Peer Teaching and Learning in Clinical Education
A Systematic Review of Literature

Jacinta Secomb

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The University of South Australia

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Abstract

Informal and incidental use of peer education is common practice, but it has lacked definition in its implementation. Considerable literature is in existence. However, there is a lack of quality evidence on the application and effectiveness of this educational intervention. This study is an analysis of existing data on the intervention peer teaching and learning in clinical education. In the context of this thesis peer teaching and learning is undergraduate health science students teaching and learning from one another in clinical practice settings. The purpose of this study is to increase the theoretical body of knowledge, which informs this educational practice.

Method- A search was conducted of health science and educational electronic databases using the terms *peer, clinical education* and *undergraduate.* The set limitations of the search were publication after 1980, English language and research paper. From this thirteen articles met the inclusion criteria, after rigorous critical and quality appraisal. This appraisal was conducted with a tool developed by the researcher that allowed the synthesis of both quantitative and qualitative studies specific to education. The authors of included studies were contacted regarding knowledge of existing articles that had been missed in the initial search. Handsearching of two key journals, Nurse Education Today and The Journal of Nursing Education, produced no further studies. The selected studies were rated according to the National Health and Medical Research Council, 2000 (NHMRC) levels of evidence for guideline development. The results have been collated into a narrative summary.

Outcomes- According to the NHMRC (2000) guidelines the evidence is low, it was accumulated, from both quantitative and qualitative studies and is listed, along with the recommendations, in the final chapter of this thesis. This study demonstrated mostly positive outcomes on the effectiveness of peer teaching and learning; it increases student's confidence in clinical practice, enhances learning in the psychomotor, affective and cognitive domains. And evidence exists that it allows for greater student numbers in a clinical practice area. The negative aspects identified included poor student learning particularly if personalities or learning styles were not compatible and a reduction in time spent singularly with the clinical instructor.

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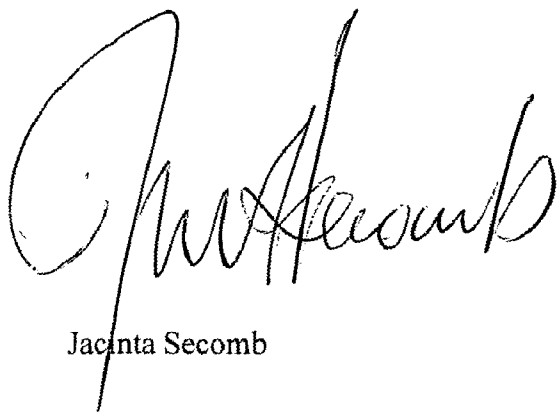
Declaration

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or a diploma in any university; and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.



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Jacinta Secomb Date

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Glossary of Terms

Bias-any influence that may alter the outcomes of a research study (Glasziou et al 2001; Langford 2001)

Case-study -"and in-depth research study of an individual unit" (Langford 2001, page 314).

Control-group- "the group of subjects in an experimental study that do not receive the treatment" (Langford 2001, page 314).

Data- "measurable units of information collected for the purposes of analysis" (Langford 2001, page 315).

Database- "a collection of related information such as a catalogue, index or abstract" (Langford 2001, page 316).

Dissertation (thesis)- "a research paper written by a graduate in fulfilment of a higher post-graduate research degree" (Langford 2001, page 315).

Descriptive statistics- "statistics used to describe and summarise data" (Langford 2001, page 315).

Descriptive study- "quantitative research that describes the concepts underpinning a study" (Langford 2001 page 315).

Experimental study- "quantitative research in which one concept (independent variable) is manipulated to determine whether another concept (dependant variable) is affected" (Langford 2001, page 315).

Extraneous variable- "variable that interferes with the relationship of the independent and dependant variables in a specific study" (Langford 2001, page 315).

Generalisation- "the ability to apply a study results from a sample to a population" (Langford 2001, page 316).

Grey Literature- literature from conference proceedings, reports, theses and unpublished studies (Glasziou et al 2001).

Heterogeneity- "This refers to the differences in treatment effect between studies contributing to a meta-anlaysis. If there is significant heterogeneity, this suggests that the trials are not estimating a single common treatment effect" (Glasziou et al 2001 page 121).

Inductive reasoning- "A logical system of thinking that begins with the component parts and builds them into a whole" (Langford 2001, page 72).

Interpretative reasoning- "is making sense of the findings and how they fit into the existing body of knowledge" (Langford 2001, page 316).

Interview-" instrument used to collect subjective data using oral question and answer format, maybe structured or non-structured" (Langford 2001, page 317).

Literature review- "a critical summary of the available theoretical and research literature on a particular topic, it places the research problem for a particular study in the context of what is currently known about the topic" (Langford 2001, page 317).

Measurement- "a set of rules used to assign numbers as variables" (Langford 2001, page 317).

Meta-analysis- "a statistical technique that pools and examines the statistical outcomes of more than one research study" (Langford 2001, page 318).

Method- "A means or manner of procedure, a regular and systematic way of accomplishing something" (Dictionary.com, n.d. ¶2).

Methodology – "the science of experimental method" (Goodman et al 1991, page 65).

Paradigm - set of beliefs. "A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline" (Dictionary.com, n.d. ¶3).

Population- "all known subjects that possess a common characteristic of interest to a researcher" (Langford 2001, page 319).

Qualitative research- "an objective way to study the subjective human experience, using non-statistical methods of data analysis" (Langford 2001, 319).

Qua*ntitative research*- "a systematic, objective research approach that gathers information that has been measured by an instrument, uses statistical analysis, to measure numerical data" (Langford 2001, page 319).

Random assignment-"placement of subjects into a control group using techniques that ensures each subject has an equal chance" (Langford 2001, page 319).

Reliability- "dependability and trustworthiness of information" (Langford 2001, page 320).

Research- "a systematic process using both inductive and deductive reasoning to confirm and refine existing knowledge and build new knowledge" (Langford 2001, page 320).

Retrospective studies- are studies that analyse data on factors or events that occurred before the onset of the study (Langford 2001).

Rigour- "Rigorous qualitative research is trustworthy and can be relied upon by other researchers. 'Rigour' is preferred to the terms validity and reliability used by quantitative researchers, because rigour indicates different methodology involved in the research on meanings and interpretations" (Rice & Ezzy 2001 page 257).

Sample-"a subset of a population selected to participate in a research study" (Langford 2001, page 320).

Snowballing- a search of bibliographies or reference lists of relevant papers or a citation search to identify missed papers (Glasziou et al 2001).

Synthesise- to combine, so as to form a more complex product (Glasziou et al 2001).

Theme- "A grouping of data emerging from research and one to which the researcher gives a name" (Rice & Ezzy 2001, page 65).

Theoretical framework- "the frame or reference underpinning a research study" (Langford 2001, page 321).

Validity – "a characteristic of a good instrument, concern with the credibility of a study" (Langford 2001, page 322).

Variable- "a concept, characteristic or trait that varies" (Langford 2001, page 322).

Chapter One: The Context of the Investigation

Introduction

In this systematic review of literature primary and secondary research articles have been synthesised for evidence on the effectiveness of peer teaching and learning in undergraduate clinical education within the health sciences. This chapter will introduce the background material that has informed this review and influenced the choice of methodology. More specifically, this chapter will provide an overview of the context in which the research is located, the scope, activity in this field and will identify the significance of the approach to the research question.

1.1 Background

The purpose of health science programs is to provide undergraduate students with the skill, knowledge and attitudes that will enable their development into competent practitioners (Ladyshewsky 2000). Consequently, it is important to their development that they have access to 'real-world situations' (clinical placements) to apply these attributes in preparation for graduate practice (DeClute & Ladyshewsky 1993 page 683). Providing clinical placements for undergraduate students is becoming problematic for universities and higher education centres. Demand for clinical placement has increased in undergraduate programs in Australia and other countries, but the clinical placement opportunities are decreasing now to the point that demand exceeds supply. This shortage is the direct result of fiscal demands on global health care systems, which have lead to the endemic rationalisation of services (National Review of Nurse Education NRNE 2002; Currens 2003). Accordingly, centres of higher learning are using more 'flexible' and innovative education models that optimise the available clinical placement opportunities (Currens 2003 page 540). Many of these innovative models are using peer teaching and learning in their framework.

Using peers in higher education to promote academic gains is not a recent concept (Blowers et al 2003). It is common practice for peers to review journal articles and to tutor in tertiary educational programs (Lake 1999). This approach aids in professional development and may increase educational outcomes for the recipients (Ladyshewsky 2000). From a pragmatic perspective, the implications that it will reduce the effects of the fiscal constraints and increased student numbers, whilst decreasing pressure on clinical staff makes it an attractive option for stakeholders (Ladyshewsky 1998). Not only primary studies assert benefits from the use of peer teaching and learning. Recent reviews of nursing and physiotherapy literature conducted by the Queensland Nursing Council (QNC 2001), National Review of Nursing Education (NRNE 2002) and Currens (2003) also suggest benefits from its use.

Historically, the practice of using peers incidentally or purposefully in the education of apprentice or undergraduate health science students is a well-established tradition (Currens 2003; Blowers et al 2003; Topping 1996). Although disputation exists, regarding the origins of this educational intervention. Currens (2003) in a review of literature suggests origins as cited by McLaughlin et al (1995) 'peer teaching and learning was first conceptualised by Bell in the eighteenth century' (page 541). Although stating different origins in a review of literature on 'The Effectiveness of Peer Tutoring in Further and Higher Education' Topping (1996) reported that this teaching and learning strategy could be traced back as far as the 'ancient greeks' (page 322). However, Kammer (1982) in an observational study claimed first documented use occurred in New York City, in a plan called the 'Lancastrian system' (page 17). Under this system the teacher 'taught the monitors', each monitor then transferred that knowledge on to ten allocated pupils 'freeing the teacher to manage 200-600 students' (Kammer 1982 page 17). Both Kammer (1982) and Topping (1996) established in their papers that early employment of this intervention used the peer tutor as the 'surrogate teacher' in a linear model of knowledge transmission. It was not recognised

until later that teaching and learning between peers was very different to the teacher student relationship. Peer education can be understood through the social constructionist view of cognitive development (Currens 2003; Topping 1996).

New knowledge is created from social interaction and collaboration. This is because 'higher levels of learning are facilitated through social interaction, whereby new understanding arises when assumptions are challenged' (Currens & Bithell 2003, page 205.) Although this interactive method of teaching and learning has been widely used in higher education it still lacks an 'explicated theoretical base' (Iwasiw & Goldenberg 1993, page 660).

The body of knowledge surrounding peer education is substantial, and much literature describes the positive impact on undergraduate students' development.

In a comparative observational study of nursing students teaching and learning the clinical skill of blood pressure monitoring in a simulated clinical environment, Clarke & Feltham (1990) reported increased learning from 'active participation and verbalisation, as well as the strong motivation of working with a peer' (page 57). Walker-Bartnik et al (1984) in a longitudinal study of the peer-tutoring program at the University of Maryland for medical students espoused the virtues of this educational intervention. 'Upperclassmen' (senior students) were allocated as tutors to junior students (page 314). It was reported that this collaboration increased organisational skills for both cohorts. Additional implications from this research were that junior students developed more efficient study skills and increased level of academic performance. Upperclassmen found value in tutoring, as an effective revision tool for the standardised examination in application for their medical licence.

Ladyshewsky's (2002) comparative study also examined the effect of reciprocal peer coaching on the clinical competency and clinical reasoning skills of third year physiotherapy students in a simulated clinical environment. Students in the reciprocal peer-coaching group scored significantly higher than the individual group. In all of these studies there was no explanation on the implementation of interventions, how these outcomes were established, and why the results occurred.

Furthermore, not all literature reports a positive impact from peer teaching and learning on learning outcomes. Costello (1989) in a discussion paper indicated that not all learning between peers was desirable and maintained that peer teaching and learning may in some instances have a negative impact on student development. Similarly, Faure et al (2002) in a case study of two physical therapy students reported that student incompatibility lead to poor learning outcomes. These findings suggest a greater theoretical base needed to be established.

Implications of the positive and negative effects of this teaching and learning strategy and the generalisability of the results across the broader context of the health sciences and clinical practice needs to be authenticated.

There is a lack of clarity and consensus surrounding peer teaching and learning and its influences on short term outcomes such as: clinical practice development, feedback increasing undergraduate development and increased learning opportunities. In addition the implications for graduate practice, how peer teaching and learning will impact on the use of evidence-based practice and life-long learning needed to be made evident.

The lack of cohesive substantiation for using peer teaching and learning in clinical education therefore warranted an investigation that systematically investigated this topic. A review and synthesis of the literature has helped to identify how and if curriculum should guide and use this teaching and learning strategy. Furthermore, this rigorous inquiry has investigated the cohesiveness of peer teaching and learning with existing teaching and learning strategies, in the achievement of maximal clinical educational outcomes for the graduating student.

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1.2 The Investigation

Widespread re-configuration of clinical education has occurred in response to the social, political, economic and cultural demands on present health-care service providers. Higher education centres have moved away from the traditional and expensive 'supervision model' (employee of higher education centre directly supervising teaching and learning in clinical practice) and the unreliable 'preceptor model' (clinical staff of the service provider undertake teaching and assessment) (Andre 2002 page 34) to more innovative, flexible approaches to clinical education (NRNE 2002; QNC 2001). Many of these approaches purposefully use peers as mentors and teachers to relieve pressure on clinical staff, and supervise beginning students (Currens 2003; NRNE 2002; Clarke & Feltham 1990). It has been the aim of this systematic review of literature to establish a theoretical base, locate areas of further inquiry and make recommendations for the implementation of peer teaching and learning in clinical practice. In order to provide evidence for these recommendations and guidelines, primary and secondary research articles have been synthesised to determine the effect of formalised peer teaching and learning strategies on the development of undergraduate qualities.

To provide evidence for curricula, I needed to find a measure of the effect within the literature. After the analysis of a broad range of educational literature it became evident that the following 'core characteristics' or learning outcomes would inform this review:

- psychomotor domain- clinical practice skills
- cognitive domain-clinical reasoning skills
- affective domain-ability to be empathetic
- increased learning opportunities
- ongoing understanding of their own development
- student leadership skills
- student's appreciation of life long learning

Furthermore in creation of a greater understanding of the mechanisms empowering this intervention, the literature was analysed for judgements by students, academics, clinicians and clients on its effect in clinical practice:

- evaluation and satisfaction for the clinical education experience
- appreciation for this practice in clinical service venues

Learning outcomes were specifically chosen to inform this investigation to enable the reviewer to analyse 'observable' behaviours within the literature (Mc Allister 2001). It was important to analyse these learning outcomes in answer to the research question informing this systematic review of literature.

The primary research question addressed in this study is:

Is peer teaching and learning an effective educational intervention during clinical placements for undergraduate health science students?

The literature was synthesised for the effectiveness of peer teaching and learning on the learning outcomes and core characteristics. Only high quality studies relevant to the question were included, following rigorous critical and quality appraisal of each potential study. The results were then tabulated with inclusion and exclusion rationale, level of evidence and relevant data (see Appendix A).

The systematic review protocol that provided the framework for this study was adapted from the National Health and Medical Research Council (NHMRC 2000) guidelines for developing systematic reviews. In addition, as this was a review of effectiveness of an intervention, the Cochrane Collaboration (permission not needed, based on the University of York Guidelines for Effectiveness, 1996) was also used in preparing the initial protocol. Again as this is a review of 'clinical education' and 'effectiveness' the Campbell Collaboration (2003) protocol was perused. Dr Chad Nye of the same institution gave feedback on the initial protocol.

The scope of literature synthesised in this investigation is limited to primary/secondary studies reported in English from peer-reviewed journals published in Australia, United States of America, Canada, South Africa and the United Kingdom.

1.3 Definitions

Although there is a comprehensive glossary of terms at the front of this thesis, there is divergent use of the terms peer teaching and learning, clinical placements and effectiveness in health science and educational literature, so clarification in the context of this investigation was established prior to synthesis.

Peer Teaching and Learning

Peer tutors/teachers are pupils/students at similar or differing levels of education, teaching and learning from one another (Clarke & Feltham 1990; Costello 1989). Peer teaching and learning is connected. Peers facilitate their learning by providing emotional support, feedback and assisting with physical tasks (Aston and Molassiotis 2003; QNC 2001). In the context of this thesis, peer teaching and learning is undergraduate health science students teaching and learning from one another in clinical practice settings. Students are enrolled in the same course at university and diversity may or may/not exist in the level of education.

Learning (acquisition of knowledge) occurs on a continuum; lower order students are able to declare knowledge they can 'identify, name and describe processes and structures', higher order students 'problem solve, hypothesise and reflect' (Andre 2002; Biggs 1999; Perry 1970). The learning outcomes in this review have been synthesised for the effect of peer teaching and learning on the whole continuum involved in the acquisition of knowledge, as the entire teaching and learning dichotomy is interlinked. Teachers facilitate student's acquisition of knowledge (Biggs 1999; Rowles & Brigham 1999) whilst increasing their own knowledge development (Walker-Bartnik et al 1984). As a consequence, in this review peer teaching and learning is viewed as a collaborative and co-operative learning strategy (Ladyshewsky 1995).

Clinical Placements

The placement of students in clinical practice settings is an integral part of clinical education for health science students (Quinn 1995). It enables students to implement theoretical knowledge and develop in the cognitive, psychomotor and affective domains. Laboratory sessions may also come under the banner of clinical education. These are staged educational sessions utilising mannequins or actors in a simulated clinical environment. In this thesis however, these

studies have been excluded as clinical practice in simulated clinical environments is seen very differently to clinical practice within the literature. The literature reviewed has students placed in service provider organisations with clinical staff and 'real' clients/patients in a diverse array of health care venues such as hospitals, community health services and mental health services.

Effective Educational Intervention

Literature included in this secondary study has been synthesised for evidence of increased student performance or decreased student performance in the identified core characteristics and learning outcomes outlined on page 17. The overall effect, validity, reliability and generalisability of the findings are discussed in detail later in the last three chapters of this thesis. The recommendations based on the synthesis of data are described and evidenced in Chapter Six: Recommendations and Future Directions.

1.4 Using Systematic Literature Reviews to Provide Evidence for Education

There has been speculation of publication bias in favour of positive findings in studies assessing the effectiveness of problem based learning (Davies et al 2000). Additionally, primary studies in educational research cover a wide range of theories and methodologies. With the increased importance of lifelong learning educational research now encompasses people from diverse age ranges, this adds to the complexity of research studies that inform education (Campbell Collaboration 2003; Davies et al 2000). These complexities have rendered past reviews of health science education literature of little value and with uncertain conclusions (Suri 2000; Davies et al 2000) when applied to the current situation. These complexities have been taken into account when developing the framework of this review.

Methods of reviewing primary studies range from empirical synthesis to narrative summaries of observational data (NHMRC 2003; Glasziou et al 2001). In order, to thoroughly investigate the effectiveness of peer teaching and learning in clinical education and to provide evidence-based guidance for best practice in clinical education, this analysis of literature will incorporate studies using both quantitative and qualitative methodologies. Therefore a framework was required that allowed the synthesis of both.

There is dispute about the analysis of qualitative primary studies. Traditional systematic reviews of qualitative primary studies have been labelled inconclusive narrative reports (Booth 2001; Suri 2000). These reviews have not been systematic in their methodology, so only the very experienced researcher was able to find value in the data. They are also considered to be highly subjective (Suri 2000). Therefore, it was important to the outcome of this review of literature, that a rigorous inquiry was conducted.

The most rigorous approach to evidence in meeting the requirements of the masters program was the combination of NHMRC, Cochrane and Campbell Collaborations protocols. This combination will achieve a broad inquiry into the effectiveness of peer teaching and learning in clinical practice. In doing so, it provides a balanced theoretical base for the utilisation of this teaching and learning strategy in clinical education.

1.5 Delimitations of this Review

A meta-analysis of primary research articles has not been achievable within the constraints of this master's project. Guided by Dr Chad Nye, statistical pooling of studies that rate in the NHMRC levels of evidence (see Table 1, Chapter

Two: The Evidence Provided by Systematic Reviews of Literature) will occur as a future project and lead to registration as a Campbell Collaboration review.

I have a particular interest in nursing curricula and a greater understanding of the culture surrounding nursing, so this may have influenced the discussion of outcomes in Chapter Five: Discussion of the Evidence.

Because the included studies revealed inconsistencies following critical and quality appraisal (see Chapter Four: Overview of the Studies for details), my confidence in many of the recommendations is limited. This is detailed in Chapter Six: Recommendations and Future Directions.

In addition, a thorough discussion of the theoretical concepts underpinning this review was unachievable in the timeframe allocated to this master's project. However, the relevant educational and cognitive theories that inform the body of knowledge surrounding peer teaching and learning have been linked into discussions throughout this thesis. In addition, the theoretical concepts underpinning the pooling of qualitative research data came from discussion papers as this is an area of inquiry that is still in the process of substantiating a theoretical base.

The literature synthesised in this systematic review of literature, are research articles from peer review journals, therefore publication bias exists. Although grey literature was analysed and considered experts in this field were contacted, these strategies have not accomplished minimisation of publication bias due to poor responses from experts.

1.6 Overview of Thesis

Chapter One: Context of the Investigation

Chapter one outlines the framework of this investigation. It introduces the background literature that provides the context in which the research is located. It identifies the importance of the research question, and the choice of approach. Additionally, it briefly summarises the investigation.

Chapter Two: The Evidence Provided by Systematic Reviews of Literature

This chapter discusses what constitutes evidence in systematic reviews of literature. It introduces the theoretical concepts that underpin this review, and provides an explanation of the method of synthesis that has provided evidence in the formation of recommendations for curricula.

Chapter Three: Methodology and Methods

Chapter three provides the rationale for the choice of methodology to answer the research question. Furthermore, this chapter describes the mechanics of this systematic review of literature.

Chapter Four: Overview of the Included Studies

Chapter four provides a rigorous critical and quality appraisal of the studies included. The relevance, validity, reliability and generalisability of the studies are detailed. Finally, the themes within the literature are discussed within the context of how reliable the studies informing them are.

Chapter Five: Discussion of the Evidence

This chapter discusses the findings of this systematic review of literature, statements are made about the most important findings. Tables and figures are used for maximal visual impact to relay these findings. This chapter provides the framework for Chapter Six: Recommendations and Future Directions.

Chapter Six: Recommendations and Future Directions

Chapter six overviews this systematic review of literature, the significance of the findings in answer to the research question are stated and discussed within the existing body of knowledge. Recommendations are made for curricula development along with the strength of evidence supporting them. Finally, the value of this secondary study and the future directions are communicated.

Chapter Two: The Evidence Provided by Systematic Reviews of Literature

Introduction

The fundamental principle of this investigation is to provide a theoretical body of knowledge for clinical education based on the best available evidence, and in providing the evidence, ensure that the findings are communicated for use in the development of curricula. The effectiveness of peer teaching and learning as an educational intervention in clinical education is under review. Therefore, this chapter discusses what constitutes quality evidence for clinical education and the significance of active dissemination strategies in the communication of research findings into practice.

2.1 Evidence Based Practice

It is well documented that best current evidence should be used for policy making, in developing practice guidelines, in prevention and health promotion strategies, in designing educational programs and performing clinical audits (Buekens et al 2004; Gray 2001; NHMRC 2000; Haines & Donald 1998). A single primary study rarely provides definite guidelines for practice (Suri 2000; McGaw1997). While individual primary studies are important in providing foundational material they are often influenced by sample size, economic restraints and the research environment is often difficult to control limiting the ability to make them significant (Suri 2000; Wolf 1986).

As a result of this, a 'comprehensive investigation' into an area that will substantiate areas of practice and provide guidelines, may involve the combining of results from many primary studies (Booth 2001; NHMRC 2000; Suri 2000). Systematic reviews are considered the best evidence about efficiency and effectiveness of interventions (Cochrane Collaboration 2003; Campbell Collaboration 2003; Grol 2002; NHMRC 2000; Feder et al 1999). This comes from the belief that systematic reviews 'the science of summing

up' are the best way to inform and guide practice (Glasziou et al 2001). It is recognised as the 'building block' for evidence based practice (Campbell Collaboration 2003; Joanna Briggs Institute 2003; Booth 2001; Davies et al 2000; NHMRC 2000; Cochrane Collaboration 1996; Light and Pillemer 1984).

The NHMRC, Cochrane Library, Campbell Collaboration and the Joanna Briggs Institute (JBI) use systematic reviews to inform and guide practice, policy and guideline development. This method of literature review, reduces the bias and the errors of the more traditional reviews by using set criteria, assessing the quality of the studies and adhering to a rigorous protocol (Glasziou et al 2001; Suri 2001; NHMRC 2000; Cochrane Collaboration 1996). Systematic reviews evaluate all available evidence from published and unpublished primary studies to gain a reliable overview of a particular topic (NHMRC 2003; JBI 2003; Glasziou et al 2001; Droogan 1996).

These reviews are 'primary scientific research' in that they are retrospective studies involving the careful systematic collection, measurement and synthesis of available research evidence in answer to a particular question (NHMRC 2003; Glasziou et al 2001). The value of this approach is that busy practitioners/educators will be able to validate their practice in the area of their expertise, without having to sift through increasing numbers of primary studies (JBI 2003; NHMRC 2000; Booth 2001; Cochrane Collaboration 1996).

This approach gives power to important fragmented and often isolated data found in primary studies (Glasziou et al 2001; NHMRC 2000), evidence that is often overlooked in the discussion of the primary studies in the research articles that they generate. While often effective, without due care, the systematic review's improved power can have the reversed effect, by allowing

small biases to have an 'apparent effect' (Glasziou et al 2001; NHMRC 2000). Therefore a rigorous approach using a proven protocol needs to be utilised.

High quality systematic reviews that provide evidence for health care interventions are generated and maintained by the Cochrane Collaboration, JBI and NHMRC. The NHMRC and Cochrane Collaboration have established data-bases of abstracts from the systematic review of randomised controlled trials (meta-analysis) which constitute the highest quality evidence for practice, level I evidence. These secondary studies are considered high quality evidence due to the minimisation of potential biases, and the control of extraneous variables in the primary studies. As a consequence a number of potential problems and limitations arise from this classification system and are discussed later in this chapter (see 2.3 The Limitations of Evidence Based Practice).

2.2 Meta-analysis in Systematic Reviews

Evidence from the meta-analysis of randomised controlled trials (RCTs) is considered higher in the evidence continuum (level I NHMRC, 2000) for evidence based practice, than from the meta-analysis of epidemiological studies (Glasziou et al 2001; Egger et al 2001). This is on the presumption that a meta-analysis of RCTs reduces confounding and bias than any other methodology (Egger et al 2001). Evidence from RCTs is a 'mechanistic calculation' (Egger et al 2001 page 5) it induces limitations and insights that studies with less rigid methodology provide from observational or case-controlled studies. Although this method is highly regarded in evidence based medicine it does not meet the evidence sought in this review.

Limitations arise from the use of RCT's in studies of clinical education as more subjective information is often sought from the participants. Furthermore, this approach to an investigation of clinical education activities is often ethically

difficult and replication can occur. The significance of the NHMRC (2000) classification system of evidence to clinical education studies is therefore diminished.

2.3 The Limitations of Evidence Based Practice

Although the use of evidence in practice has given an empirical framework to practice, rather than customary approaches, limitations still exist in its execution.

The implementation of research into practice is multi-dimensional and many factors influence its evaluation and implementation. Systematic reviews selected to inform clinical practice measure objective data and employ quantitative study designs of random or quasi-experimental allocation (Oxman et al 1995). Additionally delays do occur in implementation due to lack of appropriate information available 'at the point of decision making and social, organisational and institutional barriers to change' (Haines & Donald 1998 page 72). Although recently, there has been movement in research circles to communicate research actively therefore reducing one of the barriers to research implementation.

The formation of the Campbell Collaboration and their recognition of the limitations of the present assessment of strength of evidence, and its exclusively quantitative evaluation, has been a step forward in informing practice in the social sciences and education (Davies 2000). In spite of this fact, it is not the only barrier to informing health professionals on practice that increases outcomes for stakeholders.

It is well documented that passive dissemination strategies of research by publication in professional journals or mailing to targeted health professionals, has had minimal success in implementation and influencing health professional behaviour (Feder et al 1999; Haines & Donald 1998; Grol 1997; Oxman 1995; Haines & Jones 1994). It is now recognised that there is a requirement for more timely, valid and relevant information at the point of decision making. As Haines & Donald (1998) reported in their discussion paper that closer links to research and practice has been achieved in the elaboration of the role of the librarian. In North America, hospital librarians attend ward rounds and requests for information are documented in the client's case notes, and articles are subsequently delivered to the ward for evaluation and consideration in client decision making. The authors reported improved access and utilisation of valid evidence substantially in the clinical practice setting. It is therefore relevant that the results of this Systematic Review are communicated actively, by registration as a Campbell Collaboration Review and in conference presentations and by networking through other health professionals.

Although many fundamental flaws and barriers still exist in the present dissemination of research findings into practice, utilising evidence in clinical decision making has been essential in improving health outcomes and health professional performance (Buekens et al 2004; NHMRC 2000; Haines & Donald 1998; Cochrane Collaboration 1996; Oxman et al 1995). In the same way that evidence is important at local level, evidence is also important at a governance level, in developing guidelines for education, practice and setting national priorities.

2.4 Evidence for Guideline Development

Guidelines are necessary to maximise the effect of an intervention. Guidelines need to be based on current best available evidence (Feder et al 1999). Critical appraisal of the evidence that forms the framework of the practice/procedure is essential (Haines & Jones 1994). As the strength of evidence informs clinical practice, the evidence used in the development of curriculum guidelines for education needs to be rigorous, including both qualitative and quantitative studies (Booth 2001; Suri 2000). In this thesis quantitative and where appropriate, descriptive studies have been designated according to NHMRC levels of evidence.

2.5 Level of Evidence

The NHMRC levels of evidence have been used in this study to classify strength of evidence. The level of evidence is partially designated on "the study design used by investigators to assess the effectiveness of an intervention" (NHMRC page 5). The Cochrane Collaboration utilises a similar hierarchal classification system (level I evidence considered to be greater than level IV). The level assigned to the study reflects the degree to which bias is eliminated by the study design (NHMRC, 2000). Three dimensions collectively measure the strength of evidence:

> **Level**: the study design used, as an indicator of the degree to which bias has been eliminated in design.
>
> **Quality**: The methods used by investigators to minimise bias with in the study design.
>
> **Statistical Precision**: The *P*-value or, alternatively, the precision of the estimate of the effect (as indicated by the confidence interval). It reflects the degree of certainty about the existence of the true effect. (NHMRC 1999, page 6).

Also to ensure that the review is applicable to the area of interest, the following also need to be evaluated:

Size of the Effect: The distance of the study estimate from the 'null' value and the inclusion of only important effects in the confidence interval.

Relevance of Evidence: The usefulness of the evidence, particularly the appropriateness of the outcome measures used (NHMRC 1999).

The critical and quality appraisal tool specifically formulated for this review (available in Appendix B), this tool categorises the evidence of the literature synthesised in accordance with the study design, and its capacity to minimise or eliminate bias in the effect being measured. It is important that it is not perceived as representing the strength of evidence to which the study design is only one of several essential elements in the classification system.

Table 1. NHMRC Designation of Level of Evidence

Level of evidence	*Study design*
I	Evidence obtained from a systematic review of all relevant randomised controlled trials.
II	Evidence obtained from at least one properly-designed randomised controlled trial.
III-I	Evidence obtained from well-designed psuedorandomised controlled trials (alternate allocation or some other method).
III-2	Evidence obtained from comparative studies (including systematic reviews of such studies) with concurrent controls and allocation not randomised, cohort studies, case-control studies, or interrupted time series with a control group.
III-3	Evidence obtained from comparative studies with historical control, tow or more single arm studies, or interrupted time series without a parallel control group.
IV	Evidence obtained from case series, either post-test or pretest/post-test.

Source: NMHRC 2000

Table 1 page 32, dictates the assessment of mainly quantitative studies. To accommodate the complex nature of systematic reviews in clinical education it is important to incorporate subjective findings from qualitative studies (Booth 2000; Suri 2001). The primary concern of this systematic review of literature is the overall effectiveness of peer teaching and learning in the primary studies, and the influences on implementation, intervention and recipients. As a result the next section of this thesis discusses the literature surrounding systematic reviews of qualitative studies to ascertain the best approach to evidence for clinical education.

2.6 Using Qualitative Study Designs to Provide Evidence

Qualitative researchers study phenomena and events in their natural settings usually interpretation occurs from subjective meanings from individuals (Pope et al 2002). The implications of these meanings as evidence and the implications for clinical education have been analysed within the studies. It was beyond the scope of this minor thesis to elaborate on the theoretical framework underpinning qualitative research, but it is important to state that it is informed by a completely different paradigm to quantitative research (Pope et al 2002). In addition, it was evident in my search for a substantial framework to the synthesis of qualitative studies that there is little in existence. Therefore the theoretical framework of the analysis of the qualitative studies in this review came from the combination of discussion papers and therefore this is a limitation, of this secondary study.

Qualitative studies interpret and try to understand meanings and experiences (Pope et al 2002) in this lies the importance of evaluating experiential primary studies. The opinion of the participants, and their reflection on their own learning experience is important in the creation of a theoretical base for clinical

education. The significance of compiling subjective views on a specific work area historically dates back to Aristotle.

As cited in Booth (2001):

> 'It is necessary, while formulating the problems of which our further advance we are to find the solutions, to call into the council views of those of out predecessors who have declared and opinion on the subject, in order that we may profit by whatever is sound in their suggestions and avoid their errors' (Aristotle Page 2).

Qualitative studies in this review will be analysed for evidence utilising the following characteristics as cited in Booth's discussion paper on approaches to the synthesis of qualitative studies (2001):

> **School of thought:** Identifying major 'schools of thought' in a specific area whilst being alert to the identification of variants, minority views and dissenters. It is particularly important to identify negative or disconfirming cases.
>
> **Disciplines:** Searching within a broad range of disciplines so as to bring different views to bear on the topic at hand (Page 8).

In utilising these characteristics in the synthesis of primary qualitative studies an inductive and interpretive approach has been used. This method is isochronal with the qualitative paradigm and the synthesis of data in systematic reviews, as cited by Suri (2000) in a discussion paper on contemporary methods of research synthesis:

> 'While preserving the integrity and holism of individual studies, inductive and interpretive techniques should be used to sufficiently summarise the findings of individual studies into a product of practical value'(Jensen & Allen 1996; Noblit & Hare 1988; Sandelowski 1997; Sandelowski, Docherty & Emden 1997) page 52.

The significance of this approach is to facilitate a fuller understanding of the phenomenon, context and culture that surrounds peer teaching and learning in clinical education (Booth 2001; Suri 2000). Therefore, the inclusion criteria for the primary studies in this review will be based upon conceptual rather than methodological considerations. Although, in this process the primary studies synthesised will only be included if the articles they generated have been published by a peer-reviewed journal, and pass a rigorous critical and quality appraisal.

2.7 Combining the Quantitative and Qualitative Approaches to Provide the Best Evidence for Clinical Education.

Systematic reviews of education need both qualitative and quantitative primary studies informing curriculum development (Suri 2000). Therefore the primary studies included in this review are based on context, culture, concept and strategy (Suri 2000).

Quantitative studies included in this review will be synthesised using an aggregative approach and classified for strength of evidence, the validity of the outcomes of this approach is discussed in Chapter Six: Recommendations and Future Directions. The qualitative primary studies will be synthesised using an interpretive and inductive reasoning approach (Suri 2000). Finally both methods of synthesis will be combined and interpreted in a series of recommendations (see Chapter Six: Recommendations and Future Directions). In this synthesis for evidence, expert opinion was also to be included in the discussion, but unfortunately the reviewer has had no replies after contacting of these experts, (see Appendix C) the consequences of this are outlined in Chapter Three: Methodology and Methods.

2.8 Expert Opinion

It is interesting to note that early versions of the NHMRC levels of evidence included expert opinion (NMHRC 2000). The current table excludes this as evidence, as "it does not arise from scientific investigation" (NHMRC 2000 page). A cumulative meta-analysis found that expert opinion was not in line with the scientific evidence (NHMRC 2000). In this synthesis for evidence, recommendations from experts would have been taken into account in the discussion of findings in Chapter Five: Discussion of the Evidence.

Conclusion

In the pursuit of evidence to guide curriculum in the use of peer teaching and learning in clinical education the included primary studies are required to give an overall picture of the effect of the intervention. Therefore, both qualitative and quantitative studies have been synthesised and interpreted as to the effect of this intervention (Suri 2001). Additionally, this chapter has discussed the importance of the active dissemination of the research findings from this systematic review of literature.

Chapter Three: Methodology and Methods

Introduction

In any investigation the significance of the research approach and the area under investigation needs to be made evident. This chapter is a discussion and justification of the methodology and the choice of methods used to answer the research question. For this study timelines and the limitations of a master's project have directed the choice of methodology and prevented the statistical pooling of quantitative data.

The object of this review has been to provide evidence for recommendations in curricula development, on the use of peer teaching and learning in clinical education. This systematic review of literature is the purposeful evaluation and interpretation of all available research data in answer to the research question (Glasziou et al 2001; Egger et al 2001; NHMRC 2000). A comprehensive search was conducted to identify relevant primary and secondary research studies. Identified studies underwent a rigorous evaluation of research quality and studies that passed this evaluation where then systematically synthesised (Glasziou et al 2001; Egger et al 2001; NHMRC 2000). As a consequence, this approach differs from the traditional critical appraisal of literature, as all studies relevant to the research question are systematically identified, synthesised and assessed for quality (Glasziou et al 2001).

In providing evidence for curricula, it was important to gain a thorough overview of the area under investigation. Therefore this review has been constructed to allow the synthesis of both subjective and objective data from qualitative and quantitative studies (Khan et al 2003; Davies et al 2001). This chapter describes the processes involved in this systematic synthesis of literature.

3.1 Using a Systematic Review of Literature to Provide Evidence

To accommodate the complex nature of a systematic review in clinical education a multi-dimensional approach was required. The primary concern of this systematic review of literature was the overall effectiveness of peer teaching and learning in primary studies or secondary studies, and the influences on implementation, intervention and recipients. The significance of this approach has been discussed in detail earlier in this thesis (see Chapter Two: The Evidence Provided by Systematic Reviews of Literature).

3.2 Systematic Review's That Review Effectiveness of an Intervention

A systematic review of literature is the optimum method of summarising the effectiveness of an intervention (Eccles et al 2001; Glasziou et al 2001; NHMRC 2000). This systematic review of literature is an analysis of existing data on the intervention peer teaching and learning in clinical education. When formulating the review protocol on the effect of an intervention, it is important to recognise that substantial differences occur in the characteristics of populations examined, the nature of delivery of the intervention, the outcomes, and factor this into the findings of the review (Khan et al 2003).

Population characteristics

In an attempt to observe trends in population characteristics, I chose a window of twenty-four years as the time period examined in this review (see Figure.1 in Chapter Five: Discussion of the Evidence). It was expected that some studies would discuss the cultural diversity in population, age and sex adding interest to the overall result. No included studies reported on these diversities.

Nature of Delivery

The methods of delivery and the measurement of effect differed in each of the studies therefore preventing a meta-analysis in this thesis. How each learning outcome was analysed in the primary studies and the overall effect is discussed

in detail in Chapter Four: Overview of the Papers. It is important to note that the difference in the analysis of outcomes also influenced the hierarchal level of evidence provided in this review.

Outcomes

Again the outcomes from each of the studies differed, but certain themes became apparent in the literature and they are discussed in the final three chapters of this thesis. In the measurement of effect, it was important to discuss the significance of using learning outcomes to inform clinical education (see Chapter One: The Context of the Investigation), and how they provide evidence for curricula recommendations (see Chapter Two: The Evidence Provided by Systematic Reviews of Literature). Therefore, the effectiveness of peer teaching and learning in this thesis is dependent on the measurement of academic scores, technical skill acquisition and subjective feedback from the participants.

Quantitative-Measurement of Effect

The simple hierarchal NHMRC (2000) levels of evidence were used to determine the strength of evidence provided in studies of this intervention, according to study design and the processes used in the conduction of the studies. The quality and critical appraisal tool (see Appendix B) was used in determining the reliability, validity and generalisability of studies for potential inclusion (Khan et al 2003). The included quantitative studies and the studies that used descriptive statistics, have informed this study by providing precise statistical facts on the effectiveness of peer teaching and learning in clinical education.

Qualitative-Measure of Effect

The measurement of effect in qualitative studies was far more complex and created more discussion (see Chapter Five: Discussion of the Evidence). This

was complicated by the fact that qualitative research designs either stood alone, or were embedded in descriptive studies. Qualitative research designs inform, by exploring the subjective world, they offers insights into the social, emotional and experiential phenomena (Khan et al 2003; Pope et al 2002). These studies investigate how and why events occurred, and what were the influences (Khan et al 2003). As a consequence, qualitative studies informed this secondary study by contributing understanding on the factors or 'mechanisms' that impeded or promoted learning in the primary studies (Khan et al 2003 page 6). More specifically, in the final chapter (see Chapter Six: Recommendations and Future Directions) when the end-points from all the studies were connected together. The qualitative studies provided the framework for future research questions on this intervention (Khan et al 2003).

3.3 The Research Question

At the core of any investigation for evidence, is the evidence itself (NHMRC 2000). The type of evidence required will inevitably vary dependant on the question (Glasziou et al 2001; NHMRC 2000). The NHMRC (2000) has six classifications of questions that synthesise literature on interventions:

- Interventions (What is the effect?)
- Frequency or rate (How common is the condition or disease on a certain population?)
- Diagnostic test performance (How accurate is a sign, symptom, or diagnostic test in predicting the true diagnosis, category or patient?)
- Aetiology or risk factors (Are there known factors that increase the risk of the disease?)
- Prediction and prognosis (Can the risk for the patient be predicted?)
- Economic analysis (What are the overall costs of using the procedure?) (page 2).

The key characteristic in the formation of these questions is that the type of evidence sought will provide guidelines, and advice on the value of the interventions (Glasziou et al 2001; NHMRC 2000). In this investigation the

reviewer was studying the effect of the 'intervention' peer teaching and learning on the 'participants' health science students. Therefore, the ideal study type was a randomised control trial (RCT). These studies are comparative. Groups receiving an intervention are analysed against a comparable group that have not received the same intervention (Glasziou et al 2001; NHMRC 2000). The data that these studies generate is limited and exclusive. In this study to enable a greater diversity, depth and breadth of analysis in answer to the research question. The question was formulated to allow a greater synthesis of study types.

A well formulated question has four main elements and the acronym PICO is used to describe the process (Sladek 2003; Glasziou et al 2001):

- The (P)opulation = health science students
- The (I)ntervention = peer teaching and learning
- The (C)omparison of intervention (optional)
- The (O) utcome = increased educational outcomes

The question that informed this study incorporates three of these elements. Comparison has been excluded as to enable a broader analysis of study types across the population, intervention and outcome. Additionally, rather than focus this study to the specific population of undergraduate nurses, in which I have a specific interest. The question incorporated any health science undergraduate which has allowed "examination of the variation in the study factor across populations" (Glasziou et al 2001 page 14).

The primary research question addressed in this study is:

Is peer teaching and learning an effective educational intervention during clinical placements for undergraduate health science students?

It was important to answer this empirical question in order to address the following secondary questions.

"Should peer teaching and learning be implemented in health science clinical education?"

"If so, how and when should it be implemented to achieve optimal educational outcomes?"

"In utilising this educational intervention does it increase under-graduate student's theoretical and clinical outcomes?"

"Are clinical venues, clinical staff and clients felicitous with this educational intervention?"

"Do under-graduate students see this educational intervention as effective in developing their knowledge and clinical skills?"

"Where do we need to focus further investigations of this educational intervention?"

3.4 Finding the relevant studies

In finding the relevant studies a systematic approach to identify studies that provided the evidence was essential (Glasziou et al 2001: NHMRC 2000; Sladek et al 2002). Sifting through vast numbers of published studies and 'grey literature' (unpublished studies, conference proceedings, reports and theses) can be problematic (Glasziou et al 2001). A central tactic is to break down the study question into components (Glasziou et al 2001; Sladek 2003). In finding the relevant studies for this systematic review, I broke down the research question and looked for synonyms from each component. In order not to miss vital terms, I conducted a preliminary search through the MEDLINE database keyword system known as MESH (a common list of thesaurus terms) to capture synonyms within a single word (Sladek 2003). The explode feature, was used to capture terms that may have been missed by the reviewer. Then the terms where combined using the Boolean operators 'AND' and 'OR'.

*undergraduate# or student# and

*clinical education or placement# or practicum and

*peer# and

*evaluat# or percept# or effect#

*denotes wild card with the same stem

# denotes truncation of terms

The results of the database search are available in Table 2 (databases are in alphabetical order, not in order of relevance).

Table 2. Database Search Results

Database (alphabetical order)	Keyword In Title or Abstract	Limiters	Expanders	Results	Method of inclusion and exclusion	Abstracts sought	Full article sought for further information	Inclusion	Exclusion
Australian Education Index 24/04/04	peer and education	1980-2004, English		0				0	
Campbell Collaboration 12/12/03	peer and education			2	Scanned by title	0	0	0	2 not health science undergraduates.
Cinahl 14/04/04 repeated 5/10/04 no new studies found	peer and clinical education, or practicum or placement and student# or undergraduate# and evaluat# or effect# or percept#	1980-2004, research and English		6	Scanned abstracts	6	6	4	2 not clinical education
Cinahl	peer and clinical education, or practicum or placement and student# or undergraduate#	1980-2004, research and english		14	Scanned abstracts	14	6	4	8 not health science undergraduates
Cinahl	peer and education	1980-2004, research and english		47	Scanned titles	nil			47 not undergraduate health science students
Cinahl	peer and education and evaluat#	1980-2004, Journal articles, English		11	Scanned titles	nil			11 not health science undergraduates

Database (alphabetical order)	Keyword In Title or Abstract	Limiters	Expanders	Results	Method of inclusion and exclusion	Abstracts sought	Full article sought for further information	Inclusion	Exclusion
Cochrane Collaboration 27/03/04	peer and education	1980-2004, english		2	Scanned title	0	0	0	2 not health science undergraduates
Ed research online 24/04/04	peer and education	1980-2004, English		112	Scanned by title	3	0	0	112 not health science undergraduates
Eric 27/03/04	peer and clinical education and effect#	1980-2004, Journal articles, English	Search for related words	3	Scanned Titles	3		0	3 not health science or undergraduates
Eric	peer and placement and effect#	1980-2004, Journal articles, English	Search for related words	5	Scanned titles			0	5 not health science undergraduates
Eric	peer and practicum and evaluat#	1980-2004, Journal articles, English	Search for related words	5	Scanned abstract	5	2	0	3 not health science undergraduates
Eric	peer and student# and practicum and evaluat#	1980-2004, Journal articles, English	Search for related words	3	Synthesised abstract	3	1 (same article as above)	0	not health science undergraduates
Embase 6/10/04	Peer and clinical education and student#	1980-2004, Journal articles, English		120	Scanned title	11	3	1, 1 already included from another database search	5 simulated not clinical education; 2 not specific to peer teaching and learning; 1 not undergraduate health science students

Database (alphabetical order)	Keyword In Title or Abstract	Limiters	Expanders	Results	Method of inclusion and exclusion	Abstracts sought	Full article sought for further information	Inclusion	Exclusion
Evidence for Policy and Practice 12/12/03	peer and undergraduate# or student# and clinical education or placement or practicum and evaluat# and effect# and percept#		Search for related words	0		0	0	0	
Joanna Briggs Institute for Evidence Based Practice 21/03/04	peer and undergraduate# or student# and clinical education or placement or practicum and evaluat# and effect# and percept#		Search for related words	0		0	0	0	
Medline 21/03/04 repeated 5/10/04 no new studies identified	peer and undergraduate# or student# and clinical education or placement or practicum	1980-2004 English Research	Search for related words	11	Synthesised abstract	11	6	2	4 not undergraduates and 5 not clinical education

Database (alphabetical order)	Keyword In Title or Abstract	Limiters	Expanders	Results	Method of inclusion and exclusion	Abstracts sought	Full article sought for further information	Inclusion	Exclusion
Medline 21/03/04	peer and undergraduate# or student# and clinical education or placement or practicum and evaluat# and effect# and percept#	1980-2004 English Research	Search for related words	0					
PeDRO 24/03/04	peer and clinical education, or practicum or placement and student# or undergraduate#	1980-2004 English Research	Search for related words	4	Scanned abstract	4	4	0	Not clinical education
PsycINFO 24/03/04 repeated on 5/10/04 no new studies identified	peer and clinical education, or practicum or placement and student# or undergraduate#	1980-2004, English	Search for related words	77	Scanned by title	10	1	1	Those excluded not undergraduate health science students or clinical education
Science Direct 21/03/04 and 5/10/04	Peer and clinical education or practicum or placement	1980-2004, English	Search for related words	46	Scanned by title	5	2	2 already identified in other searches	44 not undergraduate health science students or specific to clinical education
Sociofile 5/10/04	Peer and clinical education and student#	1980-2004, English		0	0	0			0

The initial search was aimed at published primary and secondary studies in peer reviewed journals in the following databases:

Australian Education Index

Campbell Collaboration

CINAHL

Cochrane Collaboration

Education Research Online

EMBASE

ERIC

Evidence for Policy and Practice (EPPI)

Joanna Briggs Institute for Evidence Based Nursing and Midwifery

MEDLINE

PeDRO

PsychINFO

Science Direct

Sociofile

The search was run through each database using the keywords, not all databases accommodated the use of all the keywords or characters, subsequent searches where made and the final stream can be found in Table 2 along with the date of the searches conducted. A total of seventy-eight published primary studies where retrieved for potential inclusion, exclusion occurred following scanning of titles or abstracts, or analysis of abstracts (see Table 2 page 44). In developing the initial protocol it was proposed that search results could become unmanageable. If so, the search would be limited to educational outcome and ideal designs. As only twenty- seven full articles were analysed from the database search, this was not deemed necessary.

Limits

The limits were set after the initial perusal of literature. It became evident that many primary studies of this educational intervention were carried out during the 1980's. As a consequence, to provide a historical background and to observe trends within this intervention, 1980 to present was set as the date limit. The reviewer only comprehends written English; as a result only studies reported in English were included. Furthermore, to ensure quality of methodology in the included studies, only those studies published in refereed journals were included.

Snowballing

Snowballing is the term utilised to describe a search of bibliographies and citation search from the identified relevant studies in the database search, it enables the investigation of any missed papers (Glasziou et al 2001). These missed papers can "provide vital clues" and contribute to the quality of the systematic review (Glasziou et al 2001 page 20). The bibliographies of included studies were searched and a citation search was conducted (using science citation index www.isinet.com/). Nineteen potential papers were identified in searching the titles of published articles. The following key words were utilised in the identification:

- peer and
- student and
- clinical education or practicum or placement

Of these nineteen papers, five were included in this systematic review after perusal of the full nineteen articles (see Appendix A for details). It is therefore significant to the outcome of this review that snowballing took place.

3.5 Bias Minimisation

Grey Literature

It is vital to scan grey literature from conference proceedings, unpublished studies, theses, dissertations and contacting experts to minimise the effect of publication bias (Egger et al 2001; Glasziou et al 2001; NHMRC 2000). The significance is elucidated by Davies (2000), in his discussion paper on 'Approaches to Evidence Based Teaching'. The author discusses the possibility of publication bias in favour of self directed problem based learning, as medical educationalists deem it a superior approach to medical education 'than traditional didactic methods' (page 19). It has been therefore relevant to this review to search the grey literature to eliminate publication bias. Consequently, a discussion of the 'grey literature' is included in Chapter Five: Discussion of the Evidence.

Unpublished Studies

The following database registries where checked for unpublished studies to minimise publication bias:

Cochrane Collaboration Library

Campbell Collaboration Library

EPPI

Higher Education Register of Dissertations South Australia (HERBDSA)

Dissertation Abstracts International

Proceedings first

Index to theses

System for Information on Grey literature in Europe (SIGLE)

Three unpublished theses were found to be relevant to 'peer teaching and learning' they have been excluded, as inclusion criteria required publication. The researchers were contacted by letter, to determine if they had published recently or had knowledge of any other relevant studies, with no response to date (see Appendix C for letter).

Writing to Experts

Principle investigators of the primary studies included in this review were contacted directly; three by e-mail and ten by letter (see Appendix C for details of contact). At this stage, neither the letters nor e-mails have elicited a response (bearing in mind that several of the studies were of a considerable age so the contact details may have changed in the ensuing time frame). Included in the contact letter was a copy of the exclusion and inclusion rationale spreadsheet (see Appendix A). The principle investigators were asked to respond, if they were aware of any other published or unpublished studies in this area. A full report from these sources would have been evaluated for relevance against the inclusion criteria.

Handsearching Key Journals

The journals Nurse Education Today and Journal of Nursing Education were hand searched for missing studies, none were located.

Detection of Duplicate Publication

Published articles were investigated to detect a new investigation into an area, if duplicate publication had occurred and there was an update on data, the most recent publication would have been included. Only two authors Currens and Ladyshewsky had multiple publications on this intervention. Currens (2003) had conducted a review of literature (which was not a systematic review) therefore only the primary study of this author was included. Ladyshewsky has multiple publications (see Appendix A for exclusion and inclusion rationale). Two papers written by this author are included, for they inform this secondary study in differing ways. The first included study DeClute & Ladyshewsky (1993) (in this study Ladyshewsky was not the primary investigator) the researchers investigated clinical competence in a comparative study (not randomised). In the second study Ladyshewsky (1995), the author is the primary investigator. In this study he investigated the efficacy of the peer

teaching and learning model. No duplicate publications were located in the synthesis of the studies. A full critical and quality appraisal of the included studies occurs in Chapter Four: Overview of Included Studies.

3.6 Inclusion Criteria

Selection of inclusion criteria is based on participants, intervention, learning outcomes and study method this 'operationalises' the review question (Evans & Chang 2000; Glasziou et al 2001; NHMRC 2000). This criteria was selected and documented in the review protocol prior to the commencement of the review therefore reducing the risk of selection bias by the reviewer (Evans & Chang 2000). Secondly, utilising this form of standardised appraisal ensures the exclusion of those studies that critically we like, but are not relevant or high quality studies (Glasziou et al 2001). As a consequence, the strength of evidence of any recommendations arising from this systematic review of literature is increased (Glasziou et al 2001).

The Participants

The participants are undergraduate students from any of the following health care professions:

- Nursing
- Medicine
- Dentistry
- Occupational Therapy
- Social work
- Psychology
- Counselling
- Behavioural Science
- Nutrition and Dietetics
- Health Science
- Podiatry

- Physiotherapy
- Speech and Language

Utilising such a variety of participants from the differing disciplines increased the number of primary research studies that were located. Therefore, increasing the generalisability of this review by allowing a broader diversity to the application of this educational intervention. The significance of this approach is that it brings different applications and opinions to the topic under investigation.

Types of Intervention

Primary studies were included based on the fact they evaluated the educational outcomes, from the intervention of peer teaching and learning in undergraduate clinical education within the selected health science professions.

Types of Educational Outcome Measurements

Primary studies were synthesised for the effectiveness of peer teaching and learning on the following subjective and objective educational measurements and student characteristics:

- Cognitive

The development of clinical reasoning skills and clinical decision making. Further development of existing knowledge reflected by increased academic scores.

- Psychomotor

Competence and development of clinical skills demonstrated in mastery of skill and ability to perform.

- Clinician satisfaction

Clinician confidence demonstrated by allocation of clients, and clinical performance scores

- Student satisfaction and preference

Demonstrated by a willingness to work alongside peer, and subjective student feedback.

- Client confidence

Client confidence in care received. Demonstrated by satisfaction scores, and feedback regarding student's ability to be empathetic.

- Increased learning opportunities

This was based on subjective student feedback. Did students think, by working alongside a peer they where given more opportunities to develop knowledge and skills?

- Student satisfaction with feedback

The effect of critical feedback from a peer on a student's progress, demonstrated in their development and willingness to act on peer critique.

- Student participation

Demonstrated by increased student participation in clinical practice activities and equal role in organising clinical practice. What was the effect from the emotional support of a peer?

- Promotion of student leadership

Demonstrated by student confidence, in performing leadership roles and clinical decision making.

- Life long learning

Based on subjective student feedback. Has it increased or decreased knowledge base in the development of critical thinking and analysis skills, and their understanding and utilisation of evidenced-based practice.

Study Type

All primary and secondary studies from peer reviewed journals (to ensure quality of methodology) which met the participant and intervention in title and abstract were sought for further investigation and potential inclusion, a total of seventy eight. These studies then under went a rigorous critical and quality appraisal. As stated previously, the ideal study type to produce high quality

evidence, according to the NHMRC levels of evidence on an intervention, is an RCT (Glasziou etal 2001). As a broader analysis was required in answer to the research question, this secondary study was constructed to allow the synthesis of all study types.

3.7 Exclusion Criteria

Studies were excluded if they did not measure the stated educational outcomes; if they had not been published in a peer reviewed journal or received a poor rating during quality assessment. The exclusion of studies and the rationale for their exclusion is outlined in Appendix A.

3.8 References

All references were entered into the bibliographic software package Endnote. Again, when the full research report was retrieved it was assessed against the inclusion criteria for relevance to this review.

3.9 Critical Appraisal, Quality Appraisal, Data Extraction and Selection of Studies

As this review is a partial fulfilment of the degree Master of Nursing there has been only one reviewer, blinding to author, institution and journal did not occur which may influence bias in the selection and critical appraisal of studies.

Quality Check 1

A two-stage process was used to assess the quality of potential studies for this review. All articles were first rated against the NHMRC (2000) levels of evidence (see Chapter Two: The Evidence Underpinning Systematic Reviews, Table 1).

Quality Check 2

Only articles that had been published in peer reviewed journals were synthesised in this review, to ensure quality of the research methodology and processes (as the reviewer is not an expert in all fields of research methodology). Critical and quality appraisal of these studies occurred utilising a purposefully developed appraisal tool (see Appendix B). This tool (worksheet) was specifically adapted following the indepth analysis of many appraisal worksheets, used in a broad range of empirical and qualitative systematic reviews of literature. I found no existing worksheet that met the requirements of this systematic review of literature therefore the worksheet (see Appendix B) used in this review, was adapted from the following series of worksheets:

- NRNE (2002): 'Worksheet from the Review of Literature'.
- Guyatt et al (1993): Guyatt et al (1994) 'Worksheet from the evidenced Based Medicine Working Group.'
- Chalmers TC (1981) 'Quality Assessment Scale.'
- Joanna Briggs (2002) 'Quality Assessment Scale For Experimental Research.'
- Glasziou et al (2001) 'Checklist for Appraising the Quality of Studies of Interventions.'

Each article was appraised, data extraction occurred and inclusion, narrative summary, further information needed or exclusion was decided based on the inclusion/ exclusion criteria stated earlier in this thesis. Each worksheet has been classified and tabulated in a spreadsheet shown in Appendix A. Following the initial testing of the worksheet, I recognised a limitation in its appraisal. The worksheet as it stands does not provide an analysis of the background literature informing the appraised studies (see Appendix B for details). As a result the reviewer incorporated the analysis of background literature into question one (What was the research question or purpose of the study?).

3.10 Data Synthesis and Extraction

The data was extracted utilising the work sheet formulated specifically for this review (Appendix B). Each learning outcome was systematically addressed in the work sheet, and data from the primary studies was extracted and pooled and is discussed in Chapter Five: Discussion of the Evidence under the differing learning outcome headings. Statistical pooling or sub-group analysis was not performed due to the considerable heterogeneity between the groups of participants, clinical settings, method of educational delivery and the limited time frame for this review. All the relevant studies have been critically appraised and rated according to the strength of evidence (NHMRC 2000) and the included data has been synthesised into a narrative form. This narration outlines the findings in the primary studies and combines the concepts and builds them into a whole, whilst making sense of the findings and how they fit into the existing body of knowledge. This is isochronal with the inductive and interpretative reasoning approaches espoused by Booth (2001) and Suri (2000) (see Chapter Two: The Evidence Provided by Systematic Reviews of Literature), and constitutes the theoretical framework that underpins the findings in this systematic review of literature. The narration, additionally includes the limitations within the studies, any related biases, strength of evidence, applicability, benefit or harm, and implications for further primary research, these have been detailed in Chapter Six: Recommendation and Future Directions.

3.11 Limitations

In the provision of recommendations and guidelines for curricula, the object of this investigation was to provide high quality evidence. This was difficult to achieve due to the considerable diversity in the application, processes and associated outcomes in studies reporting on this intervention. In enabling a broader analysis, the level of evidence (Table 1, page 32) was not central to the investigation. For practical reasons statistical pooling of quantitative studies and sensitivity analysis could not be performed.

Conclusion

The methodology and methods used in this systematic review enabled a broad and in-depth analysis of the effectiveness of peer teaching and learning as reported in the literature. In doing so, this analysis has increased the generalisability and therefore the transferability of the recommendations for use in developing curricula within the differing health professions (see Chapter Six: Recommendations and Future Directions). More specifically, it has provided the framework for future research questions.

Chapter Four: Overview of the Included Studies

Introduction

The format of the next three chapters is to provide a critical and quality analysis of the selected studies, and bring together the single units of data from the studies into a whole. The implications of the findings within the studies are then discussed within the broader context of clinical education. Specifically this chapter gives an overview of the papers following critical and quality appraisal. The quality of this systematic review of literature is dependent on the rigour of the appraisal process and the selection of included studies and the data that they generate (Eccles et al 2001; Glasziou et al 2001). As a consequence, the robustness of the result has been dependent on this appraisal process.

4.1 The Results of the Search

Over seventy-eight studies were identified by the search strategy and supplementary updates are detailed in Table 2 (page 44). With the addition of snowballing another twenty-seven potential studies were identified. These were retrieved as full text and inclusion and exclusion criteria applied to identify a final group of thirteen studies (see Appendix A for exclusion and inclusion criteria). All of the included studies are primary studies; one secondary study Currens (2003) was identified. The article generated from Curren's review of literature was not specific in the identification of papers, therefore it did not meet the inclusion criteria of this review. The author of this article was contacted with no response. Many of the identified papers in this review, had been identified in Currens (2003) paper, so as to provide greater evidence on the analysis of the included studies similar findings have been acknowledged.

Excluded Studies

A majority of the excluded studies did not involve clinical education or undergraduate health science students (see Appendix A). Discussion papers

and theses have also excluded. The authors of the unpublished theses have been contacted at this time, unfortunately there has been no response (see Appendix C). No meta-analysis was found during the database search although four experimental designs were retrieved and statistical pooling will occur following completion of this thesis, if achievable.

Included Studies

Following critical and quality appraisal (see Appendix B for tool) thirteen studies met the inclusion criteria. Of these papers, six were nursing studies, five from physiotherapy, one from speech and language and one from occupational therapy. Two physiotherapy studies share a common author. Additionally, three physiotherapy studies and one occupational therapy study share a common model (two students to one clinical instructor). Four studies are from the United Kingdom, four from the United States, one from South Africa and two from Australia and Canada. Therefore, a broad diversity exists in the application of this intervention and the participants in the studies. Similarly, included studies are divergent in methodology and processes. Each paper has undergone a rigorous quality and critical appraisal (see Appendix B) and any potential biases have been highlighted in the following overview. The studies in this overview are listed in alphabetical order, not in order of relevance or evidence.

4.2 Overview of the Included Studies

Aston E, Molatiossis A (2003). Supervising and Supporting Student Nurses in Clinical Placements: The Peer Support Initiative. *Nurse Education Today.* 23: 202-210.

A British pilot study, using thematic analysis and descriptive statistics explored the dynamics of a student peer support program, in which senior nursing students supervised and supported junior students whilst on clinical placements. Three themes were revealed on examination of a survey. Issues were exposed relating to preparation for clinical placement, support and feedback, and personal and professional development.

Cohort- thirty-one senior nursing students and twenty-seven junior nursing students. Participants were enrolled in a program run by the University of Nottingham (course not stipulated). Method of clinical placement not described.

Method- survey, thematic analysis of qualitative literature and descriptive questionnaire statistics.

Results- the researchers identified that peer teaching promoted leadership qualities in the senior student, and provided triggers to learn and increased attention to their own practice. Additionally, junior students indicated it helped them understand their role as a nurse. Both cohorts reported it aided in their reflection and progress, but one of the junior students reported that they were not well supported in their clinical practice. The senior students reported that support varied according to the mentor, 45.1% reported no support, 16.1% reported some support, and 38.7% reported excellent support. Most senior students reported mentor feedback aided development, and teaching and leadership skills were enhanced in teaching junior students. Both cohorts of students reported more preparation on role expectations and boundaries needs to be incorporated into the program prior to clinical placement. It was also reported, that peer teaching and learning maximised the mentors and increased the student allocation to clinical placement. Overall, it was seen as a positive experience. Need for further evaluation recognised.

Limitations- the literature that formed the theoretical framework of this study was informed from a supervision perspective, rather than a peer. No comparison occurred with other curricula so educational effect not reported. Additionally, educational assessors were aware of the trial so bias for the outcome could be reflected in the results. The method of sample selection and comparability at entry of the participants was not clearly identified by the authors. Similarly, the allocation of junior and senior students was unclear. Method of clinical placement and the course the students were enrolled in was not identified. Also, an account of the methods of data collection and the relationship between the researcher and participants were not described. Educational benefits and potential costs not reported. Client and clinician preference for this educational intervention not reported on.

Bos S (1998). Perceived Benefits of Peer Leadership as Described by Junior Baccalaureate Nursing Students. *Journal of Nursing Education.* 37: 181-191.

A descriptive study using content analysis, whereby junior nursing students were assigned the role of peer leader for a day during a six week surgical rotation in the Mid West of the United States of America. The peer leader was responsible for the organisation of a group of peers: including- workload, lunch breaks, numerical information related to client (observations, blood results) and being aware of the client's norms, therefore, acting on any abnormal findings and continuously monitoring client conditions, assisting fellow student's with tasks, checking completeness of paperwork, and informing students of sessions that would aid in their ongoing development.

Cohort- twelve junior nursing students enrolled in a baccalaureate program in a Mid West University. The students completed the peer leader experience over the twelve-week semester.

Method- a descriptive study using content analysis. Loving's (1993) model of competence validation provided the theoretical framework for this study. Peer leaders were asked to write a self-evaluation of the experience, and this was

analysed by the researcher and inductively categorised on perceived benefits of this experience.

Results- from the data five themes emerged, student's appreciated: practice in prioritising care, enhancement of critical thinking skills, enhancement of technical skills, realisation of peers as a resource, development of managerial skills. The researcher recommends further investigation with a control group study using the same clinical instructor. Findings will add to the clinical education body of knowledge.

Limitations- bias existed due to only one researcher analysing the data, also only one method of data collection. No client or clinician satisfaction reported. Not all the educationally important issues considered, such as student participation and feedback from peers not reported on. No negative aspects of study reported so trustworthiness not determined by reviewer. The selection process for student participation in the study not clearly outlined. Economic benefits not reported.

Cortazzi M, Jin L, Wall D, Cavendish S (2001). Sharing Learning through Narrative Communication. ***International Journal of Language and Communication Disorders.*** **36: 252-257.**

This study used face to face interviews to examine the experiences of speech and language therapy students whilst on clinical placements in the United Kingdom. The authors argued that further learning occurs by validating the experience with peer, clinician and tutor following the original experience, therefore sharing learning through narrative communication

Cohort-ten speech and language students enrolled at Brunel University, at the end of their second year. Their clinical placements covered a wide range of clinical areas.

Method- the researcher interviewed students regarding their clinical experience, the setting, knowledge, method of learning and how they had shared their learning experience. Interviews were recorded with student permission and material transcribed into one hundred and two narratives. Prior

to the interview process students revealed a network of sharing through communication informally through telephone conversations with peers whilst on placement, or paired with a peer on clinical placement. Also formal communication occurred in the clinical setting with clinicians and tutors, and at the university with academics in seminars and feedback discussion sessions.
Results- students emphasised how sharing learning with peers, tutors, clinicians and clients helped with planning, evaluating, thinking and learning, coping and handling stress, while on clinical placement. Students found the retelling of significant experiences with peers and tutors was a reflective way for both cohorts to learn more about clinical experience, and helped the inter-weaving of theory and practice. The authors stated that findings contribute to the body of knowledge of the clinical education, and that the interaction between peers was significant.
Limitations- theoretical underpinning's not clear. Similarly, the data analysis method was not clearly outlined and nor did the authors acknowledge who was responsible for analysing the transcripts. The transcription of data may lead to potential bias from the researcher(s). Purposeful selection and process of participant selection not reported. No limitations of study reported on in article. Economic benefits not reported. Background literature did not provide justification for the study.

Currens JB & Bithell CP (2003). The 2:1 Clinical Placement Model: Perceptions of Clinical Educators and Students. *Physiotherapy.* 89:204-218.

This multi-method study explored the use of a 2:1 clinical education model (two students to one clinical educator) in the clinical education of British 1st, 2nd and 3rd year physiotherapy students in the United Kingdom. Theoretical underpinning for study related to the theorist Piaget and Slavin (Currens 2003).
Cohort- thirty-seven clinical educators and sixty-one physiotherapy students from six universities participated in thirty-four placements across five clinical

areas. Placements were repeated in nine of twelve physiotherapy services (Currens 2003).

Method- this study had multiple methods of data collection. Perceptions explored through semi-structured interviews and post-interview questionnaires in the final placement week, utilising thematic content analysis and descriptive questionnaire statistics. One student analysed twice as was a repeat student. Findings checked with peers.

Results- the 2:1 model considered feasible for all clinical specialties studied and all student years. Thirty-five of the thirty-seven clinical educators were willing to use the model again, reported more time for clinical duties and efficient teaching time; students treated 50% of clinical caseload (Currens 2003). Most students valued peer discussion, 98.3% reported an increase in problem solving and clinical reasoning. Furthermore, peer support valued by 81.4% of students (Currens 2003). Although clinical educators expected difficulties in managing 2:1 it was rarely problematic. The need for further evaluation recognised.

Limitations- the re-evaluation of the student may contribute to bias for or against this particular model of education. Additionally, the participants may have identified one author (researcher) as having university links and therefore bias responses (Currens 2003). The differences between the clinical areas, student years, single and repeated placements, and extent of patient delegation to students were not fully described (Currens 2003). Also, clinical areas studied only hospital based, so the generalisability of the data may be limited. Only 96.7% of students accounted for at the study conclusion. The clinical educators reported more students increased paper work, and extra time taken from clinical duties if difficulties erupted between students. Client satisfaction not recorded.

Declute J, Ladyshewsky R (1993). Enhancing Clinical Competence Using a Collaborative Clinical Education Model. *Physical Therapy.*73: 683-689.

The researchers used statistical analysis in a comparative study of clinical competency in third year Canadian physical therapy students.

Cohort- thirty-eight third year students on a 2:1 clinical placement were compared with eighty third year students on a 1:1 (one student to one clinical instructor) clinical placement over three acute care areas, neurology, orthopaedics and cardiorespiratory on a four week clinical placement (Currens 2003). Allocation occurred, through a computerised matching system, for students in the experimental group. Following allocation reshuffling occurred to match students with similar grade point averages.

Method – statistical analysis of evaluation of clinical competence (tool used by the University of Toronto, behavioural anchored rating scale ranked on a progressive ordinal scale, tool considered psychometrically sound). This occurred over seven sub-categories: patient evaluation, program planning, implementation of treatment, communication with patient/ family, communication and management skills, documentation and professional conduct. Then comparison of the experimental and the control groups occurred.

Results- a statistically significant improvement in each sub-category was demonstrated in the 2:1 model (Currens 2003).

Limitations- the comparison between groups relied on a single instrument (Currens 2003). The authors stated a relationship between increasing problem solving and the 2:1 model; there was no discussion or evidence to support this statement, and no underpinning theory that supported this outcome. No experience of clinical instructor in the control group identified (Currens 2003) or very little background or student characteristics. Educational outcomes limited to clinical competence. The use of only one student year level reduces the generalisability of data.

Erickson G (1987). Peer evaluation as a Teaching-Learning Strategy in Baccalaureate Education for Community Health Nursing. *The Journal of Nursing Education.* 26: 204-206.

A reciprocal experiment in peer evaluation was conducted on nursing students enrolled in a baccalaureate program in the United States.

Cohort-senior nursing students enrolled in a four year baccalaureate program whilst on a community health placement. Student's voluntarily participated.

Method-students were given guidelines on their roles as peer nurse and peer evaluator and observer. Two tools were used; the first listed nursing behaviours for peer evaluator on a four point likert scale from unsatisfactory to excellent. The second tool sought student evaluation of the experience. Student's selected their own partners, and contracted each other for specific observations and feedback. A pre-conference was held for verbal contracting and sharing client data, and a plan of care. The peer evaluator was directed to observe customary social interaction, but to refrain from participation in the nursing process. A post-conference was held with the instructor to share evaluation on strengths, areas of weakness, problem solving, and to consider strategies for future visits.

Results-the researcher reported enthusiastic and collegial post-conferencing; in objective discussions of scores given in relation to client care issues and nursing actions. Students utilising this method of teaching and learning were more likely to self realise, on their own performance as reported by the researcher. Furthermore, the students reported feeling more relaxed with a peer than with an instructor. A few students reported hesitancy in the critique of a peer. Overall students' reported it as a beneficial learning experience. Also, hasty pre-conferencing occurred, students' reported that client goal outcomes would have been better met, with more preparation and a written contract. One student reported apprehension at a home visit. Whilst, other students reported it would be more effective when a trusting relationship had developed with the client. The researcher reported enhancement of peer collaboration and accountability. Additionally, the researcher reported that the clients were receptive to the home visit. Need for further investigation highlighted.

Limitations- the theoretical underpinning of this experiment did not come from well-known educational theorists, but the experiences of Gustafson (1980) reported in a discussion paper. The purposeful selection of students and allocation was not detailed and previous community health experience not stated. It was not clear whether the researcher was the instructor in the post conference. Data collection and analysis not detailed. The university links were evident, so bias for positive outcome presumed. Results of the likert scale were not published. Additionally, the use of only one student year level reduces the generalisability of data.

Faure M, Unger M, M Burger (2002). Physiotherapy Student's Perceptions of an Innovative Practice Orientation. ***South African Journal of Physiotherapy.*****58: 3-8.**

Using thematic analysis and descriptive statistics, this was a retrospective study into the perceptions and attitudes of students on structured peer-led introduction to clinical placement (SPLICE). In this study, third and fourth year students' orientated second year students into the clinical practice setting. All student cohorts were enrolled in a physiotherapy course at the University of Stellenbosch, South Africa.

Cohort- thirty-four second year, seventeen third years and nine fourth year students participated in the study.

Method-thematic analysis and descriptive statistics from two self-administered, anonymous, comparable questionnaires completed during class time following clinical placement.

Results- 86% of students reported it as valuable to the learning experience, three negative responses from second years and one from a third year. Most students' reported it increased their confidence with patients, and they felt more at ease during clinical placement. Second year students reported it was a good introduction, they did not feel thrown in at the deep end. All student cohorts reported an increase in their learning and integration of theory into practice and motivation. Furthermore, the second year students reported it gave

them an insight into their role in clinical practice in third and fourth year. The researchers reported client satisfaction for this model of education, although 37% misinterpreted the questionnaire. Additionally, the researchers reported a need for further investigation.

Limitations- no discussion of the theory underpinning this study or no evidence that a review of literature was conducted to inform this study. The criteria for inclusion and purposeful selection of participants not clearly outlined. Similarly, not all students are accounted at the conclusion and that 37% of clients misinterpreted the questionnaire. It was unclear whether educational assessors were aware of the trial and links between university can be made, therefore bias presumed. The timeline between cessation of clinical placement and when the questionnaires were completed by students, unclear. Also the method of clinical placement and areas of clinical experience not reported. Clinician satisfaction not reported. Additionally, the researchers highlighted that objective markers for evidence need to be made clear in future studies of this intervention.

Iwasiw CL, Goldenberg D (1993). Peer Teaching Among Nursing Students in the Clinical Area: Effects on Student Learning. ***Journal of Advanced Nursing.*** **18: 659 -668.**

The purpose of this randomised control trial was to examine the effect of peer teaching and learning amongst nursing students in a Canadian baccalaureate program whilst on clinical placement in two surgical units.

Cohort- fifty volunteer second year students enrolled in a four-year baccalaureate program were randomly assigned to this trial. Three groups at one hospital (n24) comprised the experimental group, and three groups at the second hospital formed the control group (n26). Age ranged from nineteen to twenty-eight years, with a mean of 21.6 years. Six experimental and six control participants had previous post-secondary tertiary education, and ten subjects had previous nursing experience. One subject in the control group had previous peer teaching experience

Method- following a pilot study to assess the feasibility and procedures of the project. It was hypothesised that students who where taught by peers would a) achieve higher improvement scores than students taught by teachers alone, and b) rate their preference for peer teaching equal to or higher than an instructor. Bandura's (1971) social learning framework provided the theoretical underpinning for this experimental design. At the beginning of a surgical rotation, subjects in the experimental group were supervised in a dressing change procedure by a clinical teacher. Once approved the student could then supervise other students in the dressing change procedure, all students in the experimental group had the opportunity to be teacher and learner. In the control group the clinical teacher followed normal teaching procedures which included occasional peer teaching experience. The data was collected through pre and post cognitive and psychomotor tests of a surgical dressing procedure and from a clinical teaching preference questionnaire.

Results-the experimental and control group samples pre-test scores were similar, indicating homogeneity within the sample. The hypothesis that proposed student's in the experimental group would have a significant increase in scores was partially supported, the experimental group saw significant increase in time management, the level of performance increased in both groups although the experimental group rated higher but it was not significant. The second hypothesis that peers would prefer peer teaching was also only partially supported. Although the experimental group reported less anxiety, more support and increased confidence when taught by peers. The experimental group reported problem solving, collaboration and skill equal to being taught by an instructor.

Limitations- all of the experimental group were located at the one hospital, and extraneous variables such as complexity of dressing change, clinical staff assistance and non-clinical interaction could not be controlled between both groups. Also different clinical instructors for both groups, which could impact on student bias for and against clinical instructor. Additionally, client satisfaction not recorded and economic benefits not commented on. The use of

only one student year level and one clinical venue reduces the generalisability of data.

Ladyshewsky RK (1995). Enhancing Service Productivity in Acute Care Inpatient Settings Using a Collaborative Clinical Education Model. ***Physical Therapy.*****75: 503-510.**

The purpose of this comparative study was to examine the productivity effects of the 2: 1 clinical education model in acute inpatient settings amongst Canadian physical therapy students.

Cohort- eight clinical instructors and sixteen students on a third year clinical placement, in a cardio-respiratory acute care settings. Random allocation and blinding occurred, but students were rearranged to match according to academic performance (Currens 2003).

Method-the Canadian Physiotherapy Workload Measurement System was used to compare control data of the workload of one clinical instructor for one clinical week (Currens 2003), against workload of a clinical instructor with two allocated physiotherapy students during an acute inpatient clinical placement.

Results- a net increase 47 % in productivity was reported from the clinical instructor and students group. Additionally, 34% more patients were treated and each patient received 12% more treatment during the study than during the control period after completion of statistical measurements. In total the clinical instructor spent an average of 52.84 hours in the five-week student placement in clinical teaching and administrative duties.

Limitations- as reported by the author, extraneous variables such as thoracic surgeon holidays, differences in case mixes, differing patient acuities, different clinician teaching, and differing institutional systems in the operations made this study difficult to control. Furthermore, the author reported that quality of care of the clients by the students, and client preference was not assessed and should be evaluated in future studies. The unequal duration of the control and the analysis groups would indicate bias for the 2:1 model (Currens 2003). Additionally, only single measure analysis was relied upon in this study

(Currens 2003). Educational outcomes limited to time and caseload management. The use of only one student year level reduces the generalisability of data.

Martin M & Edwards L (1998) Peer Learning On Field Work Placements. *British Journal of Occupational Therapy*.61: 249-252.

The researchers used thematic analysis, in a retrospective study that examined the perceptions of British occupational therapy students during a 2:1 clinical placement in acute psychiatry.

Cohort-fourteen students, seven pairs were given an open-ended questionnaire via post with a covering letter describing the study, post clinical placement in a thirty bed acute psychiatric ward (Currens 2003).

Method- a questionnaire was sent to students following clinical placement. The respondents were given the opportunity to use own language and ideas in answer to three open ended questions. The data was then categorised and analysed by both authors.

Results- students perceived benefits in shared learning and support. Additionally, being able to share travel costs and accommodation at placement was seen as beneficial. Students stated that placement more enjoyable when shared with a peer. Student supervisors' reported less stress with two students able to share teaching load. Although, more stress was experienced by supervisor if students incompatible (Currens 2003). Also, students reported less time to be independent in practice, and less individual time spent 1:1 with supervisor (Currens 2003). Many of the students reported that it lessened the number of experiences that they were involved in overall.

Limitations- the theoretical concepts underpinning this study were restricted to previous studies. Additionally, it was unclear what level the student participants were at in their course, and whether the groups were comparable at entry. This result is limited to one single placement, previous student experience unknown. It can be assumed that bias occurred in the student responses and analysis as one author sole clinical educator (Currens 2003).

Potential educational benefits and costs not reported, client and clinician satisfaction not reported.

Mostrom E, Ribesky C, Klukos M (1999) Collaboration in Clinical Education: 2:1:Student to Therapist. *Physiotherapy Case Reports.* 2: 45-57.
A case-study of one first year physical therapist student and one second year physical therapist assistant student on a six week block placement at a private outpatient clinic, working together under one clinical instructor. Both students from different universities and enrolled in differing university courses.
Method-both students allocated at the same time to the clinical area by chance, the clinical instructor gained permission for the study from both universities and students, following allocation. The perceptions of student's experience gathered from questionnaires, interviews, course evaluations and journals. No journal was submitted from the second year student.
Results- both the students and clinical instructor reported numerous benefits from this model. Including, increased comfort with in the clinical environment, it facilitated the transition into practice and fostered collaborative teamwork. Similarly, both students reported the negative effects of having less 1:1 time with the clinical instructor. The students' reported frustration that the instructor was unaware of the differing levels of education and expectations for practice.
Limitations- this article did not state where the study had occurred, I assumed that it was a British study from the language and its publication in that particular journal. Client satisfaction not reported. Limitations not described in the article this study generated. Poor discussion of the background literature, that provided the framework for this study. Additionally, bias assumed as the data was collected by the first two authors of this paper.

Schwab T & Robinson B. (1991) Pairing Students for Community Health Nursing Home Visits. *Nursing Connections.* 4: 37-43.

A descriptive study, involving faculty paired nursing students in two metropolitan community health clinical placements in the United States.

Cohort: sixty senior baccalaureate nursing students enrolled in a one-semester course of theoretical and clinical community health nursing, over a three year period. Two faculty members coordinated the community health clinical placements over the three semesters; approximately sixty clients were involved.

Method: The two faculty staff members individualised student pairing to their own method of teaching and learning. Students either chose their own partners or they were chosen by the faculty member according to observational contact and behavioural judgement on students' actions. Both students and the faculty member could request a change to the student partnership. Students selected their clients according to a specific interest
(maternity or geriatrics) from a faculty prepared pool of clients. Informed consent was obtained from the clients, prior to the commencement of the student pairs. Each student had the opportunity to be student leader and observer. Students were required to submit a weekly nursing care plan and written family assessment, and received weekly feedback from the faculty member. Additionally, during the semester faculty made periodic home visits with the student pair, to evaluate 'family dynamics', client and student inter-relationships.

Results: the authors reported that the students enjoyed the clinical experience and 'considered it extremely valuable and personally fulfilling' (page 42). The students enjoyed a collegial relationship, the autonomy of this model, and were able to work through conflicts together. The researchers also reported it reduced stress initially in clinical practice. Additionally, the students valued feedback from peers as well as instructors. The instructors reported it provided more insights into student learning and better met the needs of the students, although it increased faculty co-ordination time and decreased individuality of student assignments. It was reported that this strategy also informed future

research considerations in conflict resolution and clinical simulations. Mostly, clients responded well to the paired students conducting the homevisits, although some reported discomfort due to limited physical space with two students.

Limitations: the background literature underpinning this study originates from primary studies, and Gustafson's (1980) discussion paper on student peer evaluation on homevisits. It was unclear from the paper how faculty members were selected to participate in this study and level of education and experience was not reported. Additionally the length of clinical placement was not stated. It was unclear whether the students were analysed in their groups, and the method of data collection and analysis was not explicit. Students aware of university links so bias assumed. The use of one-year level, and student participants enrolled at just one tertiary education centre, reduces the generalisability of the data. Costs not reported.

Yates P, Cunningham J, Moyle W, Wollin J (1997). Peer Mentorship in Clinical Education: Outcomes of a Pilot Program for First Year Students. ***Nurse Education Today.*****17: 508-514.**

A comparative study examining the outcomes of first year Australian nursing students mentored by second year nursing students during clinical placements.

Cohort-fifty five first year students mentored by eight-second year students, voluntary participation of both student groups.

Method-second year students purposefully selected by researcher based on academic achievement, clinical performance and interpersonal skills, and willingness to participate. The data analysis occurred, from pre and post clinical questionnaires and focus groups every two to three weeks during the semester. Mentors were encouraged to keep a reflective journal. Questionnaires had fixed responses using a likert scale. And analysis occurred between participating and non-participating students on selected academic measures and clinical performance.

Results-a detailed account of how data was analysed and explained. First year students reported a reduction in anxiety related to clinical practice and increased confidence. The presence of a mentor increased practice of clinical skills, and also increased first year student's confidence with dealing with difficult situations. Furthermore, the mentors also reported an increase in self-improvement, increased reflection on learning and increased organisational skills. Students reported that pre-clinical sessions poorly timed with academic program, so low attendance at sessions. No significant increase in overall grade, from participating students 66.11% and non- participating students 70.08 %. The researchers highlighted the need for a more rigorous experimental design to demonstrate educational effect.

Limitations- background literature underpinning this study restricted to primary research articles and discussion papers. The method of clinical placement and clinical area were not stated. The potential economic benefits were also not reported on. Client and clinician satisfaction not reported. Bias assumed in student response's as they were aware of links with the university and educational assessors also aware of the study. Students not always analysed in the allocated groups. It was unclear whether data collection was consistent from all participants and whether groups treated equally throughout the study. Only 47.3% of 1st year's students returned questionnaires and 87.5 % of second year students. The purposeful selection of the second year students increases the risk of bias. Only one tertiary education centre was involved in the study, so this reduced the generalisability of the data, and there was no measure of the educational effect. Costs not reported, or clinician and client preference.

4.3 Recurrent Themes that Re-occurred Significantly.

Within the studies synthesised recurrent themes emerged from the literature. The themes that re-occurred significantly are highlighted in this chapter, the following chapter (see Chapter Five: Discussion of the Evidence) discusses in detail the effect on learning outcomes in all of the studies and the implications for the clinical education of health science students.

Within the literature there was significant self-reporting of increased confidence, and comfort initially in clinical practice by all the undergraduate health science students (Faure et al 2002; Mostrom et al 1999 Aston & Molatiossis 2003; Yates et al 1997; Erikson 1987; Iwasiw & Goldenberg 1993; Martin & Edwards 1998; Currens & Bithell 2003; Schwab & Robinson.). Additionally, Bos (1998) in a descriptive study, DeClute and Ladyshewsky in a comparative study and Iwasiw & Goldenberg (1993) in a randomised control trial reported that peers teaching and learning from one another in clinical practice had a positive impact on psychomotor development (technical or clinical skill development). Furthermore, Erikson (1987), Iwasiw & Goldenberg (1993), Cortazzi et al (2001), DeClute and Ladyshewsky (1993) and Bos (1998) reported clinical reasoning, reflection and cognitive development were increased with peer teaching and learning. It is important to note however that all learning between peers was not considered desirable in all of the included studies. Mostrom et al (1999) in a descriptive study and Martin & Edwards (1998) in a retrospective survey identified negative aspects, which were self-reported by the student participants and clinical instructors. These situations occurred when peers were incompatible and mentor unaware of a difference in education level.

Conclusion

Some results have been similar in the synthesised studies, as seen in the discussion of the recurrent themes within the literature, even though diversity exists in the quality, methodology and level of evidence that the included studies bring to this systematic review of literature. The nature of the studies, their susceptibility to bias and limitations were discussed in this chapter. All of the included studies have been published in peer reviewed journals (to ensure quality of methodology). So publication bias exists, and probable bias for problem solving curricula but the method of teaching and learning was not detailed in all of the studies. The applicability of the evidence to the development of curricula in clinical education is discussed in the next two chapters.

Chapter Five: Discussion of the Evidence

Introduction

This secondary study has addressed the short fall that exists in the peer teaching and learning body of knowledge. The relevance and strength of evidence provided from the synthesised studies is discussed in this chapter, in doing so the foundation for the recommendations detailed in Chapter Six: Recommendations and Future Directions are layed down.

5.1 Providing the Evidence

A majority of the evidence provided within the studies was classified as lower level evidence according to the NHMRC (2000) continuum of evidence (see Table 1 page 22). These study types are subject to a higher level of confounding bias, or chance and significant risk (Currens 2003; Glasziou et al 2001; Eccles et al 2001; NHMRC 2000). Four experimental studies were identified and included these are detailed in Table 3 (page 80, studies listed in order of evidence, not relevance). As conveyed in this table, many studies informing this review would have been excluded if methodology was the major factor influencing inclusion (see Chapter Three: Methodology and Methods for more details). The value of the NHMRC evidence rating system in providing relevant evidence for recommendations in clinical education is circumspect (this is detailed in Chapter Two: The Theory Underpinning Systematic Reviews of Literature).

So as to provide a broad theoretical base to inform recommendations and guidelines on peer teaching and learning in clinical education, an inductive and interpretive method of data synthesis was used (see Chapter Two: The Theory Underpinning Systematic Reviews of Literature). The quality of the selected papers has been discussed in detail in the previous chapter (see Chapter Four: Overview of the Studies). The evidence identified from the learning outcomes for or against peer teaching and learning are discussed in this chapter, and the theoretical concepts that underpin them.

Table 3. The Levels of Evidence Generated by the Studies

Studies	Level of Evidence (NHMRC 2000)
Iwasiw & Goldenberg (1993)	II*
Ladyshewsky (1995) DeClute & Ladyshewsky (1993)	III.2*
Erikson (1987)	IV*
Mostrom et al (1999) Currens & Bithell (2003) Aston & Molassiotis (2003) Martin & Edwards (1998)	These studies did not rate. Descriptive statistics and thematic analysis
Faure et al (2002) Cortazzi (2001) Bos (1998)	These studies did not rate. Qualitative
Yates et al (1997) Schwab & Robinson (1991)	These studies did not rate. Descriptive studies (*denotes potential for statistical pooling)

5.2 Theoretical Concepts Within the Included Studies

Peers teaching and learning from one another is the theoretical concept that underpins the included studies in this review (Aston & Molassiotis 2003; Bos 1998;DeClute & Ladyshewsky 1993; Ladyshewsky 1995; Currens & Bithell 2003; Erikson 1987; Faure etal 2002; Iwasiw & Goldenberg 1993; Erikson 1987; Mostrom etal 1999; Yates etal 1997). A great deal of the supporting literature in these studies was drawn from appropriate educationalists and social learning theorists such as Bandura (1971) cited in Iwasiw & Goldenberg (1993), also Piaget and Slavin (1995) cited in Currens & Bithell (2003), and Dewey (1899) cited in Martin & Edwards (1993), and Lovings (1993) cited in Bos (1998).

These theorists view learners as active and equal partners, encouraging students to be self-directed and share in interventions, and actively participate in discussions and feedback (Currens 2003). They believe the concept of peer learning lies within the paradigm of constructivism, that social interaction, collaboration and non-evaluation are essential elements in the construction of knowledge. However, many studies did not explore the underlying theory at all (Currens 2003).

A majority of the studies cite earlier papers by Ladyshewsky (1993), Gerace & Siblano (1993), Erikson (1987), Gustafsen (1980) and Iwasiw & Goldenberg (1993) as the conceptual foundation. Therefore, these included studies by Ladyshewsky (1995), DeClute & Ladyshewsky (1993), Erikson (1987), Mostrom et al (1999), Aston & Molassiotis (2003), Faure et al (2002), Cortazzi (2001), Yates et al (1997) and Schwab & Robinson (1991) cannot generate underlying theory to any extent. Additionally, authors of the included studies have rarely drawn from educational literature across the health science professions.

The exception being Ladyshewsky (1995), in his study of physiotherapy students where he discussed earlier work amongst medical students, and Martin & Edwards (1998) in their study of occupational therapy students, discussed relevant developments within nursing (Currens 2003). Therefore, the ability of these studies to generate new theory, be successfully replicated and, provide generalisations for the health science professions, has been diminished. These abilities are significant to the creation of a theoretical base.

5.3 How Peer Teaching and Learning can Improve Clinical Education for Service Providers

Ladyshewsky's (1995) comparative study provided evidence of peer teaching and learning complementing existing services for the providers of care. The significance of this study lies in its evaluation of efficiency. The Canadian Workload Measurement System was used to evaluate two comparative groups.

It was well documented in the background literature of the included studies that increased demands on clinicians, increased workloads, economic constraints and the demand for increased clinical placements for undergraduates, have led universities to use peer teaching and learning as an alternative teaching and learning strategy for health science students on clinical placements (Aston & Molassiotis 2003; Bos 1998; Currens & Bithell 2003; De Clute & Ladyshewsky 1993; Erikson 1987; Faure et al 2002; Iwasiw & Goldenberg 1993; Erikson 1987; Mostrom et al 1999; Yates et al 1997).Using peers to decrease clinician teaching workload and increase educational outcomes for students was reported by Mostrom et al (1999) and Currens & Bithell (2003) in their descriptive studies. More importantly for stakeholders Ladyshewsky's (1995) study, reported a significant increase for student, clinician and client in outcomes relating to clinical practice.

5.4 Pre-clinical Education and Preparation

Pre-clinical education prior to placement was discussed in three of the included studies (Faure et al 2002; Aston & Molassiotis 2003; Yates et al 1997). Each study varied in approach to pre-clinical preparation (details in Table 4, page 84). It was identified in two studies, Faure et al (2002) in a descriptive retrospective study and Aston & Molassiotis (2003) using descriptive statistics and thematic analysis, that pre-clinical education impacts on the success of peer teaching and learning as an educational strategy. The participant students in these studies self-reported positive outcomes from decreased stress and increased confidence initially with clinical practice. Both studies reported the need for more pre-clinical preparation of both the teacher and learner roles. Additionally, Faure et al (2002) and Yates et al (1997) indicated the timing of pre-clinical sessions needed to be congruent with academic program to increase student attendance.

It is interesting that Yates et al (1997) gave a comprehensive pre-clinical preparation and did not identify the need for further pre-clinical preparation. So conceivably the more pre-clinical preparation of students, facilitates, increases confidence and reduces the stress of student entry into clinical practice

Table 4. Pre-clinical Education and Preparation

Author and Field	Pre-clinical preparation	Feedback	Future directions with pre-clinical preparation
Faure et al (2002) Physiotherapy	SPLICE consisted of 12 hours pre-clinical preparation for 2nd year students. This consisted of 6x2 hour sessions in which 2nd year students were buddied with 3rd and 4th year students to complete the following tasks; client interviews observation and assistance with evaluation and treatment techniques, senior students were responsible for client permission, outlining condition and problem solving with the 2nd year student, and providing feedback to 2nd year student	**2nd year students** **Positive** Reduced stress Increased self confidence Good preparation for clinical practice Confirmation of knowledge Increased knowledge Introduced students gradually to clinical practice **No negative comments** **3rd and 4th year students** **Positive** Forced to do more client preparation Increased their own confidence Confirmation that they had a good knowledge base Opportunity to test own knowledge Developed from the experience **Negative** Took too much time teaching Clients did not react well Third years found it difficult to take on the role as less experienced in clinical.	Time sessions to better accommodate 3rd and 4th year students, more preparation at the university on the teacher/learner roles' prior to clinical practice. Research into client effects. Gather more evidence on this model.

Author and Field	Pre-clinical preparation	Feedback	Future directions with pre-clinical preparation
Aston & Molassiotis (2003) **Nursing**	Triadic system where the qualified nurse was assigned as the mentor and senior and junior students teach and learn from one another. Mentor short-term program with updates in the school of nursing. Preparation of senior and junior students was included in preparation for practice (no specifics mentioned)	**Junior students** stated in feedback that they received no preparation prior to clinical. **Senior students** 32.2% stated not prepared, 25.8% unclear, 41.9% stated that they felt well prepared	Preparation needs to be readdressed, senior students requested more preparation as teacher
Yates et al (1997) **Nursing**	Four to seven 1st year students were allocated to a purposefully chosen 2nd year nursing student (peer mentor). Mentors attended a 6 hour orientation session which addressed aims, roles, and responsibilities, clinical teaching strategies, and management strategies for managing students, also mentors were provided with readings addressing basic concepts of teaching and learning, No 1st year preparation	No feedback regarding pre-clinical preparation	2nd year students requested that pre-clinical preparation be congruent with academic timetable.

5.5 Advantages and Disadvantages of Peer Teaching and Learning

Of the studies located, most supported the use of peer teaching and learning and indicated a positive impact on educational outcomes from its use (Aston & Molatiossis; Faure etal 2002; Mostrom etal 1997; De Clute & Ladyshewsky 1993). Mostrom et al (1997) and Martin and Edwards (1993) however identified negative aspects of the intervention if peers incompatible and mentor unaware of a difference in education level.

Psychomotor Development

Iwasiw & Goldenberg (1993), Yates et al (1997), DeClute & Ladyshewsky (1993) and Bos (1998) cited in their studies that peers teaching and learning from one another in clinical practice had a positive impact on psychomotor development (clinical skill development).

Undergraduate nurses were the identified participants in three of these studies. This may infer that nurses see clinical skill development a priority in their education programs. In McAllister's (2001) literature review of nursing education within Australia, she indicated many nursing clinicians still persist in evaluating nursing knowledge on behaviouristic performance (skill and time management) which is governed by the social and political pressures of the clinical practice setting.

Only in one nursing study, a randomised controlled trial conducted by Iwasiw & Goldenberg (1993), was psychomotor performance assessed by a clinical instructor. In the other studies performance was self-reported by the student participants. DeClute & Ladyshewsky (1993) examined skill development and reported that it increased development in their comparative study. Although they asserted that it also increased problem solving within the experimental (peer) group, they provided little evidence and no conceptual framework to support this assumption.

Cognitive Development

An increase in cognitive development was reported by Bos (1998), Cortazzi et al (2001), Flynn etal (1981), Iwasiw & Goldenberg (1993), Currens & Bithell (2003), and DeClute & Ladyshewsky (1993) in a variety of measurements (see Table 6 for details, page 103).

Reliability of the process of evaluation in Bos's (1998) descriptive survey, Cortazzi et al (2001) narrative and Currens & Bithell (2003) descriptive studies may be questioned because improvements were self-reported. Although, being reflective and analysing one's own development is considered to indicate higher levels of cognitive thinking, according to educational and cognitive theorists such as Biggs (1997) and Perry (1970). Additionally, Iwasiw and Goldenberg (1993) in their randomised-controlled trial measured a definite increase in cognitive scores in the experimental group (peer group). Although the lower than pre-test score in the control group, casts doubts on the validity and the reliability of the cognitive test.

Table-5 Cognitive Development

Author and Field	Measurement Type	Outcome	Reliability	Future progress
Bos (1998) **Nursing**	Self evaluation Critical thinking and analysis	Students reflected on their knowledge, time management and organisational development,		Not reported
Cortazzi M **Jin L** **Wall D** **Cavendish S** **(2001)** **Speech and Language**	Learning through narrative communication, Self evaluation	Reflection through shared learning with peers and academics, reported increase in integration of theory to practice	Thematic analysis of audiotaped sessions with students	Not reported
Currens & Bithell (2003)	Self evaluation	Reported an increase in clinical reasoning from bouncing ideas off one another		
DeClute & Ladyshewsky (1993)	Unclear	Reported increase in problem solving by the authors	Not reliable unclear how this was conceptualised	
Iwasiw & Goldenberg (1993)	Statistical analysis	Peers vs Clinical instructor in teaching and learning dressing technique	Increase in cognitive test of 1.67 (*t*-test) over control group	Control groups post cognitive test scored lower than pre-test, needs further investigation

Affective Development

No studies reported that peer teaching and learning enhanced the students' ability to be empathetic towards clients. These characteristics are difficult to measure and may need to be reported and evaluated by the client themselves.

Difficulty arose in Faure et al's (2002) retrospective descriptive survey (physiotherapy). Clients were asked to respond on their preference for this method of teaching and learning. As 37% of the respondents did not understand the question, and the remainder, 63% reported negative responses; the validity of this method of evaluation is questionable. Additionally the junior student participants in this study reported that it increased their interaction and comfort with clients. It is therefore feasible that peer teaching and learning would impact on greater client comfort and outcomes.

This is congruent with Erickson's (1987) nursing study, in which the students self reported client preference for this method of teaching and learning. As a consequence, further research is required in this area and the development of a reliable tool or method of analysis that will generate valid results is required.

Learning Opportunities

Yates et al (1997) in a descriptive study and Martin & Edwards (1998) utilising descriptive statistics and thematic analysis both reported on learning opportunities.

Yates et al (1997) reported that peer teaching and learning increased nursing students access and involvement in learning activities. However Martin & Edwards (1998) reported that it decreased occupational therapy students' learning opportunities as they had to share learning experiences with the other allocated student (2:1 model). The students in this study self-reported a preference for one on one teaching with the clinical educator, and that they

felt that they had less opportunity to be independent. Greater numbers of students were involved in the nursing study, where allocation was 2:1 (students to clinical instructor) than in the occupational therapy study, so conceivably, a greater number of students enables a greater and more diverse learning experience. Again, further investigation is needed for this to be considered conclusive. As student expectations are different between the differing professional bodies and this may have influenced the results.

Ongoing Student Understanding of Their Own Development

It is anticipated that students at a higher cognitive level are able to reflect and understand their limitations and are realistic of their own development (Perry 1971). Of the included studies, all supported some development in the earlier identified learning outcomes (see Chapter One: The Context of the Investigation, page 17). These learning outcomes are discussed in detail in this chapter under the differing outcome headings.

Student Leadership Skills

Numerous studies identified enhancement of student leadership skills. Aston & Molassiotis (2003) using descriptive statistics and thematic analysis reported that peer teaching and learning increased mentoring and teaching skills for senior students. Erickson (1987) in a pre-test/post-test survey reported that this intervention increased collaboration and accountability within the student body. Additionally in the descriptive study conducted by Schwab & Robinson (1991), the students self-reported a feeling of more autonomy when utilising peer teaching and learning. Again, Bos (1998) in a descriptive survey reported promotion of leadership within the peer group. The theoretical framework underpinning Bos's 1998, study was Loving's (1993) 'model of competence validation'.

As cited in Bos (1998), this model differentiates learning between extrinsic and intrinsic environments; 'the former is primarily evaluative of student performance, and the latter being the student's internal motivation to acquire knowledge and skills to continue learning' (page 189). This intrinsic motivation described by Bos (1998) was identifiable in the studies by Aston & Molassiotis (2003) Erickson, (1987) Flynn et al (1981), Schwab & Robinson and Bos (1998). These studies reported students developed skills in teaching, mentoring, organisation, management of staff, and accountability in a non-evaluative and self-directed environment. As a consequence, a student's intrinsic motivation was important to the educational outcomes reported within these studies.

A prominent theme within the included studies was increased confidence in clinical practice (see Chapter Four: Overview of the Included Studies). Leadership and confidence to take on a leadership role are intertwined. The student's evaluated their own learning, and reported increased confidence in leadership roles when working with a peer. Many clinicians and educationalists may argue that this approach to teaching and learning, requires students to function independently of the clinician or clinical instructor and this will foster independence in the junior students, resulting in a regression of leadership skills, as they do not have the resilience or knowledge to handle such independence. So again, further research in this area is required.

Student's Appreciation of Life Long Learning

No included studies formally reported on life long learning, although indirectly it may have been reported on. Educational theorists and cognitive theorists such as Biggs (1991) and Perry (1971) report a link between cognitive development and lifelong learning. They believe that students who are at a higher level in the cognitive development continuum have an appreciation and realisation of the need for lifelong learning. Studies reporting

an increase in cognitive development are therefore reporting an implied increase in student's appreciation for life long learning.

Evaluation and Satisfaction of the Learning Experience

Satisfaction of the peer teaching and learning experience and the evaluation on the students' development has been mainly self-reported in the twelve included studies (see Table 7 for details). Four studies Bos (1998), DeClute & Ladyshewsky (1993), Ladyshewsky (1995) and Martin & Edwards (1998) did not report on client, clinician and student satisfaction. The other studies reported mainly on student preference for this type of clinical education in subjective feedback, in evaluative surveys of this intervention.

The feedback from the student participants was that they had learnt from and enjoyed the experience. It increased their self-confidence, autonomy, clinical reasoning, collaboration, and evaluation of skills and knowledge (this is detailed in Table 7). Negative feedback was mainly from junior students who reported incompatibility with other students and competition for clinical practice and clinician or clinical instructor time. Senior students reported that more input should be put into the student roles prior to clinical.

In Erickson's (1987) nursing study, students reported client preference for this method of teaching and learning. Furthermore, Schwab & Robinson (1991) reported that clients appeared to interact with the students without inhibition. Faure et al (2002) reported negative comments from clients (the reliability of this study is discussed earlier in this chapter). The majority of studies did not report on client satisfaction for the experience at all. Again, this is an area that requires further investigation.

Currens & Bithell (2003) and Mostrom et al (2002), both physiotherapy studies, reported clinicians and clinical instructors were satisfied and preferred this method of teaching and learning as it gave them greater time with clients, and created more independence from the students. The nursing study by Aston & Molassiotis (2003) also reported similar comments (see Table 7). It was suprising that more of the nursing studies had not reported on clinician satisfaction, as this educational intervention has been reported on in recent reviews of Australian nursing literature (QNC 2001, NRNE 2002) as a way to decrease clinician workloads when students are on clinical placement. Again, the reliability of the data for evidence was dependent on the method of analysis, as most of the feedback was self-reported in subjective responses to open-ended questions. The evidence cannot be defined in terms of the NHMRC (2000) levels of evidence.

Table 6. Evaluation and Satisfaction of Learning Experience (studies appear in alphabetical order, not order of relevance)

Author and Field	Clinician	Client	Senior student	Junior student
Aston & Molassiotis (2003) Nursing	Clinicians stated it increased their own time with clients that would have been taken up with clinical teaching.	Not reported.	Support was dependent on mentor. More organisation and feedback from mentor, and more support from university assessor, would have increased outcomes for students.	Felt well supported, apart from one student, overall sought as a great experience.
Bos (1998) Nursing	Not reported.	Not reported.	Not reported.	Not reported.
Cortazzi M Jin L Wall D Cavendish S (2001) Speech and Language	Not reported.	Not reported.	Involvement in narrative discussion and input suggest that student's appreciated the experience.	Not reported.
Currens & Bithell (2003) Physiotherapy	Clinicians stated it increased their own time with clients that would have been taken up with clinical teaching Clinicians need more strategies to support peer teaching and learning, but overall manageable and easier than expected—94.1% willing to use model again.	Not reported.	Students (year not stated) reported positive increase in discussion and reflection 98.3%, peer support 81.4%, and peer practice 67.8%. Negative aspects—less time with clinical educator 22%, competition with peer 10.2% and incompatibility with peer 8.5%.	Not reported.

Author and Field	Clinician	Client	Senior student	Junior student
DeClute & Ladyshewsky (1993) Physiotherapy	Not reported.	Not reported.	Not reported.	Not reported.
Erickson (1987) Community Nursing	Not reported	Client's receptive and enjoyed home visit.	Students felt good about helping each other, increased accountability and collaboration, gained experience in performance evaluation, more relaxed than with instructor.	Not reported.
Faure M, Unger M Burger M (2002) Physiotherapy	Further investigation needed.	Further investigation needed.	Felt motivated and increased own confidence working with the junior student and orientating to practice. Increased own clinical skills.	More prepared for practice, anticipated clinical more positively, decreased stress, increased confidence with clients, one junior student reported incompatibility with senior student.
Iwasiw & Goldenberg (1993) Nursing	Not reported.	Not reported.	A likert scale was used (5–1 positive to negative) Decrease in anxiety, increased interaction and collaboration, increased responsibility scored 3. Communication increase, honest supportive critique, feedback, increased self-confidence score 2.	Not reported.

Author and Field	Clinician	Client	Senior student	Junior student
Ladyshewsky (1995) **Physiotherapy**	Not reported.	Not reported.	Not reported.	Not reported.
Martin & Edwards (1998) **Physiotherapy**	Not reported.	Not reported.	Not reported.	Not reported.
Mostrom E, Ribesky C, Klukos M (1999) **Physiotherapy**	Beneficial for all involved, better preparation of roles in future, easier to supervise two students than one.	Not reported.	Enjoyed the experience, met learning needs, positive comments- increased collaboration, and peer receptive.	Enjoyed experience, more input and encouragement from senior student in clinical practice, worked well with peer, missed out on client time and had to compete for clinical instructors time.
Schwab & Robinson (1991) **Nursing**	Not reported.	Clients appeared to respond well, and without inhibitions in their interactions.	Conflict arose between students, although the author's reported that the pairing added additional support to the students.	Not relevant students from the same year.
Yates P **Cunningham J** **Moyle W** **Wollin J** **(1997)** **Nursing**	Faculty keen to further investigate model, no clinician feedback.	Not reported.	Peer mentors (second year students) agree with junior students, better timing of pre-clinical sessions; increase in their own skills and knowledge, leadership skills and self-confidence.	All students reported reduced anxiety and increased in confidence

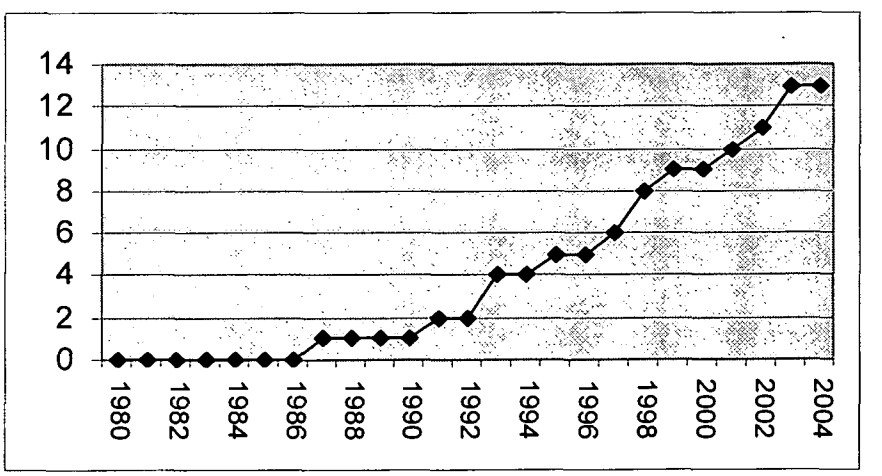
5.6 Economic Evaluation

None of the included studies reported formally on a cost-effectiveness analysis or cost-benefit analysis. Ladyshewsky (1995) looked at efficiency and the work related outcomes for service providers. Again this highlights an area in need of further investigation.

5.7 Trends Throughout the Selected Time-frame

On my initial search of the literature, which provided the background material for this study, many discussion papers and studies of peer teaching and learning had been conducted during the 1980's. Interestingly, only one study of peer teaching and learning in clinical education was conducted in the 1980's. Since, there has been a gradual increase as depicted in the cumulative frequency chart shown in Figure 1. The rationales for these trends within the literature maybe the current social and political influences on global health care and that more academics are involved in teaching the health sciences and are expected to research and publish in their fields..

Figure 1. Trends Throughout the Selected Time-frame



5.8 Assessing the Heterogeneity

A number of factors within the included studies have caused a difference in the reported effect of peer teaching and learning in clinical education. The types of studies included in this review have used a variety of methods to measure the exposure of peer teaching and learning. The criteria that they used to make their assumptions also differed. No statistical pooling was conducted due to practical reasons, therefore no statistical test was performed. It is important to the end result of this secondary study to highlight the factors and the variations that occurred, and the influences they have had on the results (Glasziou 2001). These factors will have a significant impact on the statistical pooling that is intended as a future project.

The factors that have influenced the outcomes are:

- Educational level and length of time peer teaching and learning in clinical area within the studies
- Age and previous experience of student with this type of intervention
- Experience of clinical instructor
- Timing with academic program
- Number of students involved, and ratios of students and tutors
- Duration of study
- Outcome measures used

As previously mentioned earlier in this thesis, a future project in which studies that rated level II, III and IV in the NHMRC (2000) levels of evidence will be further evaluated, and if possible the end-points will be combined and statistical pooling is intended.

5.9 Grey Literature

In systematic reviews inclusion of the grey literature is considered a way to reduce the risk of publication bias (see Chapter Three: Methodology and Methods for details). Due to the poor response from my contact with included study authors who are considered experts (due to publication on this intervention, and years of working with collaborative education models) in this field, a summary of their conclusions is unavailable at this time.

Conclusion

In summary peer teaching and learning is an area that needs further investigation. This systematic review of literature synthesised thirteen papers on this intervention that had been published in peer reviewed journals. The strength of evidence according to the NHMRC levels of evidence (2000) when generalised over the studies would be low and some studies did not rate at all. Additionally, flaws within the studies became apparent on synthesis, so this systematic review of literature has illuminated evidence in which I have a restricted confidence at this time.

More primary studies of this intervention are needed and have been discussed through out the thesis. Randomised controlled trials would provide the strongest evidence according to the NHMRC (2000) evidence continuum. It can however be argued that this is an area of qualitative inquiry and the data did illuminate recurrent themes that were mostly positive about this type of educational intervention. At present it is impossible to make conclusive claims on this educational intervention in relation to levels of evidence.

Most educational outcomes have been discussed according to the positive or negative impact of peer teaching and learning, and usually more than one study has reported on and supported the same outcome. The single units of data from

all of the included studies are combined into a more complex product (Glasziou et al 2001) in the next chapter and, recommendations are made for curricula along with the evidence supporting them (see Chapter Six: Recommendations and Future Directions).

Chapter Six: Recommendations and Future Directions

Introduction

In undertaking this systematic review of literature it has become evident that peer teaching and learning in clinical education is a multifaceted area, that has been under-researched. As this research and other research by Currens (2003), QNC (2001), and the NRNE (2002) has demonstrated the relative value of this educational intervention, and the gains for stakeholders in terms of learning outcomes, productivity, and economic viability. Still this is an area that still requires elaboration and needs to be established with further research. This chapter evaluates the current evidence at this time in answer to the research question. The reviewer makes purposeful recommendations for health science curricula and future directions are discussed within the existing body of knowledge.

The purpose of this secondary study was to synthesise learning outcomes in existing literature, for the effect of peer teaching and learning in clinical education. A search of Australian and international literature yielded thirteen studies with predominantly descriptive and qualitative research methods. Of the quantitative studies, one study was a randomised control trial (RCT) and rated level II evidence and several others rated level III.2 and IV (NHMRC 2000). No studies included in this review rated at level I according to the NHMRC levels of evidence (Table 1, page 32). Many of the studies reported on narrow learning outcomes, such as psychomotor skill development in aseptic technique. No studies detailed curricula or examined whole units of learning and the effect on other areas of learning (NRNE 2002), such as utilisation of evidence based practice and life long learning, however the implications have been discussed (see Chapter Five: Discussion of the Evidence). Again, very few studies reported on client confidence or client care outcomes, and this is congruent with the findings of the Australian NRNE (2002) and is an area in need of further investigation.

The learning outcomes identified in Chapter One: Context of the Investigation informed this systematic review of literature. The data accumulated from these outcomes underpin the recommendations made for peer teaching and learning in health science curricula. Of the included studies, most are informed by interpretive or inductive paradigms. This was expected, and the quality and critical appraisal tool was developed to enable the synthesis of these studies. Educational literature is strongly influenced by human personality therefore qualitative research methods are often used to investigate the effect on participants (Grol 1997). Therefore, evidence generated by these studies may not always lead to 'clear and unambiguous recommendations' (Haines & Jones 1994 page 7). As a consequence the reviewer has restricted confidence in the recommendations at this time. It is imperative to the development of peer teaching and learning in clinical education, that further studies and testing strategies are implemented to increase the body of knowledge in this area.

6.1 Reliability and Validity of the Data

Traditionally studies using descriptive and qualitative methods are considered a lower source of evidence (NHMRC 2000: Glasziou 2001; Egger et al 2000) in evidence based practice. Therefore, it is important to identify the reliability, validity, generalisability and applicability of the results of this review as a source of evidence for educational practice.

Validity is the closest representation to the truth (Egger et al 2001). There is a distinction between internal and external validity. Internal validity is the extent to which the circumstances being studied are correct (Egger et al 2001). Accordingly Pope et al (2002) cited 'qualitative methods are often seen as scoring highly in terms of internal validity' (page 150). This is achieved by documenting how people behave in real situations (Pope et al 2002). Consequently, the recommendations from qualitative studies have a high level

of internal validity for clinical education due to the hermeneutic paradigm informing them. Contrastingly external validity is the extent to which studies are generalised or able to be transferred (Egger et al 2001).

Therefore the definition of generalisability needs to be made clear. In this review the term is outside the "traditional definition of generalisability, whereby supported hypothesis can be applied across various identified settings and events" (Andre 2002, page 117). It will be a requirement of those using the findings of this review to assess the transferability and generalisability of data and evaluate the "relationship" between the findings "and the environment in which they wish to apply them" (Andre 2002, page 117).

The reliability of the results, which is the degree of stability that exists when a measurement is repeated (Glasziou et al 2001) is the strength of quantitative studies and is not easily assessed and validated in qualitative papers due to the considerable heterogeneity that exists in these studies (Pope et al 2002). Therefore, as expressed previously my confidence in the reliability of findings at this time is restricted.

Having synthesised studies with diverse research methodologies and processes, this has informed this review in differing ways and increased the applicability of the results. It is my opinion that this has also increased the feasibility of the outcomes by adding diversity to the overall result.

6.2 Recommendations for Curricula

This systematic review of literature revealed twelve recurrent themes pertinent to undergraduate health science curricula. These themes are:

- Service providers will benefit from peer teaching and learning both in the long and short term
- Pre-clinical education increased outcomes from peer teaching and learning
- Peer teaching and learning increases collegial behaviour within the peer group
- Incompatibility of students needs to investigated
- Number of students to maximise effectiveness needs to investigated
- Learning outcomes were only addressed singularly in many of the studies and were mostly evaluated by student opinion and preference
- Client preference, satisfaction and confidence with student allocation of their care needs further investigation
- Academic involvement and collaboration with clinicians and students needs further investigation
- Peer teaching and learning increases student learning outcomes in the psychomotor and cognitive domains, but further investigation is needed in this area
- A cost-effectiveness analysis and cost-benefit analysis needs to be performed to provide evidence on the economic benefits of peer teaching and learning in clinical education

The more complex product from the synthesis of evidence on the effect of peer teaching and learning in clinical education is stated in the following pages, along with the rationale for curricula recommendations. A rigorous critical and quality appraisal of the studies informing these recommendations has been conducted (see Chapter Five: Discussion of the Evidence & Chapter Four: Overview of the Papers).

6.2.1 Service providers will benefit from peer teaching and learning both in the long and short term

As discussed previously, universities are looking for change to the traditional approaches to clinical education. And clinical education venues (service providers) are looking for methods that increase independence, psychomotor skill and time-management skills in potential employees (Aston & Molassiotis; Ladyshewsky 1995). In achieving these attributes service providers are not prepared to increase valuable clinician time in instructing health science students, and view this as a requirement of their tertiary education (Aston & Molassiotis 2003; QNC 2001; NRNE 2002). Consequently, the following recommendations are made in order to inform service providers of the positive impact of this intervention, and the need for further utilisation and investigation. Communication to service providers will need to be insistent, and through channels other than passive dissemination strategies (see Chapter Two: The Evidence Underpinning Systematic Reviews of Literature).

Recommendations:

- More than one student working with a clinician increases client care time.

Evidence: Currens & Bithell (2003) content analysis; Ladyshewsky (1995) III.1 (NHMRC 2000).

- More than one student allocated to a clinician reduced instruction time for the clinician.

Evidence: Currens & Bithell (2003) content analysis; Faure et al (2002) descriptive survey; Martin & Edwards (1998) thematic analysis.

- Peer teaching and learning increased students' comfort initially in clinical practice, therefore reducing the need for constant supervision by clinician.

Evidence: Aston & Molassiotis (2003) descriptive statistics and thematic analysis; Bos (1998) content analysis; Currens & Bithell (2003) descriptive survey and thematic analysis; Erickson (1987) descriptive statistics; Faure et al (2002) descriptive survey; Iwasiw & Goldenberg (1993) RCT level II (NHMRC 2000); Mostrom et al (1999) thematic analysis; Yates et al (1997) pretest/postest level IV (NHMRC 2000); DeClute & Ladyshewsky (1993) III.2 (NHMRC 2000); Schwab & Robinson (1991) descriptive study.

- Increased productivity for service providers if more than one student present on clinical placement at the same time.

Evidence: Ladyshewsky (1995) comparative control trial level III.2 (NHMRC 2000).

- Senior students' became more autonomous and increased leadership and clinical reasoning skills.

Evidence: Currens & Bithell (2003) descriptive survey and thematic analysis; Aston & Molassiotis (2003) thematic analysis and descriptive statistics; Bos (1998) thematic analysis.

- Students reported peer teaching and learning increased time-management skills, how this occurred is an area that needs further investigation.

Evidence: Bos (1998) thematic analysis; Yates et al (1997) pretest/post test IV (NHMRC 2000).

6.2.2 Pre-clinical Education increases outcomes from peer teaching and learning

The importance of pre-education prior to clinical placement, and its effect on learning outcomes from peer teaching and learning was a recurrent theme in three of the included studies. The study that had a more structured pre-clinical preparation of roles and student objectives was Aston & Molassiotis (2003), they did not report in the subjective student feedback the need for more pre-clinical preparation which was reported in two of the other studies with less pre-clinical preparation.

Recommendations:

- Pre-clinical preparation needs to be congruent with the academic timetable to increase student attendance.

Evidence: Faure et al (2002) descriptive survey; Yates et al (1997) descriptive survey: Aston & Molassiotis (2003) descriptive statistics and thematic analysis.

- More preparation in senior and junior student roles prior to clinical experience.

Evidence: Faure et al (2002) descriptive survey; Aston & Molassiotis (2003) descriptive statistics and thematic analysis.

- More preparation in clinician roles and more understanding of the differing educational levels of attending students prior to clinical experience.

Evidence: Faure et al (2002) descriptive survey; Aston & Molassiotis (2003) descriptive statistics and thematic analysis.

6.2.3 Peer teaching and learning increased collegial behaviour amongst students

Erickson (1987) singularly reported enthusiastic collegial post conferencing in her descriptive study of nursing students on community health placements. Martin & Edwards (1998) and Currens & Bithell (2003) reported increased student comfort when placed with a peer initially in practice settings this indirectly supports Erickson's findings. Again this is an area that requires further investigation, before any recommendation of consequence can be made.

6.2.4 Incompatibility of students

The reviewer is recommending an increase in the application of peer teaching and learning in the clinical education of health science students, therefore strategies need to be set in place if students are incompatible. Conflict will occur if students are incompatible due to level of knowledge, education level or have incompatible personalities (Mostrom et al 1999; Martin & Edwards 1998; Schwab & Robinson 1991). Therefore the following recommendations have been made based upon the available evidence:

Recommendations:

- Preceptors, clinical instructors and mentors need to be aware of the difference in education level, and prepare student workload accordingly.

Evidence: Mostrom et al (1999) thematic analysis.

- Effective strategies need to be put in place if peer teacher or peer learner not performing to expected level, so as not to impact on student development and learning.

Evidence: Martin & Edwards (1998) thematic analysis.

- If conflict of personality unresolvable, then the peer group needs to be carefully restructured to enable teaching and learning to re-occur.

Evidence: Martin & Edwards (1998) thematic analysis; Schwab & Robinson (1991) descriptive survey.

6.2.5 Number of student's to maximise effectiveness

A nursing study reported increased learning opportunities with an increase in student numbers (Yates et al 1997). This was refuted, by Martin & Edwards (1998) where occupational therapy students reported decreased learning opportunities. The most probable rationale for the differing outcome are the student's expectations of his or her own learning within the differing professions. This disputation highlights the need for further investigation in this area. Studies in this area should be specific to student numbers, profession and ongoing student development in the cognitive, affective and psychomotor domains.

6.2.6 Learning outcomes were only addressed singularly in many of the studies and evaluation was centred on student opinion and preference

Many of the studies are specific to a clinical skill (psychomotor) or the practice of reflection (cognitive). Similarities existed within the studies and between the differing health science professions. Even so, evaluation of student learning by clinician/clinical instructor, peer teacher and academic was rare in many of the studies. This is an area that the reviewer highlights the need for investigation utilising both qualitative and quantitative research methodologies. No studies tackled the broader issues such as which set of beliefs that informed curricula resulted in the increased outcomes from peer teaching and learning. Further

investigation is required of the implications of this intervention within the constructivism paradigm that informs most health science curricula to some degree in a problem-based learning format (Davies 2000). How peer teaching and learning impacts on the long term development of problem solving and clinical reasoning skills needs to be addressed in more detail.

6.2.7 Client preference, satisfaction, comfort and confidence with student allocation of their care needs further investigation

Conflicting evidence was elucidated in client preference and confidence with allocation of their care to more than one undergraduate health science student (see Chapter Five Discussion of the Evidence). As discussed earlier in this chapter there is a need for investigation in this area (NRNE 2002).

Recommendations:

- Client confidence in student allocation needs further evaluation.

Evidence: Mostrom et al (1999) thematic analysis.

- Further evaluation of client preference for the combination of students and clinician allocated to care.

Evidence: Martin & Edwards (1998) thematic analysis.

6.2.8 Academic involvement and collaboration with clinician and student needs further investigation.

No studies reported on the outcomes of academic involvement, the universities were involved at some level in all of the studies. But the actual collaboration between the student, clinician and academic were not detailed.

Recommendation:

- Outcomes from collaboration between student, clinician and academic need to be evaluated and investigated in detail.

6.2.9 Peer teaching and learning improved student outcomes in the psychomotor and cognitive domains, but further investigation is needed in this area.

In the discussion of the evidence underpinning the recommendations for curricula, five of the included studies reported increased educational outcomes in the psychomotor and cognitive domains (Bos 1998; Currens & Bithell 2003; De Clute & Ladyshewsky 1993; Cortazzi 2001). However, peer teaching and learning was instrumental in achieving these learning outcomes requires further clarification and evaluation.

6.2.10 A cost-effectiveness analysis and cost-benefit analysis would provide evidence on the economic benefits of peer teaching and learning in clinical education.

As discussed previously in this thesis, peer teaching and learning in clinical education is recommended as being economically viable for all stakeholders (NRNE 2002; QNC 2001). No substantial evidence exists within the literature at this time to support this notion.

6.3 Concluding Statement

The recommendations and the need for further investigation are based on the current available evidence at this time. As stated previously in this chapter, the reviewer has a restricted confidence in the recommendations, and it is impossible to make conclusive claims on the effectiveness of peer teaching and learning in clinical education. Many of the included studies during quality and critical appraisal (see Chapter Four: Overview of the Papers) revealed inconsistencies so any conclusions and recommendations drawn from this systematic review should be done so with caution.

Wide-ranging research is still required to increase confidence in the recommendations for curricula. Investigation of the outcomes including a cost effectiveness and cost benefit analysis is warranted (Ladyshewsky 2002). More comparative studies with the traditional and other models of clinical education would yield more definitive evidence for its use in curricula (Currens 2003).

Although there are limitations, this systematic review of literature has provided a framework for recommendations in the development of curricula and highlighted numerous research possibilities and responsibilities. Of the included studies, all supported peer teaching and learning as increasing student's comfort initially in the clinical environment. All of the studies provided evidence to some degree that peer teaching and learning increased development in the synthesised learning outcomes even though many of the studies that provided this evidence rate low according to the NHMRC (2000) levels of evidence. Furthermore many of the recommendations made are weighted from two or more studies and these results need to be actively communicated.

Active dissemination strategies will be used to communicate the findings of this systematic review of literature and I am committed to the registration of this study as a Campbell Collaboration review and to facilitating further research in this area.

From an educationalist perspective I would encourage service providers to seriously look at preference for this intervention within their venues as there is enough evidence to suggest both long and short-term advantages to them. Increased use of peer teaching and learning in the clinical education of health science students would increase the number of clinical placements available for universities and tertiary education centres. With unflagging support from stakeholders and a multi-centred approach to its further development there is enough current evidence to validate its use in clinical practice.

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Appendix A

Inclusion and Exclusion Rationale
(References appear in alphabetical order)

Ω denotes author has been contacted by letter or e-mail

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Agha S. (2002)	peer education evaluat#	Cinahl	International Family Planning Perspectives 28 (2):67-70,113-8 June		Not clinical education Abstract not sighted Excluded by Title					A Quasi-Experimental Study to Assess the Impact of Four Adolescent Sexual Health Intervention in Sub-Saharan Africa
Aston L, Molassiotis A (2003) Ω	peer undergraduate# or student# clinical education, practicum placement	Medline	Nurse Education Today. Peer Reviewed 23 (3) 202-210	Qualitative Thematic Analysis Survey		Included				Supervising and Supporting Student Nurses in Clinical Placements: The Peer Support Initiative.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Blowers S, Ramsey P, Merriman C, Grooms J, (2003)		Bibliographic Search	Journal Of Nursing Education Peer Reviewed 42 (5) 204-211		Excluded not clinical education, full article sighted				Improved academic skills and attendance with peer tutoring	Patterns of Peer Tutoring in Nursing
Blackford J Street A (1999)	bibliographic search looking for terms peer, student, and pertaining to any of the stated health sciences	Bibliographic Search	Clinical Effectiveness In Nursing Vol 2 205-212	Qualitative	Excluded following appraisal of full article not undergraduate				Reflective peer clinical supervision useful to assist nurses with learning	The Potential of Peer Clinical Supervision to Improve Nursing Practice

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Buller D. Borland R. (1999)	peer education evaluat#	Cinahl	Health Education And Behaviour 26 (3): 317-43 June		Not clinical education Abstract not sighted Excluded by Title					Skin Cancer Prevention In Children: A Critical Review
Caracuzzo Kinsey Dianne (1981)	bibliographic search looking for terms peer, student, and pertaining to any of the stated health sciences	Bibliographic Search	Journal Of Nursing Education 20(5) 29-33	Report	Excluded following synthesis of article			Nursing Students	Peer evaluation will improve instructional program	Implementation of Peer Review Within a Baccalaureate Nursing Program
Clarke B Feltham W, (1990)		Bibliographic Search Blowers et al	Nurse Education Today 10 (1) 54-57,		Excluded full article sighted simulated laboratory sessions not clinical placement				Peer tutors facilitate learning in laboratory sessions	Facilitating Peer Group Teaching Within Nurse Education
Cheyne H, Niven C, Mc Ginley M (2003)	peer clinical education	Cinahl			Post-grad			Post-grad Midwifery students	The study supported the utilisation of peers in developing	The Peer Project: A Model Of Peer Review

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Cortazzi M, Lixian J, Wall D, Cavendishe S. (2001) Ω	peer clinical education practicum placement student# undergraduat e#	Psycinfo	International Journal Of Language And Communicat ion Disorders Peer Reviewed 36 P252-257	Narrative	Included following synthesis of entire article	Further Information Needed			Increased reflection on learning through narrative communicatio n	Sharing Learning Through Narrative Communicat ion
Costello J. (1989)		Bibliographic Search Iwasiw et al	Nurse Education Today, 9 203-209		Excluded following appraisal of full article, discussion paper.	Further Information Needed				Learning From Each Other Peer Teaching and Learning in Student Nurse Training.
Cramner Jl. Ω	peer clinical education student#	Embase	Phd Dissertation Temple University	Excluded as not published in a peer reviewed journal. Author contacted.						Nursing Students Perceptions of Clinical Experience Stresses and Peer Group Support.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Currens JB. (2003) Ω	peer practicum evaluat# percept# clinical education effect# undergraduat e# student#	Cinahl	Physiotherap y 89 (9) 540 - 54	Literature Review	Excluded a secondary study, not systematic.				Clinicians reported greater independence , fewer superficial questions, increased time for supervision with peer teaching and learning. Negative about more paper work and needing to learn additional clinical teaching skills. Students enjoyed mutual support wider experience & teamwork.	The 2:1 Clinical Placement Method.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Dana N, Gwele NS. (1998)	peer practicum evaluat# percept# clinical education effect# undergraduat e# student#	Cinahl	Caratonis Peer Reviewed 21(1) 58-64	Survey, Conceptual Framework	Excluded not specific to undergraduat es.	Second And Third Year Student Nurses How They Perceive The Community As A Clinical Learning Experience				Perception of Student Nurses, of their Personal and Academic Development During Placement in the Community as a Clinical Learning Experience.
Davidson Mary Ellen, Mcardle Paul. (1980)	bibliographic search looking for terms peer, student, and pertaining to any of the stated health sciences	Hand searching and bibliographic search.	Journal Of Nursing Education 19(2) 8-12	Discussion Paper	Exclusion after appraisal of entire article			Nursing students.	Learners can develop and refine affective behaviours following a workshop on the process of developing these behaviours, and peer evaluation.	Peer Analysis of Interpersonal Responsiven ess and Plan for Encouraging Effective Reshaping.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Ebreo A, Feist-Prices, Siewe Y, Zimmerman. (2002)	peer education evaluat#	Cinahl	Health Education And Behaviour 29 (4):411-24, Aug		Not clinical education. Abstract not sighted. Excluded by Title.				.	Effects Of Peer Education on the Peer Educator's of a School-Based HIV Program: Where Should Peer Education Research Go From Here?
Erickson Grace (2004) Ω	bibliographic search looking for terms peer, student, and pertaining to any of the stated health sciences	Bibliographic Search	The Journal of Nursing Education 26 (5) 204-206.	Qualitative		Included	Community health placement	Undergraduates in baccalaureate program.	Peer evaluation positive experience for students in comfort and promotes learning.	Peer Evaluation as a Teaching – Learning Strategy in Baccalaureate Education for Community Health Nursing.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Flynn J, Marcus M, Schmadl J. (1981)		Bibliographic Search	Journal Of Nursing Education Vol20,4 Pages 28-32	Qualitative	Excluded following appraisal of complete article, not clinical education, simulated laboratory session.		Second year nursing students.		Peer review process in clinical education increases students enthusiasm and knowledge in clinical placements.	Peer Review: a Successful Teaching Strategy in Baccalaureat e Education.
Gerace L, Sibilano H, (1984)		Bibliographic Search Iwasiw et al	Journal Of Nursing Education 23 (5) 206-209	Discussion Paper.	Appraisal of full article excluded discussion paper.	Further Information Needed.				Preparing Students for Peer Collaboratio n a Clinical Teaching Model.
Gibbons S, Adamo G, Padden D, Riccardi R, Graziano M. (2002)	clinical student# evaluat#	Cinahl	Journal Of Nursing Education 41(5):215-21, May Peer Reviewed	Descriptive	Excluded by abstract Advanced Practitioners Tool for self Assessment.			Post-grad Nursing	Recognising stages of transition from student to therapist, will assist with development of educational programs for new grads.	Clinical Evaluation in Advanced Practice Nursing Educatio.n

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Greenwood C. (1997)	peer clinical education practicum placement student# undergraduate#	Pyscinfo	Behaviour And Social Issues Peer Reviewed 7 (1) 53-57	Longitudinal Study	Excluded by abstract. Not clinical education.			1st-12 school children.	Need for special ed. Placement.	Classwide Peer Tutoring.
Guttman GD, Macpherson ER. (2003)	peer undergraduate# or student# clinical education, practicum placement	Medline	Journal Of Dental Education 67 (3) 2003	Discussion Paper	Excluded by appraisal of full article.	More Information Needed			Increased student knowledge and comprehension of anatomy and improved student scores on examination with peer tutoring.	Making Gross Anatomy Relevant to Dental Student's.
Guttman M. (1987)	peer clinical education practicum placement student# undergraduate#	Pyschinfo	Canadian Journal Of Counselling 21 (1) 49-58.	Empirical Study	14-19yr old students, not undergraduates.			14-19yr old students, not undergraduates.	Level of counsellor training, verbal interaction of group members.	Verbal Interactions of Peer Lead Group Counselling.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Hallinan M (1990)	peer clinical education practicum placement student# undergraduat e#	Pyscinfo	Sociology Of Education Peer Reviewed 63(2) 122-132	Empirical Study	High school students			High school students	Peers effect on college aspirations and attendance.	Student's Characteristi cs and the Peer Influence Process.
Hansen JC (1982)	peer practicum evaluat#	Eric	Counsellor Education And Supervision 22 (1): 15-24 September	Various Experimental Studies	Excluded following appraisal of full article not undergraduat e.		Further Information needed	Counsellin g	Support for peer supervision to enhance learning and didactic teaching methods.	Review of Research on Practicum Supervision.
Haroon-Iqbar H, Jinks A (2002)	clinical education evaluat# student#	Cinahl	Singapore Nursing Journal 29(2):8-12 Apr-Jun Not Stated Whether Peer Reviewed	Descriptive Survey	Excluded by abstract Not specific to Undergrad.			Post-grad Nursing	Portfolio Assessments don't provide evidence of rational decision makin.g	Peer Review of Clinical Education Assessment: Results of Clinical Mentors Survey.
Hart GD Ω	peer practicum evaluat# percept#	Cinahl	Phd Dissertation author contacted	Survey	No article in peer reviewed journal.	? Further Information Needed				The Clinical Learning Environment .

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Heppner M (1994)	peer clinical education practicum placement student# undergraduat e#	Pyscinfo	Journal Of Counselling And Development Peer Reviewed 72(5) 500-07	Empirical Study	Excluded by abstract Post grad.			Post grad teaching students.	Need for peer support to increase efficacy and articulate the philosophy of teaching	An Empirical Investigation into the Effects of a Teaching Practicum on Prospective Faculty.
Iwasiw CL, Goldenberg (1993) Ω		Bibliographic Search Blowers et al	Journal Of Advanced Nursing Peer Reviewed 18,P659-668	Pretest Posttest Experimental Design Level IV		Inclusion Meta-Analysis			Findings support peer education increased cognitive development comfort in the clinical environment	Peer Teaching Among Nursing Students in the Clinical Area: Effects on Student Learning.
Jones AM (2000)	peer clinical education student#	Embase	Phd Disseration		Excluded as not published in a peer reviewed journal author contacted.					Students Perceptions of the Preceptor Ship Experience.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Kerr MM, Mac Donald Th. (1997)	peer education evaluat#	Cinahl	Nurse Education Today Peer Reviewed 17 (3): 247-54. June		Not clinical education Abstract not sighted Excluded by Title.					
Ladyshewsky R. (1993) Ω		Bibliographic Search of Currens & Bullen	Journal Of Physical Therapy Education Vol 7 Pages 31-35		Excluded simulated Environment after full appraisal of articl.e				That 2:1 clinical education model increases educational outcomes for student.s	Clinical Teaching And The 2:1 Model Student To Clinical Instructor Ratio.
Ladyshewsky R. (1995)		Bibliographic Search of Currens & Bullen	Physical Therapy 75: 503-510		Included				Productivity increased with peer collaboration.	Enhancing Service Productivity in Acute Care Inpatient Settings Using a Collaborative Clinical Education Model.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Ladyshewsky R. (2002)	peer practicum evaluat# percept# clinical education effect# undergraduate# student#	Cinahl	Physiotherapy Practice Peer Reviewed 18 (1) 17-31	Quasi – Experimental Study Level Of Evidence III.2	Excluded as occurred in simulated laboratory, after appraisal of full article.	Evaluation Of Reciprocal Peer Coaching In Clinical Placements.				A Quasi-Experimental Study Of The Difference in Peer Reasoning Using Individual Learning Vs Reciprocal Learning.
Lake DA. (1999)		Bibliography Search Blowers et al	Advances In Physiology Education 21(1) 86-92		Excluded not clinical education.					Peer Tutoring Improves Student Performance in Advanced Physiology Course.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Logan K, Jacobs H, Gast K, Murray A, Daino K, Skcala C. (1998)	peer clinical education practicum placement student# undergraduat e#	Eric	Journal Of The Association For Persons With Severe Handicaps Peer Reviewed Vol 23 (4) 309-18.		Excluded by abstract Not clinical education in the Health Sciences.				Higher levels of happiness for students with disabilities when placed with typical peers rather than peers with disabilities.	The Impact of Typical Peers on the Perceived Happiness of Students with Profound Multiple Disabilities.
Lovett L, Cox Abou-Saleh. (1990)	peer undergraduat e# or student# clinical education, practicum placement	Medline	Medical Education Peer Reviewed 24(3) 243-50	Discussion Paper	Excluded after appraisal of article teaching psychiatric interviewing skills to med students utilising peer teaching and learning.					Teaching Psychiatric Interviewing Skills to Medical Student.s

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Mac Donald Coola J (1993)	peer practicum evaluat# clinical education effect#	Eric	Alberta Journal Of Education Research		Excluded by abstract Not clinical education in the Health Sciences.					Coping With Stress During the Teaching Practicum: The Student Teacher's Perspective.
Manouchehri A (2002)	peer practicum evaluat#	Eric	Teaching And Teacher Education 18 (6): 715-37 August		Not clinical education. Abstract not sighted. Excluded by Title.				Peers help assist problematic learning issues, teacher actions and their levels of reflection increase.	Developing Teaching Knowledge Through Peer Discourse.
Mason L (1999)	peer clinical education, student#	Embase	Occupational Therapy International Vol6 (3) Pages 224-42	Qualitative Study	Excluded as researcher mainly commented on supervisors and not the undergraduat e student's				A social culture of mutual learning and support is established with group allocation of students on clinical placements.	A Co-operative Inquiry to Identify Strategies for Group Supervision in Occupational Therapy.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Martin M, Edwards L. (1998) Ω	peer practicum evaluat# percept# clinical education effect# undergraduat e# student#	Cinahl	British Journal Of Occupational Therapy 61(6) 249-52	Descriptive Survey		Included Peer Learning On Fieldwork Placements.				Peer Learning on Fieldwork Placements.
Mostrom E, Ribesky C, Kljukos M. (1999) Ω	peer undergraduat e# or student# clinical education, practicum placement	Medline	Physiotherap y Case Reports 2 (2) 45-57	Case Study		Included			Peer teaching enhanced learning, support, student feedback, more enjoyable, less pressure on clinical supervisor. Negative increased stress if students incompatible not individual client care, less opportunity to	Collaboratio n in Clinical Education 2:1 Student To Therapist.

									be independent, lessen number of opportunities for learning.	

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Pardo D. Ω	peer clinical education student#	Embase	Phd Disseration The University Of Arizona		Not published, author contacted.					The Culture of Clinical Teaching.
Patriarca L Lamb M. (1990)	peer clinical education effect#	Eric	Teacher Education And Special Education 13 (3-4): 228-32 Fall		Not Clinical Education of Health Science under graduates				Increased collaborative problem solving and reflective practice when collaborating with peers.	Preparing Secondary Special Education Teachers to be Collaborativ e Decision Makers and Reflective Practitioner.s
Pearlman D, Camberg. L, Wallicel, J, Symons P, Finison L. (2002)	peer education evaluat#	Cinahl	Journal Of Adolescence Health 31(!):31-9, July		Excluded following appraisal of entire article. Not clinical education		Further Information needed?			Tapping Youth as Agents for Change: Evaluation of Peer Leadership InHIV/AID. S
Perez F, Dabis F. (2003)	peer education evaluat#	Cinahl	Aids Care 15(1):77-87, Feb		Not clinical education Excluded by Title.					HIV Prevention in Latin America.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Richardson S.	peer student# evaluat#	Cinahl	Journal Of Advanced Nursing Peer Reviewed		Excluded on title Not peer teaching: use of contracts in practicum.					Peer Consultation and Student Evaluation of the Use of Modified Learning Contracts to Individualise Learning in Practicum.
Schwab T, Robinson B. (1991) Ω	peer clinical education student#	Embase	Nursing Connections 4 (2) 37-43	Included		Entire Article Sought			Increase colleagiality and independence in the under graduate student.	Pairing Students for Community Health Home Visits.
Schnake M. (1996)	peer clinical education practicum placement student# undergraduat e#	Psycinfo	Journal Of Applied Psychology. 71 (2) 3443-345	Empirical Study	Not undergraduat es in the Health Sciences.			Peer workers	The study observed attitudes of peers when colleague received reduction in pay punishment for poor performance.	Vicarious Punishment in the Workplace.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Topping K. (1996)		Bibliographic Search Blowers et al	Higher Education 32 321-345,	A Review Of Literature	Excluded after entire article appraised not specific to clinical education.n	Further Information Needed			Narrative literature review peer tutoring in colleges and university effective, reducing stress, student attainment, more research required.	The Effectiveness of Peer Tutoring in Further and Higher Education: A Topology and Review of the Literatur.e
Tryssenaar J, Perkins J (2001)	*student fieldwork	Cinahl	American Journal Of Occupational Therapy. Therapy 55(1): 19-27 Peer Reviewed	Thematic Analysis	Excluded from abstract Post-grad			Post-grad Occupatio nal Therapist	Examined initiatives to improve post-grad clinical practice education relevant whilst maintaining theoretical perspective.e	From Student to Therapist:Ex ploring the First Yea.r

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Walker-Bartnick L, Berger J, Kappelman M. (1984)	bibliographic search looking for terms peer, student, and pertaining to any of the stated health sciences	Bibliographic Search of Blowers et al	Journal Of Medical Education 59 309-315	Discussion Paper	Excluded following appraisal of entire article.			Undergraduate medical students	Peer tutorial program effective and successful as reflected in grades, well accepted by students and lecturers.	A Model for Peer Tutoring in the Medical School Setting.
Wong T. Travers K. (1998)	peer education evaluat#	Cinahl	International Quarterly Of Community Health Education 17 (1):46-56		A Quasi-experimental study to assess the impact of four adolescent sexual health intervention in Sub-Saharan Africa. Not undergraduate students or clinical education.					Evaluation of a Peer Health Education Project in the Gambia, West Africa.

Authors Date	Keywords (abstract)	Database	Journal	Study Type/ Level Of Evidence	Exclusion Criteria	Inclusion Criteria	Method of Clinical Education	Students in which course	Message for Education	Title
Yates P, Cunningham J, Moyle W, Wollin J. (1997) Ω	peer practicum evaluat# percept# clinical education effect# undergraduat e# student#	Cinahl	Nurse Education Today Peer Reviewed 17(5) 508-14	Pre-Test Post Test Design Level Of Evidence IV		Included			Potential from peer education further investigation in this area needed, need for structured pre-clinical education on clinical teaching that is congruent with academic timetable.	Peer Mentorship in Clinical Education Outcomes of a Pilot Program for First Year Nurses.

Ω This symbol denotes contacted by letter or e-mail.

Appendix B

Critical and Quality Appraisal Tool.

Worksheet- Quality and Critical Appraisal

Type of Publication Peer reviewed/Non peer reviewed

Authors:

Title:

Reference:

Study Type *(level of evidence)*

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1. What was the research question or purpose of the study?
(Purpose of study; clearly formulated question consistent with data collection and analysis, who where the participants will be recorded here ie: Nurse, Phsyio,etc)

Sample

2. Are the criteria for selecting the sample clearly described?
(exclusion and inclusion criteria specified)

Yes ☐ No ☐ Unclear ☐

---

3. Were all students who entered the study accounted for at its conclusion?

Yes ☐ No ☐ Unclear ☐

---

4. Were the groups treated equally through out the study?

Yes ☐ No ☐ Unclear ☐

---

5. Where groups comparable at entry?

Yes ☐ No ☐ Unclear ☐

Data Collection

6. How was data collection explained?
(An account of where data was collected, by whom and the context)

---

7. Where outcomes measured the same for all participants
(Was data collection consistent)

Yes ☐ No ☐ Unclear ☐

---

8. Has the relevant data analysis been performed and explained appropriately?
(An account of how data was processed and interpreted, or how statistical analysis was performed)

Yes ☐ No ☐ Unclear ☐

Data Analysis

9. Were the students analysed in the groups to which they were allocated?

Yes ☐ No ☐ Unclear ☐

---

10. Were the educational assessors aware of the trial?

Yes ☐ No ☐ Unclear ☐

11. What measurements of educational outcomes were undertaken?

12. What were the results?
(The effect on the educational outcomes will be recorded here)

13. Specific considerations:
How large was the educational effect?

How precise was the estimate of the educational effect?

14. Were all the educationally important outcomes considered?
(For example was student participation, learning opportunities and feedback reported on)

15. What method of clinical placement did the students attend?
(This is where block placement, collaborative or other method will be described)

---

16. Are the likely educational benefits and the potential harms and costs reported on?

---

17. Was client's satisfaction reported?

Yes ☐ No ☐ Unclear ☐

Where they:

Satisfied ☐ Unsatisfied ☐

---

18. Was student satisfaction reported?

Yes ☐ No ☐ Unclear ☐

Where they:

Satisfied ☐ Unsatisfied ☐

---

19. Was clinician satisfaction reported?

Yes ☐ No ☐ Unclear ☐

Where they:

Satisfied ☐ Unsatisfied ☐

---

20. What important messages can be gained from this work?
(This is where life-long learning and leadership will be reported on and any other important messages as viewed by the reviewer. How will this increase the body of knowledge in this field?)

Use	☐	Narrative summary	☐
Exclude	☐	Further information needed	☐

Adapted from a series of worksheets including: (National Review of Nurse Education 2002; Guyatt et al 1993; Guyatt et al 1994, Worksheet from the Evidenced Based Medicine Working Group; Chalmers TC, 1981 Quality Assessment Scale; Joanna Briggs 2002, Quality Assessment Scale For Experimental Research; Glasziou et al 2001, Checklist for Appraising the Quality of Studies of Interventions).

Appendix C

Example of Contact Letter and Email
(Appendix A was an attachment in all contacts)

August 18th 2004

M. Faure,
Department of Physio therapy,
University of Stelllenbosch,
PO Box, 19063.
TYGERBERG, 7505.

Dear Sir or Madam,

At present I am conducting a systematic review of literature for completion of the higher degree Master of Nursing Science entitled "Peer teaching and leaming in clinical education". I have attached the spreadsheet of references with inclusion and exclusion rationale, if you know of any other studies or have done further research yourself in this area could you please respond.

I am grateful for your time.

Sincerely,

Jacinta Secomb
Nursing Lecturer.

Example of e-mail contact.

Hi Martin Corazzi,
at present I am conducting a systematic review of literature for completion of my master of nursing science."peer teaching and learning in clinical education". I have attached the following spreadsheet of references with inclusion and exclusion rationale, if you know of any other studies or have done further research yourself in this area could you please respond.
I am grateful for your time,
Regards Jacinta Secomb