of valid cases	100		

2d. How confident do you feel now to teach your peers?

Crosstabs

Table A2.10: Case processing summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
AT16 * AT16O	98	96.1%	4	3.9%	102	100.0%

Table A2.11: AT16 * AT16O Crosstabulation

			AT16O				
			Not confident	Poorly confident	Average	Fairly confident	Very confident	Total
AT16	Not confident	Count	2	3	2	2	2	11
		% within AT16	18.2%	27.3%	18.2%	18.2%	18.2%	100.0%
		% within AT16O	50.0%	21.4%	4.3%	6.9%	40.0%	11.2%
	Poorly confident	Count	2	4	11	2	1	20
		% within AT16	10.0%	20.0%	55.0%	10.0%	5.0%	100.0%

			50.0%	28.6%	23.9%	6.9%	20.0%	20.4%
		% within AT16O						
	Average	Count	0	7	29	17	0	53
		% within AT16	0.0%	13.2%	54.7%	32.1%	0.0%	100.0%
		% within AT16O	0.0%	50.0%	63.0%	58.6%	0.0%	54.1%
	Fairly confident	Count	0	0	4	8	2	14
		% within AT16	0.0%	0.0%	28.6%	57.1%	14.3%	100.0%
		% within AT16O	0.0%	0.0%	8.7%	27.6%	40.0%	14.3%
	Very confident	Count	0	0	0	0	0	0
		% within AT16	.	.	.	.	.	.
		% within AT16O	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total		Count	4	14	46	29	5	98
		% within AT16	4.1%	14.3%	46.9%	29.6%	5.1%	100.0%
		% within AT16O	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table A2.12: Chi-square test

	Value	df	Asymptotic Significance (2-sided)
McNemar-Bowker test	20.137	9	.017
No. of valid cases	98		

2e. How competent do you feel to teach your peers?

Table A2.13: Case processing summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
AT17NS * AT17O	98	96.1%	4	3.9%	102	100.0%

224

Table A2.14: AT17NS * AT17O Crosstabulation

			AT17O					Total
			Not competent	Poorly competent	Average	Fairly competent	Very competent	
AT17NS	Has opinion	Count	2	13	49	30	4	98
		% within AT17NS	2.0%	13.3%	50.0%	30.6%	4.1%	100.0%
		% within AT17O	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	2.00	Count	0	0	0	0	0	0
		% within AT17NS	.	.	.	.	.	.
		% within AT17O	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	3.00	Count	0	0	0	0	0	0
		% within AT17NS	.	.	.	.	.	.
		% within AT17O	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	4.00	Count	0	0	0	0	0	0
		% within AT17NS	.	.	.	.	.	.
		% within AT17O	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	5.00	Count	0	0	0	0	0	0
		% within AT17NS	.	.	.	.	.	.
		% within AT17O	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total		Count	2	13	49	30	4	98
		% within AT17NS	2.0%	13.3%	50.0%	30.6%	4.1%	100.0%
		% within AT17O	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table A2:15: Chi-square tests

	Value	df	Asymptotic Significance (2-sided)
McNemar-Bowker test	96.000	4	.000
No. of valid cases	98		

2f. How confident are you in providing honest and helpful feedback to your peers?

Crosstabs

Table A2.16: Case processing summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
AT18NS * AT18O	97	95.1%	5	4.9%	102	100.0%

Table A2.17: AT18NS * AT18O Crosstabulation

		AT18O					Total
		Very uncomfortable	Slightly uncomfortable	Average	Fairly comfortable	Very comfortable	
AT18NS	Has opinion	Count 2	8	28	52	7	97
		% within AT18NS 2.1%	8.2%	28.9%	53.6%	7.2%	100.0%
		% within AT18O 100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
2.00		Count 0	0	0	0	0	0
		% within AT18NS .	.	.	.	.	.
		% within AT18O 0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3.00		Count 0	0	0	0	0	0
		% within AT18NS .	.	.	.	.	.
		% within AT18O 0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4.00		Count 0	0	0	0	0	0
		% within AT18NS .	.	.	.	.	.
		% within AT18O 0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5.00		Count 0	0	0	0	0	0
		% within AT18NS .	.	.	.	.	.
		% within AT18O 0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total		Count 2	8	28	52	7	97
		% within AT18NS 2.1%	8.2%	28.9%	53.6%	7.2%	100.0%
		% within AT18O 100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table A2.18: Chi-square tests

	Value	df	Asymptotic Significance (2-sided)
McNemar-Bowker Test	95.000	4	.000
No. of valid cases	97		

Appendix 3: SPSS Output—Gender comparison with attitudes

General linear model

Table A3.1: Within-subjects factors

Measure: Attitudes	
Time	**Dependent Variable**
1	ATTns
2	ATTOns

Table A3.2: Between-subjects factors

		Value label	No.
Gender	1	Female	93
	2	Male	9

Table A3.3: Descriptive statistics

	Gender	**Mean**	**Std. Deviation**	**No.**
ATTns	Female	3.60	.681	93
	Male	3.24	.772	9
	Total	3.57	.693	102
ATTOns	Female	3.73	.577	93
	Male	3.82	.679	9
	Total	3.73	.583	102

Table A3.4: Multivariate tests

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's trace	.059	6.277[b]	1.000	100.000	.014	.059
	Wilks's lambda	.941	6.277[b]	1.000	100.000	.014	.059
	Hotelling's Trace	.063	6.277[b]	1.000	100.000	.014	.059
	Roy's largest root	.063	6.277[b]	1.000	100.000	.014	.059
time * gender	Pillai's trace	.025	2.601[b]	1.000	100.000	.110	.025
	Wilks's lambda	.975	2.601[b]	1.000	100.000	.110	.025
	Hotelling's trace	.026	2.601[b]	1.000	100.000	.110	.025
	Roy's largest root	.026	2.601[b]	1.000	100.000	.110	.025

a. Design: intercept + gender
Within-subjects design: time
b. Exact statistic

Table A3.5: Mauchly's test of sphericity[a]

Measure: Attitudes

Within-subjects effect	Mauchly's W	Approx. Chi-square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower bound
time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalised transformed dependent variables is proportional to an identity matrix.
a. Design: intercept + gender
Within-subjects design: time
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the tests of within-subjects effects table.

Table A3.6: Tests of within-subjects effects

Measure: Attitudes

Source		Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
time	Sphericity Assumed	2.039	1	2.039	6.277	.014	.059
	Greenhouse-Geisser	2.039	1.000	2.039	6.277	.014	.059
	Huynh-Feldt	2.039	1.000	2.039	6.277	.014	.059
	Lower bound	2.039	1.000	2.039	6.277	.014	.059
time * gender	Sphericity Assumed	.845	1	.845	2.601	.110	.025
	Greenhouse-Geisser	.845	1.000	.845	2.601	.110	.025
	Huynh-Feldt	.845	1.000	.845	2.601	.110	.025
	Lower bound	.845	1.000	.845	2.601	.110	.025
Error(time)	Sphericity Assumed	32.485	100	.325			
	Greenhouse-Geisser	32.485	100.000	.325			
	Huynh-Feldt	32.485	100.000	.325			
	Lower bound	32.485	100.000	.325			

Table A3.7: Tests of within-subjects contrasts

Measure: Attitudes

Source	Time	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
time	Linear	2.039	1	2.039	6.277	.014	.059
time * gender	Linear	.845	1	.845	2.601	.110	.025
Error(time)	Linear	32.485	100	.325			

Table A3.8: Tests of between-subjects effects

Measure: Attitudes

Transformed variable: Average

Source	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Intercept	848.790	1	848.790	1724.907	.000	.945
Gender	.304	1	.304	.617	.434	.006
Error	49.208	100	.492			

Estimated marginal means

1. Gender

Table A3.9: Estimates

Measure: Attitudes

Gender	Mean	Std. error	95% Confidence interval	
			Lower bound	Upper bound
Female	3.664	.051	3.562	3.766
Male	3.528	.165	3.200	3.856

Table A3.10: Pairwise comparisons

Measure: Attitudes

(I) gender	(J) gender	Mean difference (I-J)	Std. error	Sig.a	95% Confidence interval for difference[a]	
					Lower bound	Upper bound
Female	Male	.136	.173	.434	−.208	.480
Male	Female	−.136	.173	.434	−.480	.208

Based on estimated marginal means.
a. Adjustment for multiple comparisons: Least significant difference (equivalent to no adjustments).

Table A3.11: Univariate tests

Measure: Attitudes

	Sum of squares	df	Mean square	F	Sig.	Partial eta squared
Contrast	.152	1	.152	.617	.434	.006
Error	24.604	100	.246			

The F tests the effect of gender. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

2. Time

Table A3.12: Estimates

Measure: Attitudes

Time	Mean	Std. error	95% Confidence interval	
			Lower bound	Upper bound
1	3.420	.120	3.181	3.658
2	3.772	.102	3.569	3.975

Table A3.13: Pairwise comparisons

Measure: Attitudes

(I) time	(J) time	Mean difference (I-J)	Std. error	Sig.b	95% Confidence interval for difference[b]	
					Lower bound	Upper bound
1	2	-.352*	.141	.014	−.632	−.073
2	1	.352*	.141	.014	.073	.632

Based on estimated marginal means.
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Table A3.14: Multivariate tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.059	6.277a	1.000	100.000	.014	.059
Wilks's lambda	.941	6.277a	1.000	100.000	.014	.059
Hotelling's trace	.063	6.277a	1.000	100.000	.014	.059
Roy's largest root	.063	6.277a	1.000	100.000	.014	.059

Each F tests the multivariate effect of time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.
a. Exact statistic.

3. Gender * time

Table A3.15: Estimates

Measure: Attitudes					
				95% Confidence interval	
Gender	Time	Mean	Std. error	Lower bound	Upper bound
Female	1	3.601	.071	3.459	3.743
	2	3.727	.061	3.606	3.847
Male	1	3.238	.229	2.783	3.693
	2	3.817	.195	3.430	4.205

Table A3.16: Pairwise comparisons

Measure: Attitudes							
Time	(I) Gender	(J) Gender	Mean difference (I-J)	Std. error	Sig.a	95% Confidence interval for differencea	
						Lower bound	Upper bound
1	Female	Male	.363	.240	.134	–.114	.840
	Male	Female	–.363	.240	.134	–.840	.114
2	Female	Male	–.091	.204	.658	–.497	.315
	Male	Female	.091	.204	.658	–.315	.497

Based on estimated marginal means.
a. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Table A3.17: Univariate tests

Time		Sum of squares	df	Mean square	F	Sig.	Partial eta squared
1	Contrast	1.081	1	1.081	2.281	.134	.022
	Error	47.379	100	.474			
2	Contrast	.068	1	.068	.198	.658	.002
	Error	34.314	100	.343			

Each F tests the simple effects of gender within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

4. Gender * time

Table A3.18: Estimates

Measure: Attitudes

Gender	Time	Mean	Std. error	95% Confidence interval	
				Lower bound	Upper bound
Female	1	3.601	.071	3.459	3.743
	2	3.727	.061	3.606	3.847
Male	1	3.238	.229	2.783	3.693
	2	3.817	.195	3.430	4.205

Table A3.19: Pairwise comparisons

Measure: Attitudes

gender	(I) time	(J) time	Mean difference (I-J)	Std. error	Sig.[b]	95% Confidence interval for difference[b]	
						Lower bound	Upper bound
Female	1	2	−.126	.084	.136	−.291	.040
	2	1	.126	.084	.136	−.040	.291
Male	1	2	−.579[*]	.269	.033	−1.112	−.046
	2	1	.579[*]	.269	.033	.046	1.112

Based on estimated marginal means.
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Table A3.20: Multivariate tests

	Gender	Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Female	Pillai's trace	.022	2.258[a]	1.000	100.000	.136	.022
	Wilks's lambda	.978	2.258[a]	1.000	100.000	.136	.022
	Hotelling's trace	.023	2.258[a]	1.000	100.000	.136	.022
	Roy's largest root	.023	2.258[a]	1.000	100.000	.136	.022
Male	Pillai's trace	.044	4.650[a]	1.000	100.000	.033	.044
	Wilks's lambda	.956	4.650[a]	1.000	100.000	.033	.044
	Hotelling's trace	.046	4.650[a]	1.000	100.000	.033	.044
	Roy's largest root	.046	4.650[a]	1.000	100.000	.033	.044

Each F tests the multivariate simple effects of time within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.
a. Exact statistic.

Figure A3.1: Profile plots

Appendix 4: SPSS Output—Age groups comparison with self-reported attitudes to peer teaching

General linear model

Table A4.1: Within-subjects factors

Measure: Attitudes	
time	Dependent Variable
1	ATTns
2	ATTOns

Table A4.2: Between-subjects factors

		Value label	No.
Age in three categories	1	Late adolescents 17–21 years	41
	2	Early adults 22–30 years	46
	3	Mature adults 31 years and over	15

Table A4.3: Descriptive statistics

	Age in three categories	Mean	Std. deviation	N
ATTns	Late adolescents 17–21 years	3.52	.643	41
	Early adults 22–30 years	3.53	.736	46
	Mature adults 31 years and over	3.82	.681	15
	Total	3.57	.693	102
ATTOns	Late adolescents 17–21 years	3.77	.626	41
	Early adults 22–30 years	3.62	.557	46
	Mature adults 31 years and over	3.98	.475	15
	Total	3.73	.583	102

Table A4.4: Multivariate tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Time	Pillai's trace	.033	3.406[b]	1.000	99.000	.068	.033
	Wilks's lambda	.967	3.406[b]	1.000	99.000	.068	.033
	Hotelling's trace	.034	3.406[b]	1.000	99.000	.068	.033
	Roy's largest root	.034	3.406[b]	1.000	99.000	.068	.033
time *	Pillai's trace	.009	.427[b]	2.000	99.000	.654	.009
age1_recoded	Wilks's lambda	.991	.427[b]	2.000	99.000	.654	.009
	Hotelling's trace	.009	.427[b]	2.000	99.000	.654	.009
	Roy's largest root	.009	.427[b]	2.000	99.000	.654	.009

a. Design: intercept + age1_recoded.
Within-subjects-design: time.
b. Exact statistic.

Table A4.5: Mauchly's test of sphericity[a]

Measure: Attitudes							
Within-subjects effect	Mauchly's W	Approx. Chi-square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower bound
time	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalised transformed dependent variables is proportional to an identity matrix.
a. Design: intercept + age1_recoded.
Within-subjects design: time.
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in Table A4.6.

Table A4.6: Tests of within-subjects effects

Measure: Attitudes

Source		Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Time	Sphericity assumed	1.137	1	1.137	3.406	.068	.033
	Greenhouse-Geisser	1.137	1.000	1.137	3.406	.068	.033
	Huynh-Feldt	1.137	1.000	1.137	3.406	.068	.033
	Lower bound	1.137	1.000	1.137	3.406	.068	.033
Time * Age1_recoded	Sphericity assumed	.285	2	.142	.427	.654	.009
	Greenhouse-Geisser	.285	2.000	.142	.427	.654	.009
	Huynh-Feldt	.285	2.000	.142	.427	.654	.009
	Lower bound	.285	2.000	.142	.427	.654	.009
Error(time)	Sphericity assumed	33.045	99	.334			
	Greenhouse-Geisser	33.045	99.000	.334			
	Huynh-Feldt	33.045	99.000	.334			
	Lower bound	33.045	99.000	.334			

Table A4.6: Tests of within-subjects contrasts

Measure: Attitudes

Source	time	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Time	Linear	1.137	1	1.137	3.406	.068	.033
Time * Age1_recoded	Linear	.285	2	.142	.427	.654	.009
Error(time)	Linear	33.045	99	.334			

Table A4.7: Tests of between-subjects effects

Measure: Attitudes

Transformed variable: Average

Source	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Intercept	2192.861	1	2192.861	4604.493	.000	.979
age1_recoded	2.363	2	1.182	2.481	.089	.048
Error	47.148	99	.476			

Estimated marginal means

1. Age in three categories

Table A4.8: Estimates

Measure: Attitudes

Age in three categories	Mean	Std. error	95% Confidence interval	
			Lower bound	Upper bound
Late adolescents 17–21 years	3.648	.076	3.497	3.799
Early adults 22–30 years	3.575	.072	3.432	3.718
Mature adults 31 years and over	3.898	.126	3.648	4.148

Table A4.9: Pairwise comparisons

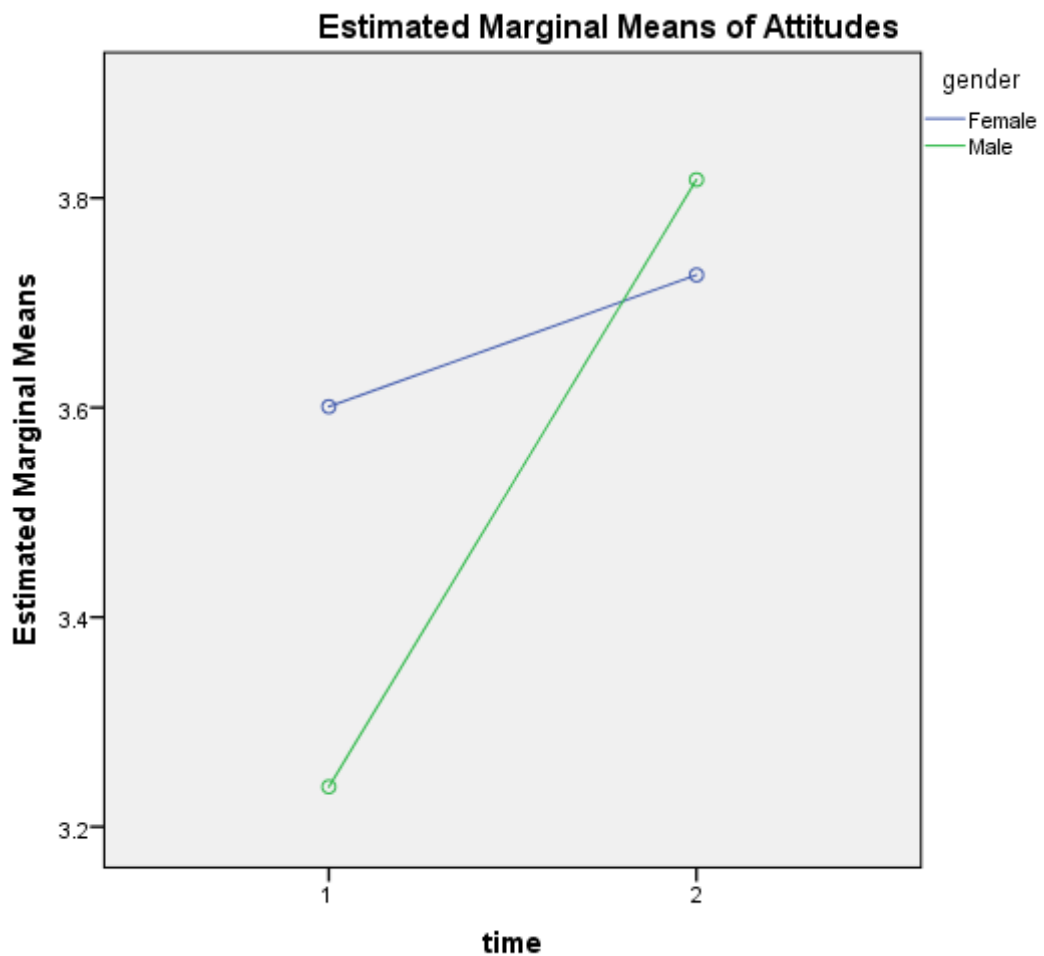|		Measure: Attitudes				
(I) age in three categories	(J) age in three categories	Mean difference (I-J)	Std. error	Sig.[b]	95% Confidence interval for difference[b]	
					Lower bound	Upper bound
Late adolescents 17–21 years	Early adults 22–30 years	.073	.105	.488	–.135	.281
	Mature adults 31 years and over	–.250	.147	.093	–.542	.042
Early adults 22–30 years	Late adolescents 17–21 years	–.073	.105	.488	–.281	.135
	Mature adults 31 years and over	–.323[*]	.145	.028	–.611	–.035
Mature adults 31 years and over	Late adolescents 17–21 years	.250	.147	.093	–.042	.542
	Early adults 22–30 years	.323[*]	.145	.028	.035	.611

Based on estimated marginal means.
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Table A4.10: Univariate tests

	Measure: Attitudes					
	Sum of squares	df	Mean square	F	Sig.	Partial eta squared
Contrast	1.182	2	.591	2.481	.089	.048
Error	23.574	99	.238			

The F tests the effect of age in three categories. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

2. Time

Table A4.11: Estimates

	Measure: Attitudes			
Time	Mean	Std. error	95% Confidence interval	
			Lower bound	Upper bound
1	3.623	.077	3.469	3.776
2	3.791	.064	3.663	3.919

Table A4.12: Pairwise comparisons

(I) time	(J) time	Mean difference (I-J)	Std. error	Sig.a	95% Confidence interval for difference[a]	
					Lower bound	Upper bound
1	2	−.169	.091	.068	−.350	.013
2	1	.169	.091	.068	−.013	.350

Based on estimated marginal means.
a. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Table A4.13: Multivariate tests

	Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Pillai's trace	.033	3.406[a]	1.000	99.000	.068	.033
Wilks's lambda	.967	3.406[a]	1.000	99.000	.068	.033
Hotelling's trace	.034	3.406[a]	1.000	99.000	.068	.033
Roy's largest root	.034	3.406[a]	1.000	99.000	.068	.033

Each F tests the multivariate effect of time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.
a. Exact statistic.

3. Age in three categories * time

Table A4.14: Estimates

Age in three categories	Time	Mean	Std. error	95% Confidence interval	
				Lower bound	Upper bound
Late adolescents 17–21 years	1	3.522	.108	3.308	3.737
	2	3.774	.090	3.595	3.952
Early adults 22–30 years	1	3.530	.102	3.328	3.733
	2	3.620	.085	3.451	3.788
Mature adults 31 years and over	1	3.815	.179	3.461	4.170
	2	3.981	.149	3.686	4.276

Table A4.15: Pairwise comparisons

Measure: Attitudes							
Time	(I) age in three categories	(J) age in three categories	Mean difference (I-J)	Std. error	Sig.[b]	95% Confidence interval for difference[b]	
						Lower bound	Upper bound
1	Late adolescents 17–21 years	Early adults 22–30 years	–.008	.149	.957	–.303	.287
		Mature adults 31 years and over	–.293	.209	.164	–.707	.121
	Early adults 22–30 years	Late adolescents 17–21 years	.008	.149	.957	–.287	.303
		Mature adults 31 years and over	–.285	.206	.169	–.693	.123
	Mature adults 31 years and over	Late adolescents 17–21 years	.293	.209	.164	–.121	.707
		Early adults 22–30 years	.285	.206	.169	–.123	.693
2	Late adolescents 17–21 years	Early adults 22–30 years	.154	.124	.216	–.091	.399
		Mature adults 31 years and over	–.207	.174	.235	–.552	.137
	Early adults 22–30 years	Late adolescents 17–21 years	–.154	.124	.216	–.399	.091
		Mature adults 31 years and over	–.361[*]	.171	.037	–.701	–.022
	Mature adults 31 years and over	Late adolescents 17–21 years	.207	.174	.235	–.137	.552
		Early adults 22–30 years	.361[*]	.171	.037	.022	.701

Based on estimated marginal means.
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Table A4.16: Univariate tests

Measure: Attitudes

Time		Sum of squares	df	Mean square	F	Sig.	Partial eta squared
1	Contrast	1.067	2	.533	1.114	.332	.022
	Error	47.393	99	.479			
2	Contrast	1.581	2	.791	2.386	.097	.046
	Error	32.800	99	.331			

Each F tests the simple effects of age in three categories within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

4. Age in three categories * time

Table A4.17: Estimates

Measure: Attitudes

Age in three categories	Time	Mean	Std. error	95% Confidence interval	
				Lower bound	Upper bound
Late adolescents 17–21 years	1	3.522	.108	3.308	3.737
	2	3.774	.090	3.595	3.952
Early adults 22–30 years	1	3.530	.102	3.328	3.733
	2	3.620	.085	3.451	3.788
Mature adults 31 years and over	1	3.815	.179	3.461	4.170
	2	3.981	.149	3.686	4.276

Table A4.18: Pairwise comparisons

Measure: Attitudes

Age in three categories	(I) time	(J) time	Mean difference (I-J)	Std. error	Sig.[a]	95% Confidence interval for difference[a]	
						Lower bound	Upper bound
late adolescents 17-21 years	1	2	−.251	.128	.052	−.504	.002
	2	1	.251	.128	.052	−.002	.504
Early adults 22-30 years	1	2	−.089	.120	.461	−.328	.150
	2	1	.089	.120	.461	−.150	.328
Mature adults 31 years and over	1	2	−.166	.211	.434	−.584	.253
	2	1	.166	.211	.434	−.253	.584

Based on estimated marginal means.
a. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Table A4.19: Multivariate tests

Age in three categories		Value	F	Hypothesis df	Error df	Sig.	Partial eta squared
Late adolescents 17–21 years	Pillai's trace	.038	3.879[a]	1.000	99.000	.052	.038
	Wilks's lambda	.962	3.879[a]	1.000	99.000	.052	.038
	Hotelling's trace	.039	3.879[a]	1.000	99.000	.052	.038
	Roy's largest root	.039	3.879[a]	1.000	99.000	.052	.038
Early adults 22–30 years	Pillai's trace	.006	.549[a]	1.000	99.000	.461	.006
	Wilks's lambda	.994	.549[a]	1.000	99.000	.461	.006
	Hotelling's trace	.006	.549[a]	1.000	99.000	.461	.006
	Roy's largest root	.006	.549[a]	1.000	99.000	.461	.006
Mature adults 31 years and over	Pillai's trace	.006	.618[a]	1.000	99.000	.434	.006
	Wilks's lambda	.994	.618[a]	1.000	99.000	.434	.006
	Hotelling's trace	.006	.618[a]	1.000	99.000	.434	.006
	Roy's largest root	.006	.618[a]	1.000	99.000	.434	.006

Each F tests the multivariate simple effects of time within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.
a. Exact statistic
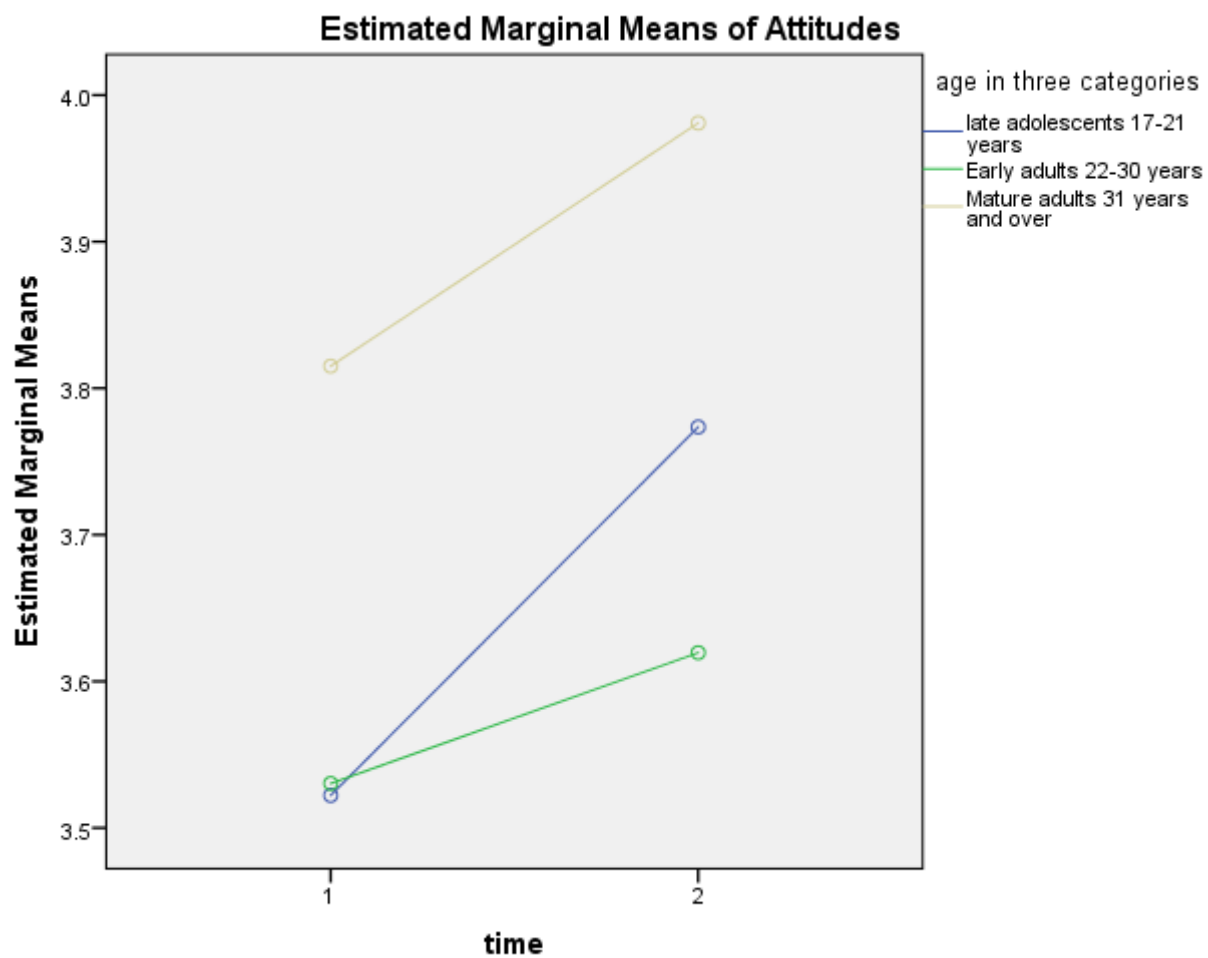
Figure A4.1: Profile plot

Appendix 5: SPSS Output—Previous experience with peer learning and teaching with self-reported attitudes to peer teaching

General linear model

Table A5.1: Within-subjects factors

Measure: Attitude	
time_pre_post	Dependent variable
1	ATT
2	ATTO

Table A5.2: Between-subjects factors

		Value Label	N
priorPTteach1	1	Yes	30
	2	No	72
PriorPTlearnt1	1	Yes	32
	2	No	70

Table A5.3 Descriptive statistics

	priorPTteach1	PriorPTlearnt1	Mean	Std. deviation	No.
Attitude total: Pre-test from items 1 to 14	Yes	Yes	52.31	7.719	26
		No	39.75	18.839	4
		Total	50.63	10.341	30
	No	Yes	52.17	4.070	6
		No	48.33	10.236	66
		Total	48.65	9.911	72
	Total	Yes	52.28	7.122	32
		No	47.84	10.870	70
		Total	49.24	10.029	102
Attitude total: Post-test from items 1 to 14	Yes	Yes	56.73	6.030	26
		No	48.25	13.200	4
		Total	55.60	7.614	30
	No	Yes	52.83	5.419	6
		No	50.73	8.245	66
		Total	50.90	8.041	72
	Total	Yes	56.00	6.038	32
		No	50.59	8.483	70
		Total	52.28	8.168	102

Table A5.4: Multivariate tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
time_pre_post	Pillai's trace	.038	3.824[b]	1.000	98.000	.053
	Wilks's lambda	.962	3.824[b]	1.000	98.000	.053
	Hotelling's trace	.039	3.824[b]	1.000	98.000	.053
	Roy's largest root	.039	3.824[b]	1.000	98.000	.053
time_pre_post *	Pillai's trace	.015	1.456[b]	1.000	98.000	.230
priorPTteach1	Wilks's lambda	.985	1.456[b]	1.000	98.000	.230
	Hotelling's trace	.015	1.456[b]	1.000	98.000	.230
	Roy's largest root	.015	1.456[b]	1.000	98.000	.230
time_pre_post *	Pillai's trace	.005	.504[b]	1.000	98.000	.479
PriorPTlearnt1	Wilks's lambda	.995	.504[b]	1.000	98.000	.479
	Hotelling's trace	.005	.504[b]	1.000	98.000	.479
	Roy's largest root	.005	.504[b]	1.000	98.000	.479
time_pre_post *	Pillai's trace	.001	.083[b]	1.000	98.000	.774
priorPTteach1 *	Wilks's lambda	.999	.083[b]	1.000	98.000	.774
PriorPTlearnt1	Hotelling's trace	.001	.083[b]	1.000	98.000	.774
	Roy's largest root	.001	.083[b]	1.000	98.000	.774

a. Design: intercept + priorPTteach1 + PriorPTlearnt1 + priorPTteach1 * PriorPTlearnt1.
Within-subjects design: time_pre_post.
b. Exact statistic.

Table A5.5: Mauchly's test of sphericity[a]

Measure: Attitude

Within-subjects effect	Mauchly's W	Approx. Chi-square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower bound
time_pre_post	1.000	.000	0	.	1.000	1.000	1.000

Tests the null hypothesis that the error covariance matrix of the orthonormalised transformed dependent variables is proportional to an identity matrix.
a. Design: intercept + priorPTteach1 + PriorPTlearnt1 + priorPTteach1 * PriorPTlearnt1.
Within-subjects design: time_pre_post.
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in Table A5.6.

Table A5.6: Tests of within-subjects effects

Measure: Attitude

Source		Type III sum of squares	df	Mean square	F	Sig.
time_pre_post	Sphericity assumed	271.624	1	271.624	3.824	.053
	Greenhouse-Geisser	271.624	1.000	271.624	3.824	.053
	Huynh-Feldt	271.624	1.000	271.624	3.824	.053
	Lower bound	271.624	1.000	271.624	3.824	.053
time_pre_post * priorPTteach1	Sphericity assumed	103.415	1	103.415	1.456	.230
	Greenhouse-Geisser	103.415	1.000	103.415	1.456	.230
	Huynh-Feldt	103.415	1.000	103.415	1.456	.230
	Lower bound	103.415	1.000	103.415	1.456	.230
time_pre_post * PriorPTlearnt1	Sphericity assumed	35.818	1	35.818	.504	.479
	Greenhouse-Geisser	35.818	1.000	35.818	.504	.479
	Huynh-Feldt	35.818	1.000	35.818	.504	.479
	Lower bound	35.818	1.000	35.818	.504	.479
time_pre_post * priorPTteach1 * PriorPTlearnt1	Sphericity assumed	5.870	1	5.870	.083	.774
	Greenhouse-Geisser	5.870	1.000	5.870	.083	.774
	Huynh-Feldt	5.870	1.000	5.870	.083	.774
	Lower bound	5.870	1.000	5.870	.083	.774
Error(time_pre_post)	Sphericity assumed	6,960.219	98	71.023		
	Greenhouse-Geisser	6,960.219	98.000	71.023		
	Huynh-Feldt	6,960.219	98.000	71.023		
	Lower bound	6,960.219	98.000	71.023		

Table A5.7: Tests of within-subjects contrasts

Measure: Attitude

Source	time_pre_post	Type III sum of squares	df	Mean square	F	Sig.
time_pre_post	Linear	271.624	1	271.624	3.824	.053
time_pre_post * priorPTteach1	Linear	103.415	1	103.415	1.456	.230
time_pre_post * PriorPTlearnt1	Linear	35.818	1	35.818	.504	.479
time_pre_post * priorPTteach1 * PriorPTlearnt1	Linear	5.870	1	5.870	.083	.774
Error(time_pre_post)	Linear	6,960.219	98	71.023		

Table A5.8: Tests of between-subjects effects

Measure: Attitude

Transformed variable: Average

Source	Type III sum of squares	df	Mean Square	F	Sig.
Intercept	171047.629	1	171047.629	1975.481	.000
priorPTteach1	52.427	1	52.427	.605	.438
PriorPTlearnt1	773.800	1	773.800	8.937	.004
priorPTteach1 * PriorPTlearnt1	242.390	1	242.390	2.799	.097
Error	8485.360	98	86.585		

Estimated marginal means

Table A5.9: PriorPTlearnt1

Measure: Attitude

PriorPTlearnt1	Mean	Std. error	95% Confidence interval	
			Lower bound	Upper bound
Yes	53.510	1.490	50.553	56.466
No	46.765	1.694	43.403	50.127

Table A5.10: priorPTteach1

priorPTteach1	Mean	Std. error	95% Confidence interval	
			Lower bound	Upper bound
Yes	49.260	1.767	45.753	52.766
No	51.015	1.403	48.231	53.799

Measure: Attitude
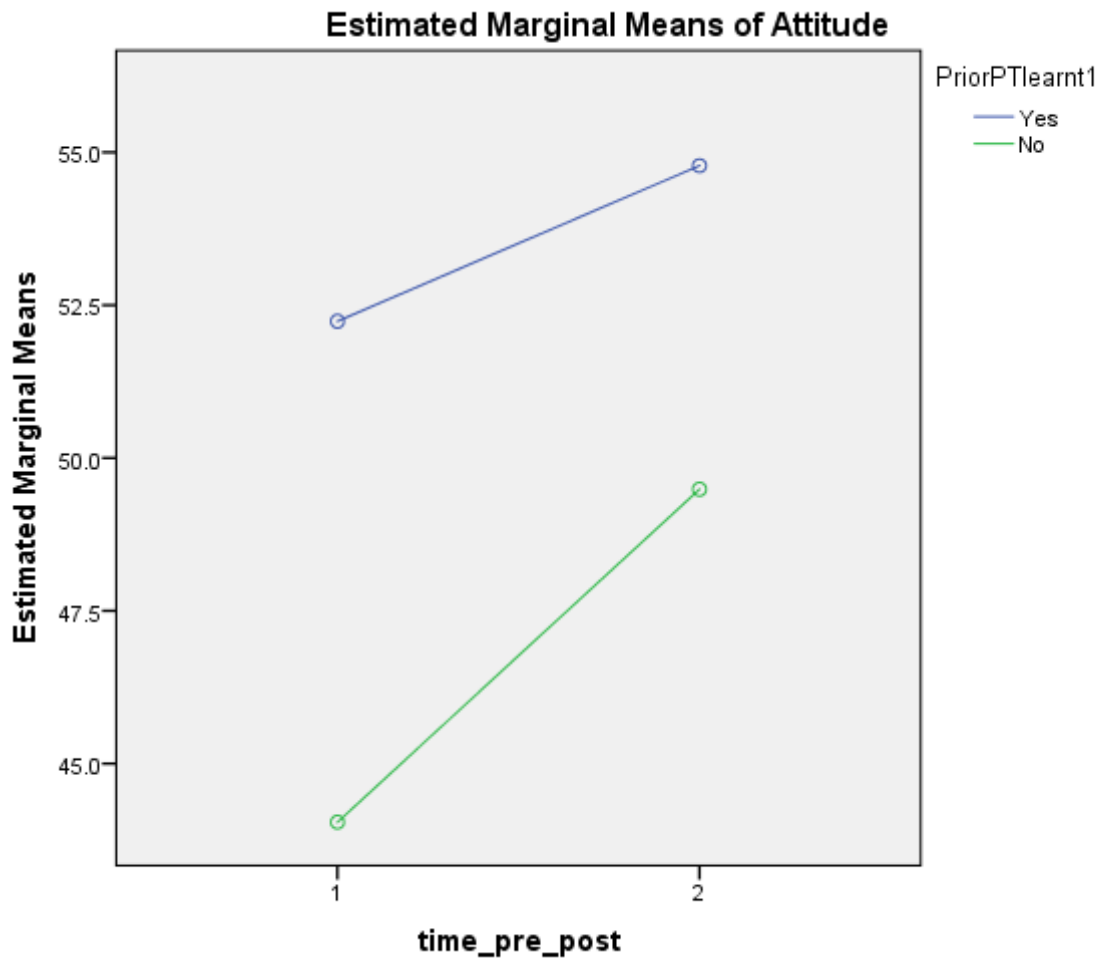
Figure A5.1: Profile plot A
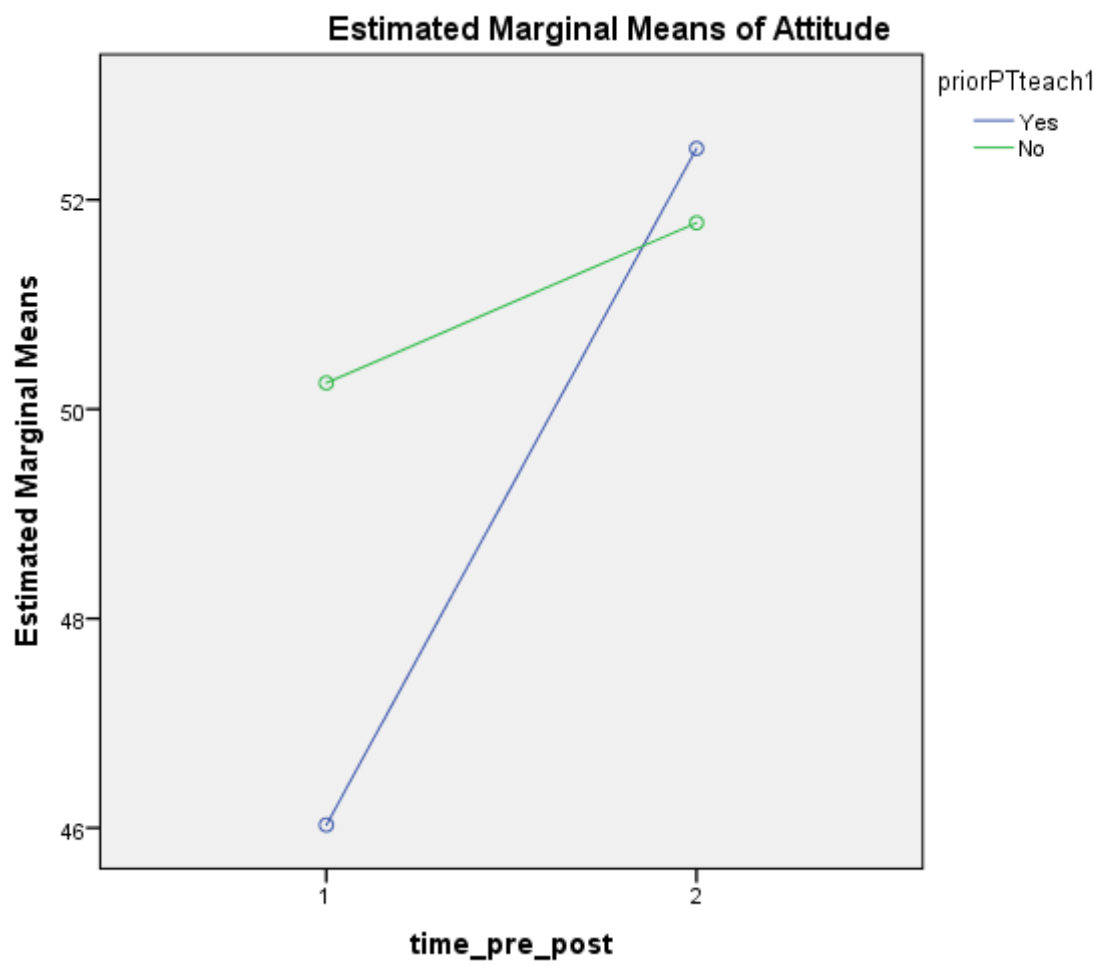
Figure A5.2: Profile plot B

Appendix 6: SPSS Output—Difference between overall knowledge scores for each skill

Table A6.1: Paired samples statistics

Paired samples statistics					
		Mean	N	Std. deviation	Std. error mean
Pair 1	Knowledge total: pre-test	6.93	102	1.986	.197
	Knowledge total: post-test	9.69	102	1.861	.184

Table A6.2: Paired samples correlations

		N	Correlation	Sig.
Pair 1	Knowledge total: pre-test & Knowledge total: post-test	102	.187	.060

Table A6.3: Paired samples test

		Paired differences					t	df	Sig. (2-tailed)
		Mean	Std. deviation	Std. error mean	95% Confidence interval of the difference				
					Lower	Upper			
Pair 1	knowledge Total: pre-test - knowledge total: post-test	–2.755	2.455	.243	–3.237	–2.273	–11.332	101	.000

Appendix 7: SPSS Output—Relationship between the knowledge scores for each skill, peer roles and time (pre and post-test)

Table A7.1: Between-subjects factors

		Value label	N
SkillTeacher	1	Tracheostomy suctioning	56
	2	IV cannulation	46

Table A7.2: Descriptive statistics

	SkillTeacher	Mean	Std. deviation	N
TT	Tracheostomy suctioning	2.96	1.175	56
	IV cannulation	3.11	1.370	46
	Total	3.03	1.262	102
IVT	Tracheostomy suctioning	3.98	1.433	56
	IV cannulation	3.80	1.222	46
	Total	3.90	1.339	102
Total scores for Tracheostomy skill questions	Tracheostomy suctioning	5.34	1.164	56
	IV cannulation	4.57	1.377	46
	Total	4.99	1.316	102
Total scores in IV skill questions	Tracheostomy suctioning	4.70	1.320	56
	IV cannulation	4.70	1.209	46
	Total	4.70	1.265	102

2. Time

Table A7.3: Estimates

Measure: Knowledge				
			95% Confidence interval	
time	Mean	Std. error	Lower bound	Upper bound
1	3.465	.099	3.268	3.662
2	4.824	.091	4.644	5.005

Table A7.4: Pairwise comparisons

Measure: Knowledge

(I) time	(J) time	Mean difference (I-J)	Std. error	Sig.b	95% Confidence interval for difference[b]	
					Lower bound	Upper bound
1	2	−1.359*	.121	.000	−1.600	−1.119
2	1	1.359*	.121	.000	1.119	1.600

Based on estimated marginal means.
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

3. Skill

Table A7.5: Estimates

Measure: Knowledge

Skill	Mean	Std. error	95% Confidence interval	
			Lower bound	Upper bound
1	3.994	.093	3.811	4.178
2	4.295	.104	4.089	4.500

Table A7.6: Pairwise comparisons

Measure: Knowledge

(I) skill	(J) skill	Mean difference (I-J)	Std. error	Sig.b	95% Confidence interval for difference[b]	
					Lower bound	Upper bound
1	2	−.300*	.130	.023	−.559	−.041
2	1	.300*	.130	.023	.041	.559

Table A7.7: SkillTeacher * time

Measure: Knowledge

SkillTeacher	Time	Mean	Std. Error	95% Confidence interval	
				Lower bound	Upper bound
Tracheostomy suctioning	1	3.473	.133	3.209	3.738
	2	5.018	.122	4.775	5.260
IV cannulation	1	3.457	.147	3.165	3.748
	2	4.630	.135	4.363	4.898

Table A7.8: SkillTeacher * skill

Measure: Knowledge

SkillTeacher	Skill	Mean	Std. error	95% Confidence interval	
				Lower bound	Upper bound
Tracheostomy suctioning	1	4.152	.124	3.905	4.398
	2	4.339	.139	4.063	4.615
IV cannulation	1	3.837	.137	3.565	4.109
	2	4.250	.154	3.945	4.555

Table A7.9: Time * skill

Measure: Knowledge

Time	Skill	Mean	Std. error	95% Confidence interval	
				Lower bound	Upper bound
1	1	3.036	.126	2.787	3.286
	2	3.893	.134	3.628	4.158
2	1	4.952	.126	4.703	5.202
	2	4.696	.126	4.445	4.947

Estimated Marginal Means of knowledge
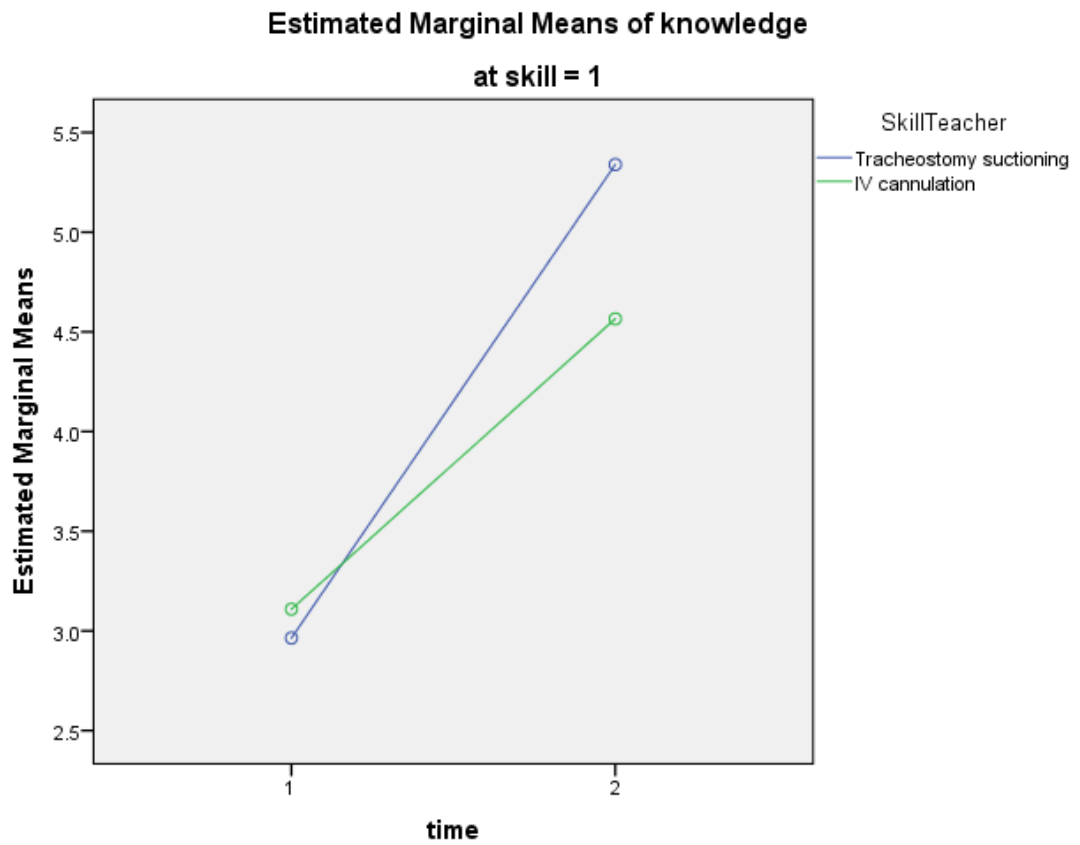
at skill = 1

Figure A7.1: Profile plot—time * SkillTeacher * skill

Skill 1 = Tracheostomy suctioning
Skill 2 = IV cannulation

Appendix 8: SPSS Output—Aggregate scores of the pre and post-test scores for CTPQ

Table A8.1: Paired samples statistics

		Mean	N	Std. deviation	Std. error mean
Pair 1	CTPQ total: Pre-test	39.99	102	5.094	.504
	CTPQ total: Post-test	41.23	102	4.720	.467

Table A8.2: Paired samples correlations

		N	Correlation	Sig.
Pair 1	CTPQ total: Pre-test & CTPQ total: Post-test	102	.018	.856

Table A8.3: Paired samples test

		Paired differences					t	df	Sig. (2-tailed)
		Mean	Std. deviation	Std. error mean	95% Confidence interval of the difference				
					Lower	Upper			
Pair 1	CTPQ total: Pre-test - CTPQ total: Post-test	–1.235	6.881	.681	–2.587	.116	–1.813	101	.073

Appendix 9: SPSS Output—CTPQ two factors comparison between pre and post-test scores using paired t-tests

Table A9.1: Paired samples statistics

		Mean	N	Std. deviation	Std. error mean
Pair 1	CT_SUB_1_AVERAGE	3.33	102	.746	.074
	CTO_SUB_1_AVERAGE	3.52	102	.687	.068
Pair 2	CT_SUB_2_AVERAGE	3.83	102	.629	.062
	CTO_SUB_2_AVERAGE	3.87	102	.793	.078

Table A9.2: Paired samples correlations

		N	Correlation	Sig.
Pair 1	CT_SUB_1_AVERAGE & CTO_SUB_1_AVERAGE	102	.116	.244
Pair 2	CT_SUB_2_AVERAGE & CTO_SUB_2_AVERAGE	102	.000	.997

Table A9.3: Paired samples test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	CT_SUB_1_AVERAGE - CTO_SUB_1_AVERAGE	–.191	.954	.094	–.378	–.004	–2.025	101	.046
Pair 2	CT_SUB_2_AVERAGE - CTO_SUB_2_AVERAGE	–.039	1.012	.100	–.238	.159	–.392	101	.696

Appendix 10: SPSS Output—Comparing PTEQ factor 'benefits of peer supervision' factor with the age groups

Oneway

Table A10.1: Descriptives

PT_SUB_1

	N	Mean	Std. deviation	Std. error	95% Confidence interval for mean Lower bound	Upper bound	Minimum	Maximum
Late adolescents 17–21 years	41	15.27	3.302	.516	14.23	16.31	6	20
Early adults 22–30 years	46	14.41	2.587	.381	13.64	15.18	10	20
Mature adults 31 years and over	15	16.67	2.498	.645	15.28	18.05	13	20
Total	102	15.09	2.959	.293	14.51	15.67	6	20

Table A10.2: ANOVA

PT_SUB_1

	Sum of squares	df	Mean square	F	Sig.
Between groups	59.672	2	29.836	3.582	.031
Within groups	824.534	99	8.329		
Total	884.206	101			

Post-hoc tests

<div align="center">

Table A10.3: Multiple comparisons

Dependent variable: PT_SUB_1

Bonferroni

</div>

(I) age in three categories	(J) age in three categories	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval	
					Lower bound	Upper bound
Late adolescents 17–21 years	Early adults 22–30 years	.855	.620	.512	–0.65	2.36
	Mature adults 31 years and over	–1.398	.871	.335	–3.52	0.72
Early adults 22–30 years	Late adolescents 17–21 years	–0.855	.620	.512	–2.36	0.65
	Mature adults 31 years and over	–2.254[*]	.858	.030	–4.34	–0.16
Mature adults 31 years and over	Late adolescents 17–21 years	–1.398	.871	.335	–0.72	3.52
	Early adults 22–30 years	2.254[*]	.858	.030	.16	4.34

*. The mean difference is significant at the 0.05 level.
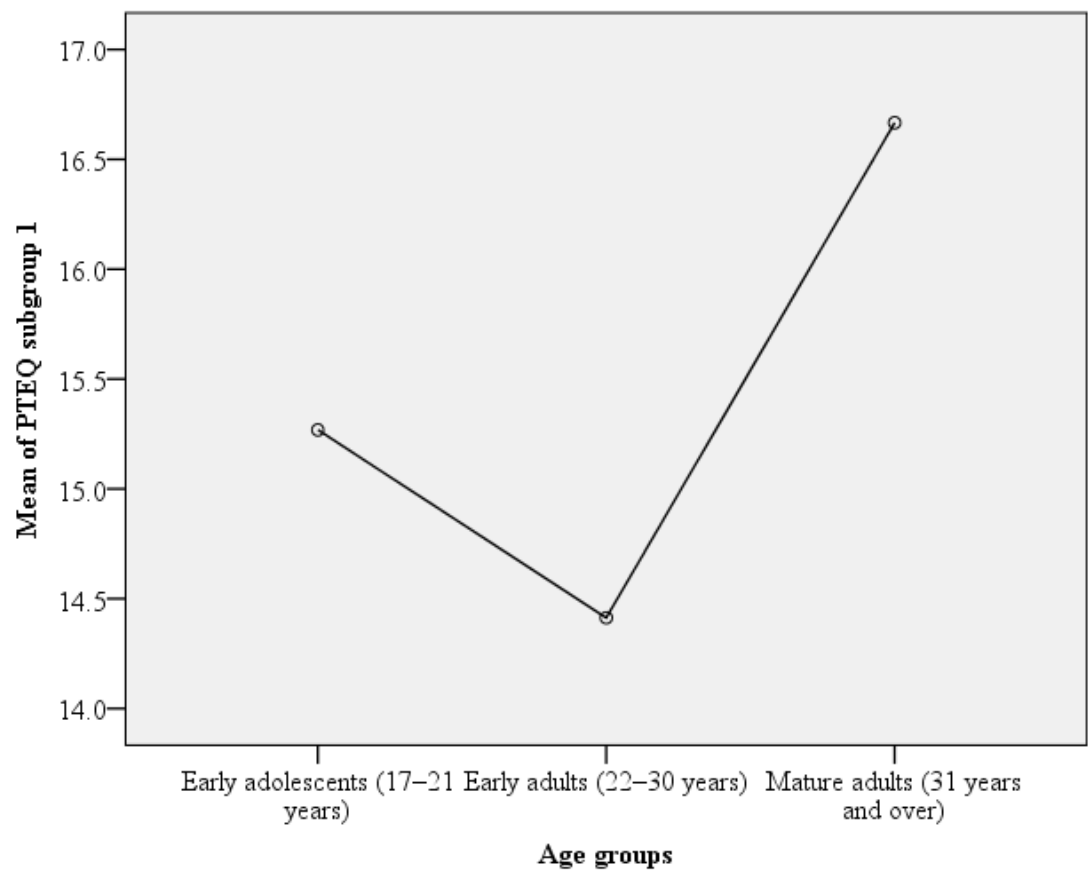
Figure A10.1: Means plot

Appendix 11: SPSS Output—Comparing PTEQ factor 'Teaching importance' factor with the age groups

Oneway

Table A11.1: Descriptives

PT_SUB_2

	N	Mean	Std. Deviation	Std. Error	95% Confidence interval for mean Lower bound	95% Confidence interval for mean Upper bound	Minimum	Maximum
Late adolescents 17–21 years	41	8.98	1.037	.162	8.65	9.30	6	10
Early adults 22–30 years	46	9.02	1.043	.154	8.71	9.33	7	10
Mature adults 31 years and over	15	9.40	.910	.235	8.90	9.90	8	10
Total	102	9.06	1.023	.101	8.86	9.26	6	10

Table 11.2: ANOVA

PT_SUB_2

	Sum of squares	df	Mean square	F	Sig.
Between groups	2.093	2	1.047	1.001	.371
Within groups	103.554	99	1.046		
Total	105.647	101			

Post-hoc tests

Table A11.3: Multiple comparisons

Dependent variable: PT_SUB_2

Bonferroni

| (I) age in three categories	(J) age in three categories	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval	
					Lower bound	Upper bound
Late adolescents 17–21 years	Early adults 22–30 years	–.046	.220	1.000	–0.58	.49
	Mature adults 31 years and over	–.424	.309	.517	–1.18	.33
Early adults 22–30 years	Late adolescents 17–21 years	.046	.220	1.000	–0.49	.58
	Mature adults 31 years and over	–.378	.304	.649	–1.12	.36
Mature adults 31 years and over	Late adolescents 17–21 years	.424	.309	.517	–0.33	1.18
	Early adults 22–30 years	.378	.304	.649	–0.36	1.12
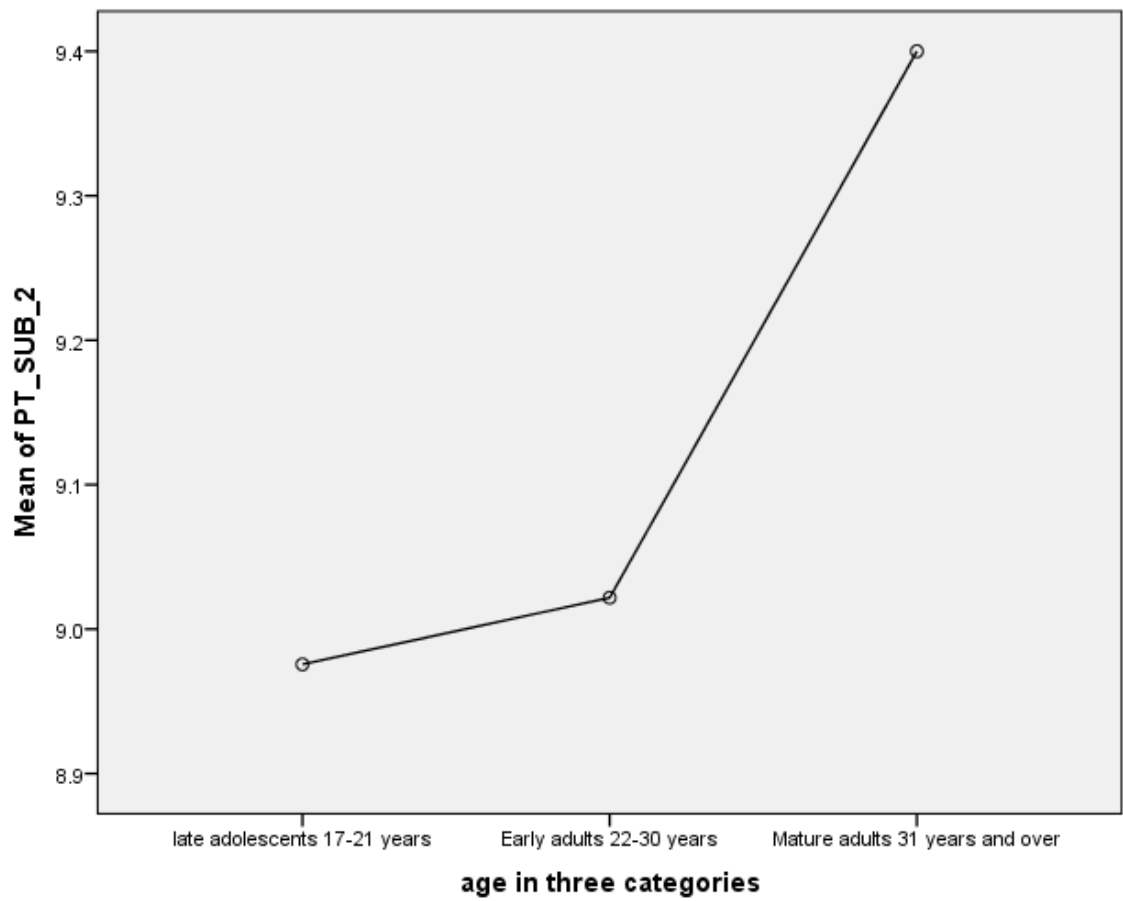
Figure 11.1: Means plot

Appendix 12: SPSS Output—Comparing PTEQ factor 'Peer teaching satisfaction' factor with the age groups

Oneway

Table A12.1: Descriptives

PT_SUB_3

	N	Mean	Std. deviation	Std. Error	95% Confidence interval for Mean		Minimum	Maximum
					Lower bound	Upper bound		
Late adolescents 17–21 years	41	15.24	2.396	.374	14.49	16.00	9	20
Early adults 22–30 years	46	14.39	2.490	.367	13.65	15.13	7	20
Mature adults 31 years and over	15	15.87	1.767	.456	14.89	16.85	13	20
Total	102	14.95	2.402	.238	14.48	15.42	7	20

Table A12.2: ANOVA

PT_SUB_3

	Sum of squares	df	Mean square	F	Sig.
Between groups	30.504	2	15.252	2.734	.070
Within groups	552.251	99	5.578		
Total	582.755	101			

Post-hoc tests

Table A12.3: Multiple comparisons

Dependent variable: PT_SUB_3

Bonferroni

| (I) age in three categories	(J) age in three categories	Mean difference (I-J)	Std. error	Sig.	95% Confidence interval	
					Lower bound	Upper bound
Late adolescents 17–21 years	Early adults 22–30 years	.853	.507	.288	–0.38	2.09
	Mature adults 31 years and over	–.623	.713	1.000	–2.36	1.11
Early adults 22–30 years	Late adolescents 17–21 years	–.853	.507	.288	–2.09	0.38
	Mature adults 31 years and over	–1.475	.702	.115	–3.19	0.23
Mature adults 31 years and over	Late adolescents 17–21 years	.623	.713	1.000	–1.11	2.36
	Early adults 22–30 years	1.475	.702	.115	–0.23	3.19
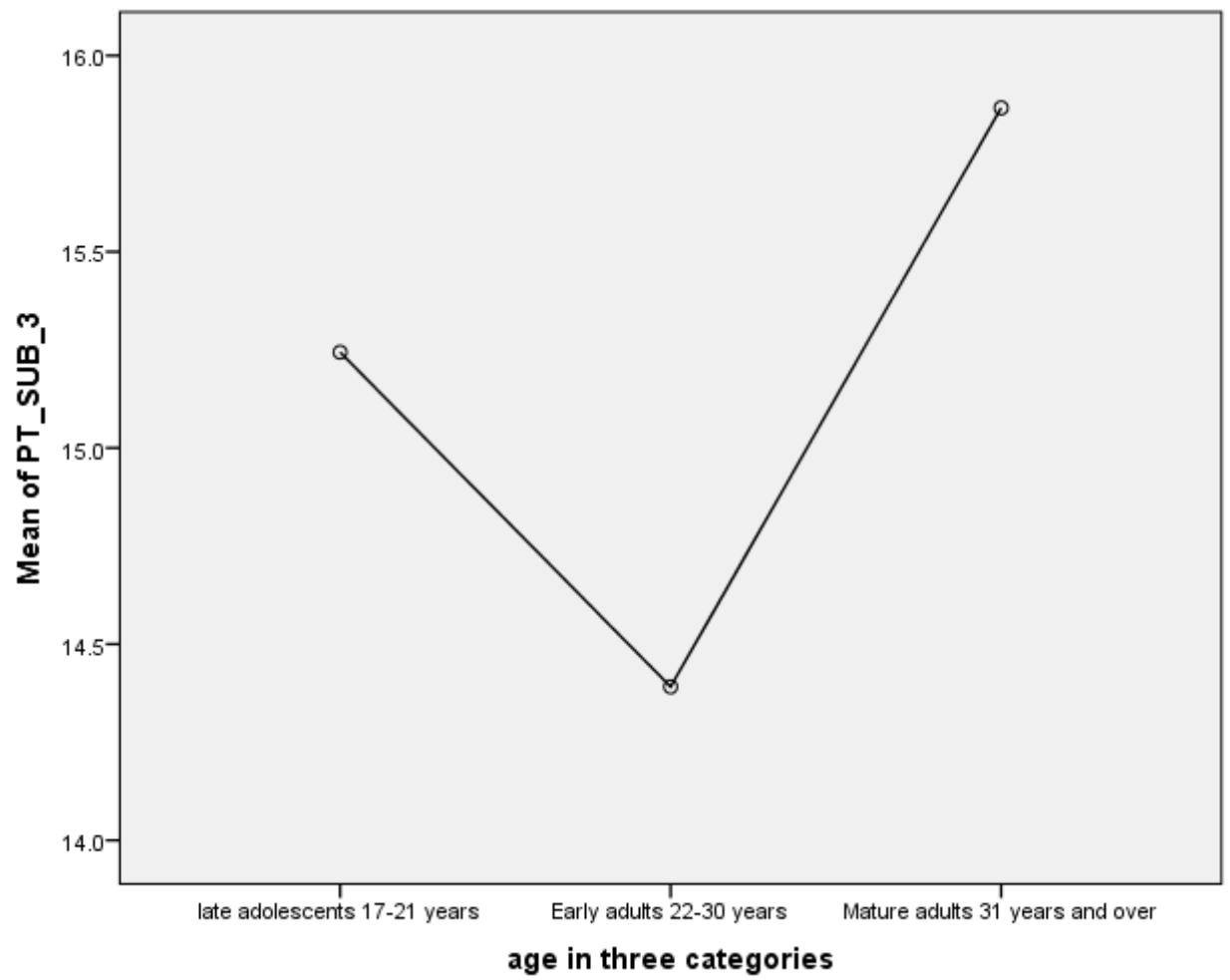
Figure 12.1: Means plot

Appendix 13a: Human research ethics approval

Principal Researcher:	Professor Penny Paliadelis
Other/Student Researcher/s:	Professor Simon Cooper Professor Lisa McKenna Ms Swapnali Gazula
School/Section:	**School of Nursing Midwifery and Healthcare/ Faculty of Health**
Project Number:	**A16-153**
Project Title:	**Reciprocal Peer Tutoring outcomes in laboratory learning of undergraduate nursing students within a regional Australian university: a mixed methods study.**
For the period:	27/10/2016 **to** 16/01/2021

Quote the Project No: A16-153 in all correspondence regarding this application.

Please note: Ethics Approval is contingent upon the submission of Annual Progress reports and a Final report upon completion of the project. It is the responsibility of researchers to make a note of the following dates and submit these reports in a timely manner, as reminders may not be sent out. Failure to submit reports will result in your ethics approval lapsing

REPORTS TO HREC:

Annual reports for this project must be submitted to the Ethics Officer on:
27 October 2017
27 October 2018
27 October 2019
27 October 2020

A Final report for this project must be submitted to the Ethics Officer on:
16 February 2021

These report forms can be found at:
http://federation.edu.au/research-and-innovation/research-support/ethics/human-ethics/human-ethics3

Fiona Koop
Ethics Officer
27 October 2016

Please see attached 'Conditions of Approval'.

CONDITIONS OF APPROVAL

1. The project must be conducted in accordance with the approved application, including any conditions and amendments that have been approved. You must comply with all of the conditions imposed by the HREC, and any subsequent conditions that the HREC may require.

2. You must report immediately anything which might affect ethical acceptance of your project, including:

    - Adverse effects on participants;
    - Significant unforeseen events;
    - Other matters that might affect continued ethical acceptability of the project.

3. Where approval has been given subject to the submission of copies of documents such as letters of support or approvals from third parties, these must be provided to the Ethics Office before the research may commence at each relevant location.

4. Proposed changes or amendments to the research must be applied for, using a '**Request for Amendments**' form, and approved by the HREC before these may be implemented.

5. If an extension is required beyond the approved end date of the project, a '**Request for Extension**' should be submitted, allowing sufficient time for its consideration by the committee. Extensions cannot be granted retrospectively.

6. If changes are to be made to the project's personnel, a '**Changes to Personne**l' form should be submitted for approval.

7. An '**Annual Report**' must be provided by the due date specified each year for the project to have continuing approval.

8. A '**Final Report**' must be provided at the conclusion of the project.

9. If, for any reason, the project does not proceed or is discontinued, you must advise the committee in writing, using a '**Final Report**' form.

10. You must advise the HREC immediately, in writing, if any complaint is made about the conduct of the project.

11. You must notify the Ethics Office of any changes in contact details including address, phone number and email address.

12. The HREC may conduct random audits and / or require additional reports concerning the research project.

Failure to comply with the *National Statement on Ethical Conduct in Human Research* (2007) and with the conditions of approval will result in suspension or withdrawal of approval.

Appendix 13b: Final project report submitted to Human research ethics

Please indicate the type of report	☐ Annual Report (Omit 3b & 5b) ☒ Final Report
Project No:	A16-153
Project Name:	Reciprocal Peer Tutoring outcomes in laboratory learning of undergraduate nursing students within a regional Australian university: a mixed methods study.
Principal Researcher:	Professor Simon Cooper
Other Researchers:	Professor Lisa McKenna Ms Swapnali Gazula
Date of Original Approval:	27/10/2016
School / Section:	School of Nursing and Healthcare Professions
Phone:	03 5122 8032
Email:	s.cooper@federation.edu.au

Please note: For HDR candidates, this Ethics annual report is a separate requirement, in addition to your HDR Candidature annual report, which is submitted mid-year to research.degrees@federation.edu.au.

1) Please indicate the current status of the project:	
1a) Yet to start	☐
1b) Continuing	☐
1c) Data collection completed	☒
1d) Abandoned / Withdrawn:	☐

1e) If the approval was subject to certain conditions, have these conditions been met? (If not, please give details in the comments box below)	☒ Yes	☐ No
Comments: NA		

1f) Data Analysis	☐ Not yet commenced	☐ Proceeding	☒ Complete	☐ None

1g) Have ethical problems been encountered in any of the following areas:		
Study Design	☐ Yes	☒ No
Recruitment of Subjects	☐ Yes	☒ No
	☐ Yes	☒ No
Finance	☐ Yes	☒ No
Facilities, Equipment		
(If yes, please give details in the comments box below)		
Comments: NA		

2a) Have amendments been made to the originally approved project?	
☒ No	☐ Yes
2b) If yes, was HREC approval granted for these changes?	
☐ Yes	Provide detail: ☐ Yes Application for Amendment to an Existing Project ☐ Yes Change of Personnel ☐ Yes Extension Request

☐ No	If you have made changes, but not had HREC approval, provide detail as to why this has not yet occurred:

2c) Do you need to submit any amendments now?	
☒ No	☐ Yes Application for Amendment to an Existing Project
	☐ Yes Change of Personnel
	☐ Yes Extension Request
	* NB: If 'Yes', download & submit the appropriate request to the HREC for approval:
	Please note: Extensions will not be granted retrospectively. Apply well prior to the project end date, to ensure continuity of HRE approval.

3a) Please indicate where you are storing the data collected during the course of this project: (Australian code for the Responsible conduct of Research Ch 2.2.2, 2.5 – 2.7)
Locked filing cabinet in H117.   Electronic data on password protected laptop.   Access to all data is restricted to the named researchers.
3b) Final Reports: Advise when & how stored data will be destroyed   (Australian code for the Responsible conduct of Research Ch 2.1.1)
The data will be securely destroyed after five years (December, 2023). All the paper based raw data will be shredded and the electronic data will be permanently deleted from all electronic devices.

4) Have there been any events that might have had an adverse effect on the research participants OR unforeseen events that might affect continued ethical acceptability of the project?

⊠ No	☐ Yes * NB: If 'yes', please provide details in the comments box below:
Comments: NA	

5a) Please provide a short summary of results of the project so far (no attachments please):

There was positive improvement in attitudes to peer teaching (M = 49.2, SD = 10.0 to M = 52.3, SD = 8.2, p < 0.05, [95% CI = 0.7 to 5.4]). Knowledge scores also increased significantly (M = 6.9, SD = 2.0 to M = 9.7, SD = 1.9), p < 0.05 [95% CI = 2.3 to 3.2]. Aggregate mean knowledge scores increased more for peer teachers (M = 3.3) than they did for peer learners (M = 2.2). Thematic outcomes from focus groups indicated challenging yet beneficial journeys, collective learning along with benefits of RPT including enhanced teaching, self-confidence, communication, and independent and collaborative learning. This study concludes that RPT is effective in clinical skills teaching and sets a foundation for further research.

5b) Final Reports: Provide details about how the aims of the project, as stated in the application for approval, were achieved (or not achieved).

(Australian code for the Responsible conduct of Research 4.4.1)

This research study aimed at assessing the effect of RPT on final year nursing students' knowledge, experience and attitudes. A mixed methods approach, using one group pre-test surveys and post-test design along with focus groups enabled answering the overall research question of 'What is the effect of RPT on nursing students?' Thus, the aims of this project, as stated in the original Ethics application, were met.

6) Publications: Provide details of research dissemination outcomes for the previous year resulting from this project: eg: Community seminars; Conference attendance; Government reports and/or research publications

Gazula, S., McKenna, L., Cooper, S. & Paliadelis, P. 2017 'A systematic review of reciprocal peer tutoring within tertiary health profession educational programs', *Health Professions Education,* pre-publication version available from:

http://dx.doi.org/10.1016/j.hpe.2016.12.001

Presented the research findings at Australasian Nurse Educator Conference, 2017, Christ Church, NZ.

Presented the research findings at Networking for Education in Healthcare, 2017 and 2018, Cambridge, UK.

7) The HREC welcomes any feedback on:

- Difficulties experienced with carrying out the research project; or
- Appropriate suggestions which might lead to improvements in ethical clearance and monitoring of research.

Nil

8) Signatures

| Principal Researcher: | Print name: Prof Simon Cooper | Date: | 11/12/2018 |
| Other/Student Researchers: | Print name: Prof Lisa McKenna | Date: | 11/12/2018 |

| | ……………….. | Date: | 11/12/2018 |
| | Print name: Ms. Swapnali Gazula | | |

Submit to the Ethics Officer, Mt Helen campus, by the due date:

research.ethics@federation.edu.au

Appendix 13c: Human research ethics acknowledgement of final project report

From: Research Ethics <research.ethics@federation.edu.au>
Sent: Tuesday, 11 December 2018 3:07 PM
To: Swapnali Gazula <s.gazula@federation.edu.au>
Subject: RE: Final Report_Project no 16-53A _Signed

Hi Swapnali,

Thank you for the submission of the final report for project A16-153 'Reciprocal Peer Tutoring outcome in laboratory learning of undergraduate nursing students within a regional Australian university: a mixed methods study'. No further information is required.

Kind regards,

Fiona Koop

Coordinator, Research Ethics

Research Services

Federation University Australia | Office 218 | Building F | Mt Helen Campus

PO Box 663 Ballarat VIC 3353

T: 03 5327 9765

E: research.ethics@federation.edu.au W: www.federation.edu.au

Appendix 14: Plain language explanatory statement

SCHOOL OF NURSING MIDWIFERY AND HEALTHCARE

FACULTY OF HEALTH

PROJECT TITLE:	Reciprocal peer tutoring outcomes in laboratory learning of undergraduate nursing students within a regional Australian university: a mixed methods study
PRINCIPAL RESEARCHER:	Professor Penny Paliadelis
OTHER RESEARCHERS:	Professor Simon Cooper
	Professor Lisa McKenna
STUDENT RESEARCHER	Ms Swapnali Gazula (PhD student)

You are invited to participate in this research as a final-year nursing student enrolled in standard cohort at Mt Helen campus to experience and provide your views on reciprocal peer tutoring (RPT). RPT involves students from same year level alternating in teaching and being taught by their peers.

Aim of this research:

The aim of this study is to identify the effect of RPT on student learning within undergraduate nursing education and to obtain your perspectives on this teaching strategy.

What are the possible benefits in participating in this study for me?

Participating in this study could assist you to improve your teaching skills and your ability to observe and provide feedback by teaching your peers. You will be invited to work alongside your peers and hence participation could assist in developing your team work and communication skills. Your participation will enable you to gain a better understanding of how RPT could be used in nursing education and practice.

What are the possible risks for me to participate in this research?

There are no direct risks to you. This study has been approved by the Higher Research Ethics Committee at Federation University Australia to ensure it complies with the ethical requirements and has minimal risks to you as a participant.

Your decision to participate/withdraw from this study will not affect your academic grades and progression. None of the researchers involved in this study will be directly involved in your teaching/assessment during the academic year of 2017. All data you provide including your demographic data will be treated with the strictest confidence. If you feel upset as a result of your peer interaction or any other aspects of this study, you are welcome to access the free counselling service at Federation University Australia on 03 5327 9470

What will the research involve?

As a participant, you will be invited to do the following:

- Complete a questionnaire on knowledge about two clinical skills. This will take about 5–6 minutes. You will be requested to complete this questionnaire twice; first in week 0 and then in week 5 once you have participated in the teaching activities. You will be requested to create a unique code to compare your responses in week 0 and week 4, while maintaining your confidentiality.

- Complete a questionnaire on attitudes towards peer teaching. This will take about 5–8 minutes to complete. You will be requested to complete this questionnaire twice; first in week 0 and then in week 5 once you have participated in the teaching activities.

- Complete an online questionnaire—Clinical Teaching Preference Questionnaire which will elicit your perspectives of being taught by your peers. You will be requested to complete this questionnaire in week 5 only and this will take about 5 minutes to complete.

- Complete a questionnaire on Peer Teaching Experience Questionnaire in week 5, which will take about five minutes.

- You will be randomly allocated into pairs and every student from the pair will be allocated one of two nursing skills that you will teach and demonstrate to your peer in week 3 in the first hour of your nursing laboratory session. Your peer-partner will teach you a different nursing skill, the following week.

- Finally, you will also be invited to participate in a focus group of 5–8 participants in week 11 to explore your experience with RPT. This will take about 1.5 to 2 hours. You will have an option to choose from any of the three group interviews times. The discussions in these focus groups will be audio taped to assist with data

analysis. You will be requested to sign a consent form to indicate your approval to participate in the focus groups.

You are free to choose not to answer questions on the questionnaires or during the focus groups.

How can I teach my peer if I have never taught before?

There has been careful thought given to the planning aspects of this study to prepare you to teach one of two skills and to making this a positive learning experience for you.

All third-year nursing students will explore fundamentals of teaching through core content in the course *NURBN 3018—Teaching, Learning and Leadership for Clinical Practice*. The online module will take students about two hours to complete and will enable them to understand the fundamental principles of teaching, how to be an effective teacher, how to teach in clinical settings and how to provide constructive feedback.

You will also be provided with preparatory material to enable you to teach the identified skill in the form of a standardised lesson plan and video demonstrating the skill you will be teaching. This will be available through Moodle, in the course *NURBN 3017—Contexts of Practice 5: Patient deterioration and management*. This online module will take about 45 minutes to complete.

During your peer interactions in week 2 and 3, you will also have your laboratory tutor present in the nursing laboratory to provide support. However, their role will be maintained passive throughout the RPT session.

How can I speak my mind about my experience with RPT before my peers in a focus group?

All participants will be reminded of confidentiality before participating in the focus groups as you will be sharing your experiences in a group of 5–8 students. Any personal or private information you share during the interview will be treated with confidentiality. You will not be identified in any reporting of the findings as you will be given a pseudonym.

What if I choose not to participate in this study?

Since participation is voluntary, you may choose not to participate in this study. This will only mean that you will not be required to complete questionnaires or participate in the focus group. However, you will still be required to undertake the teaching-learning activity of teaching your peers and getting taught by your peers in week 3 and 4 in NURBN 3017, as this is a core component of that course.

Will I get any monetary reimbursements for my participation in this study?

You will not receive payment for participating in this research. However, all participants will have a chance to win one of three $50 Myers/Coles vouchers through a lucky draw. In order to be eligible to enter this draw, you will be required to complete all the pre and post questionnaires. The three winners will be announced in week 12. Every participant will be given a certificate of participation in this study which you can add to your resume. Participants in the focus groups will be offered light refreshments.

Will I be penalised in any way for my responses in this study?

No. Your responses will not jeopardise you as a student and will have no effect on your academic grades and progression. A code will be assigned for your responses in your group interviews and your online responses will be de-identified to ensure your confidentiality.

Can I withdraw from this study?

Your participation in this study is voluntary and you are under no obligation to participate. You are entitled to withdraw at any time in the study, however since there will be measures to de-identify your online responses, it will not be possible to withdraw your responses once they have been submitted as it will be impossible to identify your exact responses. Also, once the data has been processed for analysing, it will not be possible to withdraw de-identified data, although you can still withdraw your consent to participate in any further stages of the study.

How will the data from this research study be used?

All the data gathered in this study will be de-identified and used in the completion of a Doctoral Thesis by Ms Swapnali Gazula—a PhD student at Federation University Australia. The findings from this study will be published in relevant professional journals and presented at conferences. At the end of the study, a summary of the research findings

can be made available to participants. If you would like to receive a copy of the findings, kindly contact Ms Swapnali Gazula at s.gazula@federation.edu.au after January 2021 and a copy will be forwarded to you.

How will the data be stored and assured confidentiality?

Data storage will comply with the Federation University Australia regulations for storing research data. All the digital data acquired through this research will be stored on computers with password access restricted to the researchers only. Hard copies will be stored in a locked cabinet in the student researcher's office. All the data will be securely stored for minimum of five years after the completion of the study and securely destroyed after that.

Kindly note—your completion of the informed consents implies your consent to participate in this study to fill your responses in the questionnaires and get audio taped during the focus group interviews.

Thank you for taking your time. Your contribution to this study is greatly appreciated.

If you have any questions, or you would like further information regarding the project titled ***reciprocal peer tutoring outcomes in laboratory learning of undergraduate nursing students within a regional Australian university: a mixed methods study***, please contact the Principal Researcher, Professor Penny Paliadelis, Faculty of Health, Federation University Australia

EMAIL: p.paliadelis@federation.edu.au

PH: 03 5327 6445

Should you (i.e. the participant) have any concerns about the ethical conduct of this research project, please contact the Federation University Ethics Officers, Research Services, Federation University Australia,

P O Box 663 Mt Helen Vic 3353 or Northways Rd, Churchill Vic 3842.

Telephone: (03) 5327 9765, (03) 5122 6446

Email: research.ethics@federation.edu.au

CRICOS Provider Number 00103D

Appendix 15: Informed consent form

PROJECT TITLE:	Reciprocal peer tutoring outcomes in laboratory learning of undergraduate nursing students within a regional Australian university: A mixed methods study
RESEARCHERS:	Professor Penny Paliadelis Professor Simon Cooper Professor Lisa McKenna Ms Swapnali Gazula

Consent—Please complete the following information:

I (insert name) _____,

hereby consent to participate in the above research study by completing the surveys and the peer teaching sessions in laboratories during week 3 and 4 of the semester 1, 2017. I also consent in participating in the focus group interviews conducted in week 11 of the semester 1, 2017. I understand that all the views provided by participants will be treated confidentially and used anonymously to inform this research study.

The research program in which I am being asked to participate has been explained fully to me, verbally and in writing, and any matters on which I have sought information have been answered to my satisfaction.

I understand that: all information I provide during through the surveys and focus groups will be treated with the strictest confidence and data will be stored separately from any listing that includes my name and address.

- Aggregated results will be used for research purposes and may be reported in scientific and academic journals.
- I am free to withdraw my consent at any time during the study in which event my participation in the research study will immediately cease and information/data obtained from it will not be used.

- I understand the exception to this is, if I withdraw after information has been aggregated—it is unable to be individually identified—so from this point it is not possible to withdraw my information/data, although I may still withdraw my consent to participate.

SIGNATURE: _____**DATE:** _____.

Appendix 16: Email invitation for students enrolled in NURBN 3018

Dear students (enrolled in NURBN 3018 as Standard Mt Helen student cohort),

You are invited to participate in this research study titled 'Reciprocal peer tutoring outcomes in laboratory learning of undergraduate nursing students within a regional Australian university: A mixed methods study.'

You will be undertaking peer tutoring as a part of NURBN 3023 (week 3 and 4) and NURBN 3018 (week 1) as a part of your curriculum. You need to be enrolled in NURBN 3023 to be eligible for participating in this study. We are inviting you to be involved in evaluating peer tutoring.

 Reciprocal Peer Tutoring (RPT) involves students from same year level alternating in teaching and being taught by their peers.

All standard students at Mt Helen will experience RPT over week 3 and 4 in your regular labs for NURBN 3023. If you choose to not participate in this study, you will still undergo RPT in week 3 and 4 as this is the core component of your course but you will not be completing the questionnaires.

If you agree to participate, you will be requested to fill some questionnaires, which will take no more than 15 - 18 minutes of your time in week 1 and week 5 respectively. Participants will also be invited to focus groups in week 11, where light refreshments will be provided. All students participating in this study will receive a certificate of participation. You will also be eligible to participate in a lucky draw to win one of three $50 Myers/Coles vouchers.

You are free to choose your participation in this study. Your decision will not have any effect on your course progression or grades.

Please take the time to read the attached plain language information sheet, which will answer most of your queries. If you are willing to be involved, please indicate your approval to participate by completing a consent form and survey forms (you will need the first five digits of your driver's licence as a unique code to complete the survey), which will be supplied to you during your NURBN 3018 tutes in week 1.

Thank you for your time.

Researchers:

Prof Penny Paliadelis

Prof Simon Cooper

Prof Lisa McKenna

Ms Swapnali Gazula (PhD Candidate)

Appendix 17: Email invitation for students enrolled in NURBN 3023

Dear students (enrolled in NURBN 3023 as Standard Mt Helen student cohort),

You are invited to participate in this research study titled 'Reciprocal peer tutoring outcomes in laboratory learning of undergraduate nursing students within a regional Australian university: A mixed methods study.'

You will be undertaking peer tutoring as a part of NURBN 3023 (week 3 and 4) and NURBN 3018 (week 1) as a part of your curriculum. Those of you not enrolled in NURBN 3018 will get access to the module on 'Theory on peer teaching' through NURBN 3023 Moodle. We are inviting you to be involved in evaluating peer tutoring.

Reciprocal Peer Tutoring (RPT) involves students from same year level alternating in teaching and being taught by their peers.

All standard students at Mt Helen will experience RPT over week 3 and 4 in your labs for NURBN 3023. <u>If you choose to not participate in this study, you will still undergo RPT in week 3 and 4 as this is the core component of your course but you will not be completing the questionnaires.</u>

If you agree to participate, you will be requested to fill some questionnaires which will take no more than 15–18 minutes of your time in week 1 and week 5 respectively. Participants will also be invited to focus groups in week 11, where light refreshments will be provided. All students participating in this study will receive a certificate of participation. You will also be eligible to participate in a lucky draw to win one of three $50 Myers/Coles vouchers.

You are free to choose your participation in this study. Your decision will not have any effect on your course progression or grades.

Please take the time to read the attached plain language information sheet which will answer most of your queries. If you are willing to be involved, please indicate your approval to participate by completing a consent form and survey forms (you will need the first five digits of your driver's licence as a unique code to complete the survey), which will be supplied to you during your lab in week 1.

Thank you for your time.

Researchers:

Prof Penny Paliadelis

Prof Simon Cooper

Prof Lisa McKenna

Ms Swapnali Gazula (PhD Candidate)

Appendix 18: Self-report questionnaire on attitudes to peer teaching

Please enter the first five digits of your driver's licence. This will be your own unique code for this survey

_____

Demographic data:

Please indicate your response to the following questions by ticking the relevant circle

1. Age-   ○ 17–21 years

                                     ○ 22–25 years

                                     ○ 26–30 years

                                     ○ 31–35 years

                                     ○ 36–40 years

                                     ○ > 41+ years

2. Gender –   ○ Female

                                     ○ Male

3. Campus –   ○ Mt Helen

                                     ○ Churchill

4. Type of student cohort –   ○ Standard

                                     ○ Flexible

5. Prior to this semester, have you ever had experience of teaching peers from the same class/year as yourself?

○ Yes   ○ No

If yes, please specify the course where this occurred:

_____
_____

6. Prior to this semester, have you experienced being taught by your peers from the same class/year as yourself?

○ Yes   ○ No

If yes, please specify the course where this occurred:

_____
_____

Tick the box, which most appropriately describes your response for each item. Please tick only one response for each item.

Sr no	ITEM	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not sure
1.	Teaching is an important role for nurses						
2.	I believe teaching skills will be required of me in my graduate role						
3.	Teaching peers is a good use of time and efforts						
4.	I feel teaching peers will be personally rewarding						

5.	I understand the principles of teaching and learning						
6.	I feel apprehensive teaching my peers						
7.	I feel comfortable teaching my peers						
8.	I believe I have skills for teaching basic clinical skills to my peers						
9.	By teaching my peers, I can reflect on my previous learning						
10.	I enjoy teaching my peers						
11.	I can learn by teaching my peers						
12.	I feel confident to teach a clinical skill to my peers						
13.	There should be more opportunities for peer teaching in the curriculum						
14.	Nurses have a professional responsibility to teach students and their peers						

		Reported confidence and competence of participants					
15.	How would you rate your teaching ability?	Very good	Good	Average	Below average	Poor	Not sure
16.	How <u>confident</u> do you feel now to teach your peers?	Very confident	Fairly Confident	Average	Poorly confident	Not confident	Not sure
17.	How <u>competent</u> do you feel now to teach your peers?	Very competent	Fairly Competent	Average	Poorly competent	Not competent	Not sure
18.	How confident are you in providing honest and helpful feedback to your peers even if it involves providing negative aspects of performance?	Very comfortable	Fairly comfortable	Neutral	Slightly uncomfortable	Extremely uncomfortable	Not Sure

Appendix 19: Knowledge Questionnaire

Please enter the first five digits of your driver's licence. This will be your own unique code for this survey _____

Please select ONLY ONE option for each of the questions below

1. What size of cannula would you use in a patient who needed a rapid blood transfusion?

18 gauge.

20 gauge.

22 gauge.

24 gauge

2. How many attempts should you make to cannulate a patient before passing the job on to a senior colleague?

a) 4

b) 3

c) 2

d) 1

3. What is the maximum duration an IV cannula can remain *in situ,* in the absence of any complications?

a) 24 hours.

b) 36 hours.

c) 48 hours.

d) 72 hours.

4. How often should a cannula be flushed?

a) Every 4 hours.

b) Every 8 hours.

c) Every 12 hours.

d) Every 16 hours.

5. Which one of the following is *not* a use for intravenous infusions?

a) Administer prescribed intravenous fluid.

b) Administer dyes or contrast media for radiographic examinations.

c) Administer prescribed blood products.

d) To orally hydrate a patient.

6. A 14–16-gauge needle is most likely to be used for:

a) children.

b) elderly patients.

c) inserting in the back of the hand.

d) trauma or burns patients.

7. Leakage of blood into the tissues due to the needle being partially inserted into a vein will result in:

a) haemoconcentration.

b) lymphostasis.

c) infection.

d) haematoma.

8. How long should you apply suction to the tracheostomy?

a) Approximately 40 seconds.

b) Approximately 30 seconds.

c) Approximately 15 seconds.

d) Approximately 5 seconds.

9. When during the suction procedure should suction be applied?

a) Only when withdrawing the suction catheter.

b) Only when inserting the suction catheter.

c) Either during insertion or withdrawal, depending on when the patient coughs.

d) Only if the patient coughs.

10. What is the recommended pressure setting for the suction unit?

a) 130 mmHg.

b) 140 mmHg.

c) 120 mmHg.

d) 150 mmHg.

11. What is a tracheostomy?

a) An opening between third and fourth tracheal rings.

b) An opening between second and third tracheal rings.

c) An opening in the anterior chest wall.

d) An opening between first and second tracheal rings.

12. Why can't a patient talk if the cuff is inflated?

a) They are unable to breathe in sufficiently.

b) They are unable to swallow properly.

c) It is too tiring.

d) They are unable to pass air through their vocal cords.

13. What temperature should the humidifier be set to?

a) 18ºC

b) 21ºC

c) 37ºC

d) 40ºC

14. Which of the following statements is incorrect?

Suctioning should be performed:

    a) When the patient asks.
    b) If the patient appears to have difficulty breathing.
    c) Not more than 3 times a day.
    d) As part of a cuff deflation procedure

Appendix 19a: Answer key for Knowledge Questionnaire used for analysis

Answers for each item are highlighted in red.

1. What size of cannula would you use in a patient who needed a rapid blood transfusion?

a) 18 gauge.

b) 20 gauge.

c) 22 gauge.

d) 24 gauge.

2. How many attempts should you make to cannulate a patient before passing the job on to a senior colleague?

a) 4

b) 3

c) 2

d) 1

3. What is the maximum duration an IV cannula can remain *in situ*, in the absence of any complications?

a) 24 hours.

b) 36 hours.

c) 48 hours.

d) 72 hours.

4. How often should a cannula be flushed?

a) Every 4 hours.

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c) Every 12 hours.

d) Every 16 hours.

5. Which one of the following is *not* a use for intravenous infusions?

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d) To orally hydrate a patient.

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c) inserting in the back of the hand.

d) trauma or burns patients.

7. Leakage of blood into the tissues due to the needle being partially inserted into a vein will result in:

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c) infection.

d) haematoma.

8. How long should you apply suction to the tracheostomy?

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c) It is too tiring.

d) They are unable to pass air through their vocal cords.

13. What temperature should the humidifier be set to?

a) 18ºC

b) 21ºC

c) 37ºC

d) 40ºC

14. Which of the following statements is incorrect?

Suctioning should be performed:

a) When the patient asks.

b) If the patient appears to have difficulty breathing.

c) Not more than 3 times a day.

d) As part of a cuff deflation procedure

Appendix 20: Clinical Teaching Preference Questionnaire

Please enter the first five digits of your driver's licence. This will be your own unique code for this survey– _____

Based upon your experience of being **taught by peers**, please complete the following questionnaire:

Please indicate your response to the following statements by ticking **ONLY ONE** relevant circle:

Question number	Preference Item	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1	Teaching is an important role for nurses	○	○	○	○	○
2	I feel freer to approach my instructor for help than I do my peers	○	○	○	○	○
3	My ability to problem solve improves more from instructor teaching than from my peers	○	○	○	○	○
4	I am less anxious when performing a nursing skill in the presence of my peers than my instructor	○	○	○	○	○
5	Being taught clinical skills by my peers increases my interaction and collaboration with other students more than when being taught by my instructor	○	○	○	○	○

6	Being taught clinical skills by my instructor increases my sense of responsibility more than by being taught by my peers	○	○	○	○	○
7	I learn more from my instructor than my peers	○	○	○	○	○
8	I can communicate more freely with my peers than with my instructor	○	○	○	○	○
9	The feedback I receive from my peers is from a student's viewpoint, therefore more honest, realistic, helpful than from my instructor	○	○	○	○	○
10	My peers are more supportive to me when I am performing a nursing skill than my instructor	○	○	○	○	○
11	I am more self-confident and able to perform independently because of being taught by my peers, more so than by my instructor	○	○	○	○	○

Developed by Iwasiw and Goldenberg (1993)

Please feel free to write any comments you have about your peer teaching experience that you would like us to know.

Appendix 21: Peer Teaching Experience Questionnaire

Please enter the first five digits of your driver's licence. This will be your own unique code for this survey _____

Please indicate your response to the following statements by ticking ONLY ONE relevant circle

Question number	Preference Item	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
1	Teaching is an important role for nurses	○	○	○	○	○
2	Experience with peer teaching will help with my graduate nurse role	○	○	○	○	○
3	The peer teaching experience was time and effort well spent	○	○	○	○	○
4	The peer teaching experience was personally rewarding	○	○	○	○	○
5	I now understand the principles underpinning teaching and learning	○	○	○	○	○
6	I was initially apprehensive about the peer teaching requirement in the nursing laboratory	○	○	○	○	○
7	I felt comfortable teaching my peer	○	○	○	○	○
8	I have developed skills for teaching basic clinical skills	○	○	○	○	○
9	The peer teaching experience allowed me to reflect on my own previous learning	○	○	○	○	○
10	I enjoyed working with my peers	○	○	○	○	○
11	I felt uncomfortable teaching my peers	○	○	○	○	○

12	I would be more confident teaching a clinical skill after this experience	○	○	○	○	○
13	There should be more opportunities for peer teaching in the curriculum	○	○	○	○	○
14	Nurses have a professional responsibility to teach students and their peers	○	○	○	○	○

Adapted from McKenna and French (2011)

Please feel free to write any comments you have about your peer teaching experience that you would like us to know.

Appendix 22: Focus Group interview schedule

Aim of the focus group: To determine student perspectives on experiencing Reciprocal Peer Tutoring (RPT) within a laboratory setting.

Time: approximately 1 hour 45 minutes to 2 hours

Timing: 22nd (11:30–13:30 hrs), 23rd (10:00–12:00 hrs) and 25th (12:30–14:30) and 26th (10:30–12:30) May, 2017

Venue: P915 (Meeting Room)

Number of participants: 4 to 8 per focus group.

Facilitators: Student researcher facilitated the discussion using the following guide.

Audio recording of the session: Yes.

Light refreshments were provided during the session.

Participants were read out the Plain Language Information Sheet. They were reminded of the consent form signed by them at the start of the study, which included consent to participate in the focus group. They were informed of being audio-recorded during the session. They were also reminded that although their names will be addressed during the session, their responses will remain anonymous and confidential in disseminating the results. They were also requested to not share any information discussed during the focus group sessions.

(Participants were provided with a hard copy of the original PLIS and informed consent)

- Introductory question to get participants talking (breaking the ice question):
    - Please introduce yourself to the group.

The following questions were asked by the researchers:

Participants' were encouraged to expand on their responses by prompting them to discuss their thoughts and perceptions about RPT.

1. What are your perceptions about teaching and being taught by your peers (RPT) broadly?
2. Which aspects were most challenging for you in this experience?
3. Did you enjoy the experience of RPT? – Why or why not?

4. Did your feelings about RPT change or remain the same after you completed the activities?

5. What are your thoughts about the two clinical skills you learnt/taught over the two weeks? Were there any similarities/differences in your experience over these two weeks?

6. Has this experience impacted upon your perception on nurses' teaching roles?

7. Have you have gained/learnt anything as a result of being involved in RPT? (academic/ other skills)

8. Do you think this experience will impact on your role as a graduate nurse, if so how?

9. How could we develop RPT for future students?

10. Is there anything else you would like to share about your experiences participating in RPT?

Potential prompt questions:

- You mentioned RPT helped you in 'X', can you elaborate further?

You said you found RPT challenging in 'X', can you explain why?

Appendix 23: SRA questionnaire – Relevance and Clarity assessment

Please assess each item for:

- Relevance – is this item relevant to a study examining student nurses attitudes to peer teaching as well as their confidence and competence to teach peers? (1= not relevant; 2=somewhat relevant; 3= quite relevant; 4= highly relevant)
- Clarity – is this item clear? Is there any uncertainty or ambiguity. (1= not clear; 4= totally clear)

	Item	Relevance	Clarity
1	Teaching is an important role for nurses	1 2 3 4	1 2 3 4
2	I believe teaching skills will be required of me in my graduate role	1 2 3 4	1 2 3 4
3	I understand the principles of teaching and learning	1 2 3 4	1 2 3 4
4	Teaching peers is a good use of time and efforts	1 2 3 4	1 2 3 4
5	I feel teaching peers will be personally rewarding	1 2 3 4	1 2 3 4
6	I feel apprehensive teaching my peers	1 2 3 4	1 2 3 4
7	I feel comfortable teaching my peers	1 2 3 4	1 2 3 4
8	I believe I have skills for teaching basic clinical skills to my peers	1 2 3 4	1 2 3 4
9	By teaching my peers, I can reflect on my previous learning	1 2 3 4	1 2 3 4
10	I enjoy teaching my peers	1 2 3 4	1 2 3 4
11	I can learn by teaching my peers	1 2 3 4	1 2 3 4
12	I feel confident to teach a clinical skill to my peers	1 2 3 4	1 2 3 4
13	There should be more opportunities for peer teaching in the curriculum	1 2 3 4	1 2 3 4
14	Nurses have a professional responsibility to teach students and their peers	1 2 3 4	1 2 3 4
Reported confidence and competence of participants			
15	How would you rate your teaching ability? (on a scale of 0-5)	1 2 3 4	1 2 3 4
16	How confident do you feel now to teach your peers? (on a scale of 0-5)	1 2 3 4	1 2 3 4

17	How <u>competent</u> do you feel now to teach your peers? (on a scale of 0-5)	1 2 3 4	1 2 3 4
18	How confident are you in providing honest and helpful feedback to your peers even if it involves providing negative aspects of performance? (on a scale of 0-5)	1 2 3 4	1 2 3 4

Tool feasibility **Using the following scales how feasible was the Self-report attitudes to peer teaching and teaching confidence, competence tool to complete?**	
How easy was this tool to complete (1= not easy – 10 = very easy)	1 2 3 4 5 6 7 8 9 10
On average how long did it take you to complete	…………………………seconds

How many years have you taught as a nursing academic	…………………years
Highest academic qualification	

Appendix 23a: SRA – Relevance assessment findings

Items rated 3 or 4 on a 4-point relevance scale (1= not relevant; 2=somewhat relevant; 3= quite relevant; 4= highly relevant)

SRA tool item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number in agreement	Item CVI
1	X	X	X	X	X	X	6	1.00
2	X	X	X	X	X	X	6	1.00
3	X	X	X	X	X	X	6	1.00
4	X	X	X	X	X	X	6	1.00
5	X	X	X	X	X	X	6	1.00
6	X	X	X	X	X	X	6	1.00
7	X	X	X	X	X	X	6	1.00
8	X	X	X	X	X	X	6	1.00
9	X	X	X	X	X	X	6	1.00
10	X	X	X	-	X	X	5	0.83
11	X	X	X	X	X	X	6	1.00
12	X	X	X	X	X	X	6	1.00
13	X	X	X	X	X	X	6	1.00
14	X	X	X	X	X	X	6	1.00
15	X	X	X	X	X	X	6	1.00
16	X	X	X	X	X	X	6	1.00
17	X	X	X	X	X	X	6	1.00
18	X	X	X	X	X	X	5	1.00
Relevant proportion	1.00	1.00	1.00	0.94	1.00	1.00	Mean I-CVI = 0.99	

Appendix 23b: SRA – Clarity assessment findings

Items rated 3 or 4 on a 4-point clarity scale (1= not clear; 2= somewhat clear; 3= quite clear; 4= totally clear)

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number in agreement	Item CVI
1	X	X	X	X	X	X	6	1.00
2	X	X	X	X	X	X	6	1.00
3	X	X	X	X	X	X	6	1.00
4	X	X	X	X	X	X	6	1.00
5	X	X	X	X	X	X	6	1.00
6	X	X	X	X	X	X	6	1.00
7	X	X	X	X	X	X	6	1.00
8	X	X	X	X	X	X	6	1.00
9	X	X	X	X	X	X	6	1.00
10	X	X	X	X	X	X	5	1.00
11	X	X	X	X	X	X	6	1.00
12	X	X	X	X	X	X	6	1.00
13	X	X	X	X	X	X	6	1.00
14	X	X	X	X	X	X	6	1.00
15	X	X	X	X	X	X	6	1.00
16	X	X	X	X	X	X	6	1.00
17	X	X	X	X	X	X	6	1.00
18	X	-	X	X	X	X	5	0.83
Relevant proportion	1.00	0.94	1.00	1.00	1.00	1.00	Mean I-CVI = 0.99	