

Contribution of Clinical Education in Developing Clinical Reasoning Skills of Undergraduate Physiotherapy Students in Preparation for Professional Practice in the United Arab Emirates

مساهمة التعليم السريري في تطوير مهارات التفكير السريري لدى طلبة العلاج الطبيعي في المرحلة الجامعية الاولى لتحضيرهم لممارسة مهنة العلاج الطبيعي في دولة الامارات العربية المتحدة

by

SENTHILNATHAN RAMAKRISHNAN

A thesis submitted in fulfilment
of the requirements for the degree of
DOCTOR OF PHILOSOPHY IN EDUCATION

at

The British University in Dubai

June 2019



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Senthilnathan Ramakrishnan

**A thesis submitted to the Faculty of Education
in fulfilment of the requirements for the degree of
DOCTOR OF PHILOSOPHY IN EDUCATION**

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June 2019

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ABSTRACT

Clinical reasoning expertise determines the quality of patient care but the process by which clinicians achieve expertise in clinical reasoning is not well documented. Physiotherapists are becoming more and more accountable for their clinical decisions, actions and outcomes. This increase in autonomy and accountability for physiotherapists' means there is more responsibility on the physiotherapy education settings to focus on development of clinical reasoning skills for physiotherapy graduates. The main purpose of this study was to explore the contribution of clinical education in developing clinical reasoning skills and professional practice readiness among undergraduate physiotherapy students. This research also aimed at finding the factors underlying effective clinical education and the factors affecting development of clinical reasoning skills in order to recommend an appropriate reasoning-based, clinical education model for the UAE context. Though there are several studies available on this phenomenon globally, extensive literature search couldn't locate studies published locally within the UAE. Theoretical underpinning for this study was primarily drawn from the dual-process theory of clinical reasoning and the experiential learning theory. This study took mixed methods approach that followed the sequential explanatory research design to collect the data from 34 students and 26 clinical educators using questionnaires and semi-structured interviews. Quantitative data analysis showed no significant difference in students' self-assessment of clinical reasoning. In-depth interviews were useful to explore the factors affecting the development of clinical reasoning and the factors underlying effective clinical education. Thematic analysis of the qualitative data collected identified several factors that were mainly intrinsic to the students' such as the knowledge, skills and experience influencing the development of clinical reasoning skills apart from the effectiveness of clinical education. This

study has several implications for undergraduate physiotherapy education, particularly to the clinical education aspects in the United Arab Emirates.

نبذة مختصرة

الخبرة في التفكير السريري هي التي تحدد نوعية رعاية المرضى، ولكن عملية تحقيق الخبرة السريرية التي يقوم من خلالها اخصائيو العلاج الطبيعي ليست موثقة توثيقا جيدا. لقد أصبح أخصائيو العلاج الطبيعي مسؤولين أكثر فأكثر عن قراراتهم السريرية وإجراءاتهم ونتائج تأهيل مرضاهم. هذه الزيادة في الاستقلالية والمساءلة عن العلاج الطبيعي تعني أن هناك المزيد من المسؤولية على مسؤولي تعليم العلاج الطبيعي في الجامعات لاعداد الطلبة للتركيز على تنمية التفكير السريري لديهم.

ان الغرض الرئيسي من هذه الدراسة هو استكشاف مساهمة التعليم السريري في تطوير مهارات التفكير السريرية واستعداد طلاب البكالوريوس في العلاج الطبيعي لممارسة مهنة العلاج الطبيعي في دولة الامارات العربية المتحدة. هذا البحث يهدف أيضا إلى إيجاد العوامل الكامنة وراء فعالية التعليم السريري و العوامل التي تؤثر على التنمية السريرية لمهارات التفكير من أجل التوصية المناسبة من خلال المنطق القائم على التعليم السريري في سياق ايجاد نموذج لدولة الإمارات العربية المتحدة. على الرغم من أن هناك العديد من الدراسات المتاحة عن هذه الظاهرة عالميا ، ولكننا في هذا البحث لم نجد دراسات واسعة النطاق منشورة محليا في دولة الإمارات العربية المتحدة. وقد استمد هذا البحث أساسا من نظرية العملية المزدوجة للاستدلال السريري وأبضا نظرية التعلم التجريبي. وقد اتبعت هذه الدراسة نهجا مختلطا يتبع تصميم البحوث التوضيحية المتتالية لجمع البيانات من 34 طالبا و 26 معلما إكلينيكيًا باستخدام استبيانات ومقابلات شبه منظمة. ولم يظهر تحليل البيانات الكمية أي فرق يذكر في التقييم الذاتي للطلاب للمنطق الإكلينيكي. ان المقابلات المتعمقة مفيدة لاستكشاف العوامل التي تؤثر على تنمية التفكير السريري والعوامل الكامنة وراء فعالية التعليم السريري. وقد حدد التحليل الموضوعي للبيانات النوعية المجموعة عدة عوامل متأصلة أساسا في معارف الطلاب ومهاراتهم وخبراتهم التي تؤثر على تطوير مهارات التفكير إلى جانب فعالية التعليم الإكلينيكي. ان لهذه الدراسة عدة آثار على دراسة البكالوريوس في العلاج الطبيعي وخاصة جوانب التعليم السريري في دولة الإمارات العربية المتحدة.

DEDICATION

First and foremost, I dedicate this thesis to Mr. Harikrishnan who is my paternal uncle. One needs inspiration and guidance to achieve their ambition. I would not be standing here without his guidance, support and everlasting motivational talks that he had given me throughout the various stages of my life. He has been a wonderful person, role model and the godfather for me all along this way. Next, I would like to dedicate this thesis to my late father Ramakrishnan and my mother Meenakshi for their continuous prayers for my success. Especially, I would like to remember the support that my mother gave us over the last two years by staying in the UAE with us and looking after my children while my wife and I were working fulltime.

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LIST OF ABBREVIATIONS

APC – Australian Physiotherapy Council

APTA – American Physical Therapy Association

CAA – Commission for Academic Accreditation

CAPR – Canadian Alliance of Physiotherapy Regulators

CAPTE – Commission on Accreditation in Physical Therapy Education

CE – Clinical Educator

CSP – Chartered Society of Physiotherapists

DHA – Dubai Health Authority

DoH – Department of Health

FSBPT – Federation of State Board of Physical Therapist

GCC – Gulf Cooperation Council

HCPC – Health and Care Professions Council

HPCSA – Health Professions Council of South Africa

KSA – Kingdom of Saudi Arabia

MOH – Ministry of Health

MOHESR – Ministry of Higher Education and Scientific Research

NHS – National Health Services

NSW – New South Wales

REC – Research Ethics Committee

SA – South Africa

SACRR – Self Assessment of Clinical Reflection and Reasoning

SEHA – Abu Dhabi Health Services Company

SMART – Specific Measurable Achievable Realistic Time

SPSS – Statistical Package for Social Studies

ST – Student

UAE – United Arab Emirate

UK – United Kingdom

US – United States

WCPT – World Confederation of Physical Therapy

WHO – World Health Organization

GLOSSARY OF TERMS

Physiotherapist (PT)

Physical Therapist (PT)

Students (ST)

Clinical Educator (CE)

CHAPTER 1: INTRODUCTION

This research study explored the contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students in preparation for their future profession practice as qualified physiotherapists. This chapter includes the background information, problem statement, research purpose and the guiding research questions. In addition, the scope and significance of this study is also discussed within this chapter, and at the end of this chapter, a brief overview of the thesis leading to subsequent chapters is provided to give the readers an understanding of how this thesis is structured.

1.1 Background

Physiotherapists are healthcare professionals who provide services to individual clients and/or people to develop, retain and regain maximal movement and function throughout their lifespan (Chetty et al, 2018; World Confederation for Physical Therapy 2016). To become a physiotherapist in most countries, a university education that is Bachelor of Physiotherapy or Bachelor of Sciences in Physiotherapy is required. Upon successful completion of the program requirements, graduates are eligible to apply for registration as a physiotherapist in the country of qualification and abroad (Hager-Ross & Sundelin 2007). In some countries there are additional requirements of passing the national level licensing examination to qualify for license, for example, in the United Arab Emirates, a candidate with a physiotherapy qualification from a higher education institution within the country and/or outside need to pass the licencing exam conducted by the Department of Health of Abu Dhabi or “Dubai Health Authority” or the Ministry of Health (Department of Health 2017). It is mandatory for the practicing physiotherapists to possess the license issued by one of these authorities. Similarly,

the “Federation of State Board of Physical Therapy” (FSBPT) in the United States, “Canadian Alliance of Physiotherapy Regulators” and the “Australian Physiotherapy Council” are the authorities controlling the licensure of physiotherapist thorough professional licensing exams in order to practice in those countries (The Federation of State Boards of Physical Therapy 2019; Canadian Alliance of Physiotherapy Regulators 2019; Australian Physiotherapy Council 2019).

Physiotherapists own different titles in different countries, in most of the countries they are called physiotherapist, for example in Australia, Canada, Ireland, New Zealand, South Africa, Singapore and the United Kingdom (World Confederation for Physical Therapy 2016). Physical therapist is another term used in some countries such as the United States of America, Kingdom of Saudi Arabia and Bahrain. Other countries have their own version of the word physical therapist, such as kinesiologist, for instance Argentina and Benin. But in essence they are all part of the same profession and in the UAE, it is physiotherapist and physiotherapy are the terms used to identify the practitioner and their profession respectively (World Confederation for Physical Therapy 2016). According to WCPT an international association that guides physiotherapy practice globally, “The scope of physical therapy practice is dynamic and responsive to patient/client and societal health needs. Physiotherapist can help people at any stage of life, when movement and function are threatened by ageing, injury, diseases, disorders, conditions or environmental factors. Physical therapists help people maximize their quality of life, looking at physical, psychological, emotional and social wellbeing. They work in the health spheres of promotion, prevention, treatment/intervention and rehabilitation, and with the understanding that functional movement is central to what it means to be healthy” (World Confederation for Physical Therapy 2016).

The American Physical Therapy Association (APTA) in its 2020 vision statement stresses the need for autonomous practice and evidence-based practice for physical therapists, hence there is more and more emphasis being placed on the process of clinical reasoning in order to achieve those goals set by them (American Physical Therapy Association 2015). Clinical reasoning is a complex process that involves use of cognitive abilities, psychomotor skills and reflective thoughts (American Physical Therapy Association 2001). The strategies for clinical reasoning may differ based on the situation and the clinician's expertise and knowledge. An important element of this clinical reasoning process is that formulating achievable goals by involving the client in decision making, therefore the expertise in this field is not only related to the clinician's years of practice experience, instead it is closely connected with client satisfaction and the health outcomes which are mainly focused on their quality of life (Wainwright et al. 2010).

Andrews and Syeda (2017) describes clinical reasoning as an ability to precisely diagnose and initiate appropriate interventions according to the problems list identified by the clinician. However, the clinicians' ability to solve the problem is far from uniform as lot of factors impact clinical decisions at each step from assessment through to intervention (Lilienfeld, Ammirati & David 2012). Clinical judgement is the focal point of clinicians' assessment decisions and it is often based on one's professional training, clinical experience, theoretical knowledge, technical and procedural skills, use of empirical evidences to support the treatment choice and the clinical practice model they believe in. It is argued that clinical reasoning is best taught in the clinical context and the clinical educators have a major role in enhancing the students' reasoning skills and this particular skill has a greater impact on graduates' professional practice readiness (Linn et al. 2012).

The physiotherapy profession is still evolving and the clinical practice in this area must grow in order to meet society's needs (Furze, Kenyon & Jensen 2015). Physical therapists are becoming more and more accountable for their own actions, clinical decisions that they make and the patient's outcomes. This increase in autonomy and accountability for physiotherapists' means there is more responsibility on the physiotherapy education settings to focus on development of clinical reasoning for physiotherapy graduates. In literatures the term "clinical reasoning" is also referred as clinical judgement, decision making, problem solving and critical thinking (Hoffman 2007; Kraischsk & Antony 2001; Laurie et al. 2001).

Ajjawi and Smith (2010) argue that the foundation requirement for an entry-level physiotherapy education program should be to develop the clinical reasoning skills for all graduates. To achieve this, the educators needs to adopt specific strategies to teach in the clinical context. Teaching clinical reasoning is not merely the knowledge acquiring process, rather it should stimulate the abilities to use ones higher order cognitive and metacognitive functions and also social and emotional behaviors during the process of the clinical decision making (Ajawi & Smith, 2010). The scope for the physiotherapists in the contemporary and modern-day healthcare system puts a high demand on newly qualified therapists as they are required to practice independently as a registered physiotherapist. Hence there is a strong need to develop these skills as a part of entry-level professional education.

Medical and allied health students can acquire range of skills through experience of working with people who have health problems (Conn et al. 2012). Clinical education provides the opportunity for this and helps to prepare the students for future professional practice and integrate themselves into healthcare teams. Clinical reasoning is a fundamental skill to be developed in medical education, but it is not explicitly taught to the students. It is essential to

develop this skill into the students as it impacts on the ability to diagnose and deliver a safe and effective care to the clients (Clark et al. 2015).

According to Durak et al. (2007), the clinical reasoning process is an intellectual activity in which the practitioner thinks and make appropriate decisions that provides the best possible course of action in a clinical environment. Clinical reasoning is defined as “the sum of the critical thinking and decision-making processes associated with clinical practice within the health profession” (Furze, Kenyon & Jensen 2015) and earlier it was classified into two broad categories known as deductive reasoning and inductive reasoning (Hasson 2003). The former strategy uses the hypothetico-deductive approach that relies on the information gathered through patient interviews to develop the initial hypothesis. Then the therapist uses the additional information gathered through other investigations to confirm or reject the initial hypothesis by a deductive reasoning approach. On the other hand, the second strategy which is inductive reasoning involves recognizing the familiar clinical scenarios and previous experiences to diagnose the condition (Jenson et al. 2000). Physiotherapist often use one of these strategies for their clinical decision making depending on the scenario. However, Edwards et al. (2004) believed that reasoning in physical therapy practice goes beyond the two cognitive models that are the deductive and inductive reasoning explained earlier as their argument throws light into the new dimensional interpretive model of clinical reasoning. This newer approach to clinical reasoning by then presented several other reasoning strategies such as collaborative, narrative, ethical and interactive reasoning are used in the process of decision making depending on the contextual factors (Furze, Kenyon & Jensen 2015).

Physical therapy students and newly qualified physiotherapy graduates often face the challenge of making the right decision for their clients because of their difficulty in understanding the

patient progress and they are uncertain of what to do on those situations. These should not be seen as failure and/or shortcomings, instead should be considered as a learning opportunity for them to improve their understanding (Salvatori 2000). The key challenge for the physiotherapy faculty members and clinical educators is that there are not many tools available for them to facilitate the development of students' clinical reasoning process (Sellheim 2006; Weddle & Sellheim 2009). It is important for the educators to get the "inside out" that is understanding what the student thinks so that they can correct them if there are any misconceptions on the students thought process (Shulman 2004). In addition, the students should consistently reflect on and self-monitor to develop their own clinical reasoning skills (Walmsley & Birkbeck 2006).

Furze, Kenyon and Jensen (2015) argued that, teaching clinical reasoning is not an easy task and requires understanding of few educational philosophies. They also believed that, clinical reasoning skills develops over a period, therefore it is common to find the students and the novice practitioners using the deductive approach to confirm their hypothesis whereas the experienced ones will rely on inductive reasoning. Clinical competence largely depends on the clinician's critical thinking ability. This problem-solving skill is vital for clinical practice to diagnose and treat the patients (Boshuizen & Schmidt 2000). It is not uncommon to expect that there may be differences in the problem-solving abilities of the novice and an experienced physiotherapist (Wainwright et al. 2010). This is because the experienced clinician is likely to possess well organized knowledge and an enormous amount of practice within their field of expertise. Hence it can be argued that the level of expertise will determine the problem-solving skills and the accuracy of results (Durak et al. 2007).

Hoffman (2007) stated that clinical reasoning is a multi-faceted process through which the clinicians such as medical practitioners, physiotherapist, nurses and others disciplinarians

collect cues, process relevant information, understand the problem pertinent to their patients, devise and implement appropriate treatment, measure the outcomes and reflect on their own practice and also learn from the whole process itself. Andrews and Syeda (2017) argued that clinical reasoning is an integral part of competencies required for safe clinical practice and it serves mainly to bridge the gap between knowledge, skills and experience in solving real-life problems. They believed that clinical reasoning is a multi-dimensional skill which involves observation, reflection, judgement, inference and problem-solving skills as well as appraisal of factors related to the client status and change.

Atkinson and Nixon-Cave (2011) believed that physiotherapists may use several strategies for clinical reasoning and the International Classification of Functioning, disability and health which is widely known as ICF is the main framework that guides the physical therapist in their reasoning process and decision-making process for their patients. During the process of clinical reasoning the therapist may use forward and backward reasoning, concept mapping and evidence-based practice for appropriate and accurate clinical decision making (Atkinson & Nixon-Cave 2011). Clinical decision making is an integral part of healthcare practice and it is associated with clinicians thought process in day to day business to make the right judgement towards patient care (Stubbings, Chaboyer & McMurray 2012). Sound clinical decision-making skills as core competence would enhance the quality of care provided as well as influencing the patients' outcome (Thompson & Stapley 2011).

Furze et al. (2015) thought that clinical reasoning depends on several factors hence it is referred as a complex phenomenon. It is a reflective process which requires the clinician to recall the content-specific knowledge and ability to effectively communicate with the patient and their family members to fully understand the patient's problem (Higgs & Jones 2008). These factors

result in informed decision making and reliable clinical judgement (Nikopoulou-Smyrni & Nikopoulos 2007). There are various other factors which may affect the clinical decision-making skills and understanding those factors will assist in improving the decision making in order to provide high-quality care and safe practice (Hoffman, Donoghue & Diffield 2004). Several researchers have explored the factors influencing the clinical decision making of nurses and identified clinical experience (Traynor, Boland & Buus 2010), education (Hagbaghery, Salsali & Ahmadi 2004) and environment (Bucknell 2003) as the key factors affecting the decision-making process. According to Bucknell (2003) patient's condition, physical capacity, personal resources and interpersonal skills are the important environmental factors that influences the decision making. Wu et al. (2016) claimed that staffing issues and workload problems could also interfere with the clinical decision making. There is strong debate about the relationship among the education programs, clinical experience and the clinical decision making. Most of the studies on these variables are qualitative in nature yet to better explain this relationship a quantitative study is very much needed to be included. Other than these factors, age, area of expertise, position and understanding of one's own roles and responsibilities might also contribute to the variance in clinical decision making (Wu et al. 2016).

When the physiotherapy practitioners' see a bodily dysfunction, they generally recognize it but rarely do they stop and think about what is meant by that? Simultaneously they may not know how to teach this internal recognition process to the next generation of physiotherapists (Anderson 2006). Clinical reasoning is the ability to link and utilize various kinds of knowledge, to research the evidence, critically think and reflect about the processes that were used to arrive at a diagnosis for the particular case scenario. Therefore, it requires certain level of clinical practice experience apart from the core knowledge acquisition, which is what distinguishes the experienced clinician from the students and entry-level practitioners (Harasym, Tsai &

Hemmati 2008). Several theories were proposed about the clinical reasoning process and the recent one known as dual-process theory which argues that the clinicians mostly combine their intuition and analytical skills during their consultation to diagnose a condition (Elstein 2009). But the other theories argue that this may not be the case in all kinds of scenarios because the familiarity of the condition may lead to quicker diagnosis. However, the novice learners may still rely on the analytical approach, known as hypothetico-deductive approach to make their clinical decisions, hence the instructional strategies using this framework should be the ideal one for teaching clinical reasoning (Croskerry 2008). Clinical consultation is the vital stage in the clinical reasoning process as the clinician gathers data from the patient, considers and challenges the collected information and finally integrates them to arrive at a diagnosis. In-depth case history taking, formulating a hypothesis or preliminary diagnosis, detailed physical examination, appropriate investigation and ruling out the differential diagnosis are the key steps in devising the management plan which is the basis for sound clinical reasoning (Koh et al. 2008). To master these skills, it is essential to inculcate problem-solving skills as a part of university education, hence the problem-based learning and/or case-based learning should be an integral part of curriculum for the early development of diagnostic skills (Linn et al. 2012). Applying the knowledge gained from formal education to the patient care is a complex phenomenon and it is extremely challenging for the students and new graduates. Thus it is ideal to teach this complex clinical reasoning process in a clinical context. One must not have a false assumption that the students would learn this automatically as they move through different practice placements. It requires structured learning experience to develop these skill sets and both the clinical educators and clinical students must understand the significance of this process to enhance the development of clinical reasoning (Linn et al. 2012). The Peyton model (1998) which consists of demonstration, deconstruction, comprehension and performance is a widely

adopted model by the clinical teachers to enhance clinical reasoning of their students (Lake & Hamdorf 2004).

Clinical reasoning in healthcare practice evolved over three overlapping phases, which includes psychometric reasoning, cognitive reasoning and hermeneutic reasoning (Patel, Arocha & Shortliffe 2000). The third and the recent form, hermeneutic, emphasized the significance of the phenomenological approach for moving towards a patient centered care (Ward 2003). It also stressed upon the situated cognition and clinician's lived experience as the key factors for effective clinical reasoning (Edwards et al. 2004). Teaching as well as assessing the clinical reasoning are considered to be the primary aim of physiotherapy and other healthcare education programs worldwide. But it is the students' and teachers' conceptualization of clinical reasoning that determines the development of deep clinical reasoning skills because clinical reasoning requires more sophisticated conceptualization for which the focus of learning should be on understanding the topic not just memorizing it (Hendrick et al. 2009).

The process by which a clinician thinks and decides in clinical practice is referred to as clinical reasoning. According to Higgs and Jones (2000), clinical decisions are not only made by the therapists as they believe it is vital to involve the patients and their family members in this process of care planning. In the past decade, clinical reasoning has become a prominent area for study because of changes in healthcare practice standards. Particularly for physiotherapists the focus of clinical reasoning is in the limelight as they have become increasingly accountable for their decisions as an autonomous practitioner. Physical therapists are responsible for making numerous decisions in their day to day clinical practice, hence they are keen on understanding and improving their clinical reasoning skills. Earlier studies about clinical reasoning in physiotherapy confirm that it is similar to the physicians' model and focused on the diagnosis

of patients' condition (Rothstein, Echternach & Riddle 2003). This is mainly because of the adaptation of hypothetico-deductive model of clinical reasoning by the physical therapist which is till date mainstream decision-making model in medicine. Though this model originates from the cognitive sciences, its roots are from the empirico-analytical research paradigm which focuses on forward reasoning in contrast to the hypothetico-deductive reasoning (Higgs and Titchen 2000). These were the main models of clinical reasoning until the late twentieth century. However, both these models did not count on the lived experience of clients while making clinical decisions, hence another research approach known as the interpretive paradigm emerged to address this perspective. An example of this form of clinical decision making is narrative reasoning in which the patient shares his or her lived experience of the condition that may include the descriptions about the nature of pain, their feelings and beliefs about the disability to facilitate the therapist in making their clinical judgement (Edwards et al. 2004).

Early studies about clinical reasoning in physiotherapy were mainly concerned about the diagnostic aspect and most of those studies were focused on the orthopedic physical therapy practice (Rivett & Higgs 1997; Christensen 1993 & Zvulun 1993 in Edwards et al. 2004). But the physical therapist tends to practice in wide variety of clinical settings covering a range of cases in various areas such as neurology, pediatrics, cardiovascular and respiratory conditions etc., in both acute hospitals and the primary care settings in the community. Physiotherapists practicing in these dynamic healthcare settings should possess good problem-solving skills to address the complex problems faced by the patients. In addition to this, they should develop a range of skills including communication, teaching, cultural and social understanding plays an important role in the decision-making process (Edwards et al., 2004). Hence the clinical reasoning skill is considered as a core competency for physiotherapists, but its implicit nature makes it a daunting task for the clinical teachers to teach to their students. Phenomenal changes

in the physiotherapy profession brought attention to this short fall and deeper thinking in this area resulted in a variety of strategies to effectively transfer clinical reasoning skills to the physiotherapy students (Juneja & Brekke 2015). Now the onus is also on the clinical educators as they should be aware of the different pedagogical approaches to enhance their students' clinical reasoning skills (Juneja & Brekke 2015).

Communicating the clinical reasoning process is vital for healthcare practice because it is a legal requirement and also to justify the clinical decisions to various stakeholders in a multidisciplinary team. Similarly, it is essential to share the reasoning process to novice students as a part of clinical education especially while handling difficult cases to improve their reasoning skills (Ajjawi & Higgs 2011). Clinical reasoning is usually a subconscious process that occurs quickly in the clinicians' mind so it is not very easy to explain and recall (Higgs & Jones 2008). As a clinical instructor in physical therapy it is inevitable to be clear and systematically deconstruct the process involved in reasoning to effectively communicate it to the next generation of physiotherapists (Ajjawi & Higgs 2011).

Physical therapy consultations are generally led by the therapists and they usually adapt a biomechanical framework for history taking as it is an important element leading to clinical decisions. But they engage the patients differently during the treatment session by discussing the emotional and social problems associated with the patient condition in a real-life situation. This unintegrated model of clinical reasoning helps to establish good rapport between the patients and therapists (May et al. 2008). Therefore, the sound clinical reasoning needs a dialectical interplay between the narrative and cognitive strategies of the clinician's task (Edwards et al. 2004). Communication skill is listed as one of the key learning outcomes on the modern day physiotherapy curricula and it includes building rapport with patients and their

family members, detailed history taking, discussing the various treatment options available for the particular patient, writing authentic reports and discussing the patient progress in multidisciplinary team meetings (Taylor & Mifflin 2008). However, the focus of learning in physiotherapy education is all about knowledge and skills needed for decision making rather than preparing the students to effectively communicate their reasoning with other members of the team. This results in a gap between the cognitive and narrative reasoning strategies. The physiotherapy educators should aim to address this gap by linking the biomedical and psychosocial aspects of decision making for effective patient care (Hendrick et al. 2009).

Though clinical reasoning is the cornerstone of clinical competence in physiotherapy practice, the difficulties in this area are usually identified at a very late stage in the clinical training. Physiotherapy preceptors face the dual challenge of being a clinician and an educator, so they have little room to contribute to the students' practice. This current state of affairs warrants a paradigm shift and collective effort is required to develop a structured clinical education model (Audetat et al. 2012). Raymond and Profetto-McGrath (2005) believes that clinical reasoning is a fundamental skill for healthcare professionals and an essential one for the decision makers in patient care. Hence the physiotherapists who are part of healthcare teams should possess an adequate level of reasoning skills to identify their patient's problems and chose appropriate interventions for their clients and also to withstand the changes occurring in the healthcare system. Clinical reasoning is strongly associated with the individual's ability to think critically and influenced by various internal and external factors such as genetic factors, models of clinical reasoning and the formal education processes (Murphy 2004). If the decisions made were appropriate and the outcomes are better, then we can argue that the clinical reasoning process was effective. Various instructional strategies are used to foster the clinical reasoning skills of the students. Problem-Based Learning (PBL), reflective narrative and concept mapping are the

widely used approaches and all of these are underpinned by strong theoretical frameworks that aims to promote clinical reasoning in healthcare practice (Ozturk et al. 2008; Tiwary et al. 2006; Windish et al. 2005 and Murphy 2004). Pragmatically it is hard to understand the cause and effect relationship between these educational strategies, development of clinical reasoning skills and improvement in the patient's outcome (Rochmawati & Wiechula 2010).

Clinical reasoning is complex and a tacit process in which the pattern recognition happens automatically, hence it is difficult to teach this to others. It is often built through experience in a specific context and involves diagnostic and therapeutic reasoning (Norman 2005). Experts intuition recognize the pattern quickly based on their previous knowledge and experience, whereas the novice needs to think in an explicit manner and ask more questions some of which may be irrelevant to the situation. This ultimately brings a big challenge to clinical educators to teach clinical reasoning (Eva 2005).

Clinical reasoning is ingrained in the clinician's thinking, but it is invisible to the novice and students. Therefore, it becomes vital for the clinical educators to get an insight into the pedagogical approaches that makes thinking visible. When they understand this metacognition process of thinking about one's own thinking, it becomes easy for them to scaffold the clinical reasoning process to their students (Ritchhart, Church & Morrison 2011). An important element in teaching clinical reasoning is simplification of knowledge in order to reduce the students' cognitive work and to facilitate their participation in discipline specific thinking and discourse. Another way is providing the opportunities for professional socialization so that the students can develop their reasoning skills from their peer and other professionals in the community. This approach is well supported by Vygotsky's theories which stresses the importance of

explicit scaffolding and social inclusion of students in educational activities (Delany & Golding, 2014).

Educational research within the UAE and GCC is not a new dimension of research as locally several educational researchers are actively engaged in scholarly activities. However, there is a lack of research in health sciences education in the region and in particular there were only two studies found since 2006 in the GCC. In the recent study, Maghraby and AlShami (2013) explored the Saudi Arabian physiotherapy students' learning styles and their preferred teaching methods. Earlier to this study, Wessel and Larin in 2006 conducted research on physiotherapy students studying at the University of Sharjah and they have explored the role of clinical training in developing the reflective practice skills in undergraduate physiotherapy students. Clinical education for physiotherapy students' is an integral part of their professional education and the real-world experience that the clinical environment will provide the learners is irreplaceable. It is important to understand the role of clinical education in developing the skills of undergraduate physiotherapy students' and its contribution towards preparing them for their future role as physiotherapists. There is a gap in the literature on this domain within the United Arab Emirates and in the Gulf region, which supports the rationale for this research.

1.2 Problem Statement and Research Purpose

Standards of proficiency that directs the contemporary physiotherapy practice demands the entry-level physiotherapist to possess adequate skills required for safe practice (Health and Care Professions Council 2013). In the field of medical and allied health sciences education, clinical placements apart from the university education play a significant role in developing these skill sets. Universal standards expect the physiotherapy graduates to have experienced at least 1000

hours of clinical practice as a part of their graduate program (World Confederation for Physical Therapy 2018).

Locally the “Ministry of Higher Education and Scientific Research” (MOHESR) of the United Arab Emirates (UAE) also maintains the similar guidelines (Commission for Academic Accreditation 2011) which the affiliated institutions are obliged to comply. Still the point of debate is “are the graduates work ready?” and this was the point of discussion in the recently held stakeholder forums from 2014 to 2016 for the institution where this study will be conducted. Most of the rehabilitation managers and physiotherapy supervisors who took part in the stakeholders’ forum criticized the readiness of potential graduates and they quoted “poor clinical reasoning skills” as the main reason for their stand. Hence there is a need to investigate the clinical reasoning process, its development and factors affecting it.

According to the literature (Clark et al. 2015; Conn et al. 2012; Wu et al. 2016) clinical education plays a pivotal role in developing the clinical reasoning skills which is the foremost factor that determines the professional practice readiness. Therefore, the proposed study will be conducted in the context of clinical education. Though the universities are very much committed to produce the healthcare workforce required to meet the demands of the complex as well as challenging clinical situations, health service providers often complain that the new graduates in healthcare are “not work ready”. The state of the art facilities and the modern teaching and learning approaches do not guarantee the attainment of expected levels of clinical reasoning skills in the students. Cognitive failure is the root cause for adverse clinical incidents, hence the recognition of this should be promoted from the entry-level education (NSW Health 2008). In the United States, 70% of graduate nurses attained “unsafe” level scores in their clinical reasoning skills in their performance review which used a tool named performance-based

development system. Though the nurses possessed good subject knowledge and adequate level skills in performing the nursing procedures, they did not have sound clinical reasoning skills needed to act appropriately in unfavorable conditions (del Bueno 2005). There are number of reasons according to Higgs and Jones (2008), that evaluate the development of clinical reasoning skills and how this affects professional practice. First of all the complexity associated with clinical reasoning leads to challenges in understanding, evaluating and measuring this phenomenon. Apart from these, clinical decision making depends on the context and individual expertise and also it poses challenges to the novice in developing this skill and to the preceptors in facilitating development of the clinical reasoning skills (Higgs & Jones 2008). According to Higgs et al. (1999) clinical reasoning is a simple as well as complex process which incorporates the key elements of knowledge, cognition and metacognition. A patient-centered approach to care forms the context for clinical reasoning which is an invisible process but linked to visible performances such as diagnosing and treating the patients, justifying the treatment plan to the multi-disciplinary team and teaching the novice practitioners. Research in recent times stressed the importance of understanding the relationship between the effectiveness of clinical reasoning behaviors and the contextual factors and practice models.

According to Dockter et al. (2011) clinical education is a key component of physiotherapy education programs and quality clinical training is vital to students' learning. It is also argued that clinical education has a powerful effect on students' learning and can shape their future attitude towards work and clinical practice. Research has shown that years of experience in clinical practice is positively correlated to effective clinical instruction. Clinical educators in physical therapy adapt various teaching styles to enhance students learning among which peer coaching, supervised practice, role playing, and questioning are the popular strategies used for clinical instruction. However, there is no unique recommended clinical education model which

facilitates the development of clinical reasoning skills and this study aims to recommend an appropriate clinical education model that would ensure professional practice readiness of the graduates in a UAE physiotherapy program. This research is an attempt to address these problems by exploring the best possible answers for the following five research questions which is again divided in to one main and four sub questions that are directly linked to the purpose and objectives of this study.

1.3. Research Aim

The main purpose of this study was to explore the contribution of clinical education in developing clinical reasoning skills of undergraduate physiotherapy students in the UAE and its role in preparing students for professional practice.

1.4. Objectives

The objective of this study was to identify the factors affecting effectiveness of clinical education and development of clinical reasoning skills and also to recommend an appropriate reasoning-based, clinical education model for the UAE context.

1.5. Research Questions

Main research question:

Does clinical education contribute to the development of clinical reasoning skills and professional practice readiness among physiotherapy students in the UAE?

Sub questions:

1. What are the underlying factors for an effective clinical education?

2. What factors affect the development of clinical reasoning skills?
3. Does clinical education adequately prepare the undergraduate physiotherapy students for professional practice?
4. What is, if any, the appropriate clinical education model that facilitates clinical reasoning skills and professional practice readiness for the UAE context?

1.6 Scope and Significance of the Study

Though the concept of clinical reasoning development in physiotherapy students is explored well in the literature, most of this research originates from Western countries. Within the Middle East there is no evidence to indicate the level of research around clinical reasoning skills development. At present there are only three educational institutions offering a physiotherapy program within the United Arab Emirates. There were no studies exploring the clinical reasoning skills of physiotherapy students found in this region and the literature search could not identify similar studies. This is the first study that explored the development of clinical reasoning skills in undergraduate physiotherapy students and the contribution of clinical education towards it.

The scope of physiotherapy allows autonomous practice for physiotherapists in most of the Western countries. In this context the physical therapist receives a referral from medical practitioners, and they have the autonomy to choose the treatment based on their physical examination and finding of the patient. However, in other parts of the world physiotherapists are bound to the prescriptions they have received from the referring specialist(s). The aim of physiotherapy programs in line with the standards of World Confederation of Physical Therapists (WCPT) is to prepare undergraduate physiotherapy students for professional autonomy and best practice. Physiotherapy courses composed of didactic sessions on basic and

applied sciences are delivered within the university settings and clinical education happens outside the university campus. The later forms one third of the educational program requirements and involves supervised clinical practice under the guidance of qualified clinical educators. Clinical reasoning is one of the embedded learning outcomes in physiotherapy curriculum and understanding this phenomenon is vital for students for them to learn the practice of clinical reasoning.

1.7 Context of the study: United Arab Emirates

The union of 7 emirates for the United Arab Emirates which consists of the capital Abu Dhabi and other emirates include Dubai, Sharjah, Ajman, Ras Al Khaimah, Umm al-Qaiwain and Fujairah (Ministry of Foreign Affairs 2019). UAE was not a hospitable place until the 1960s as it was mostly an “arid desert”, but now it has developed to one of the most attractive areas of the world (Hopkyns 2014). The population of UAE is dominated by the expatriates as they are extremely large in proportion compared to the UAE local population. Therefore, this has become a multicultural country with people from diverse background. However, in the context of this study, the student participants were mostly from the UAE and some students were from other Arab countries such as Palestine, Egypt, Oman and Yemen. But almost all of them were born in the UAE and brought up in this culture. In the UAE, “public schools and universities are segregated” which means the females and males do not have an opportunity to mingle together during their younger ages (World Culture Encyclopedia 2019). According to Gaad (2001), “All mainstream public education is conducted in single gender classes”, in addition female staff are the ones governing and delivering the primary education in public schools in the UAE (Gaad 2015).

Coeducation system is a very recent initiative of the Ministry of Education and implemented in UAE public schools at the start of academic year 2018/2019 (Sebugwaawo 2018). From the background of the participants it is assumed that most of the students were graduated from public schools in the UAE, hence they would not have had an opportunity to mix with male students which highlights their cultural restrictions and sensitivity. Though the female's enrollment and performance in schools and higher education is impressive than men, their participation in labor force was one of the lowest in the world with just 6% as of 1990 (World Culture Encyclopedia 2019). However, this has increased to 43.5% in 2011 according to the Gender Inequality Index (GII) by the United Nations Development Program (UNDP) and the report published in October 2015 in Gulf News stated that women occupy 66% of the public sector jobs in the UAE. It is believed that this trend continues till date and women are empowered in various role at multiple levels in both public and private sectors the UAE. Despite new employment opportunities, most women opt for marriage and raising children. UAE society places a high value on those roles. Conservative cultural attitudes lead women to seek jobs that do not involve mixing with men or commuting far from home. As a result, most women are employed in education sectors and in civil services (World Culture Encyclopedia 2019).

UAE Government has launched Emiratization campaign which mandates the inclusion of Emiratis in all kind of job sectors including the health sectors. Only 8% of nurses in public hospitals in the UAE are Emiratis (Ministry of Health 2019) and the health sectors in the country heavily relies on expatriates for nursing, physiotherapy and other allied health professional roles. The Ministry of Health is taking efforts towards Emiratization of the healthcare workforce and awards full scholarship for Emiratis to study the health sciences program (Ravindranath & Al Amir 2019). The Mission of the health sciences institute where this study was conducted is to “prepare knowledgeable and skillful professionals, who will deliver evidence-based practice

in different health care settings” (Host institution 2019). This being a female only institution posts great challenge on them to overcome the cultural sensitivity associated with their learners. In order to prepare the students for contemporary healthcare practice which involves working in a dynamic, challenging and multicultural healthcare settings, it is important that the learners need to be nurtured with a flexible, dynamic and culturally sensitive curricula that are responsive to the changing health care needs in the UAE.

It was not an easy task for the male researcher to undertake this research in all female student population. As discussed above the cultural sensitivity associated with female student population was a challenge for the researcher to recruit the female participants for the qualitative part of the study. Even for the quantitative study an online survey was administered but did not fetch the full response from the student population available. This shows their restrictions and sensitivity for sharing information. So, it was essential for the researcher to ensure confidence to the willing participants for the study that the information they provide is protected and safeguarded. Since the researcher was an educator at the host institution, he was able to understand the cultural dimensions of students and adapt to the participant needs during the interview, a time when the participants had to meet the researcher face to face. Abdelkhalek et al. (2009) conducted a study on the medical students studying at the University of Sharjah College of Medicine in the United Arab Emirates. In their study, the faculty members acted as a simulated patient in assessing the medical students clinical reasoning skills. The authors have reported several context related factors such as culture and language as the main challenges in assessing the clinical reasoning skills of their students.

1.8 Conclusion

The background arguments in the earlier section of this chapter highlights the significance of clinical reasoning skills for physiotherapist to function independently in their professional practice. Physiotherapy graduates are expected to possess these skills from day 1 of their graduation which means the physiotherapy education providers and the curriculum should incorporate strategies to enhance the development of clinical reasoning skills from the early in the program. It is believed that the clinical education plays a pivotal role in developing the clinical reasoning skills by contributing to the development of various other core competencies and skills required for physiotherapy practice. However, the tacit nature of this cognitive skill makes it difficult for educators to understand the students' abilities in clinical reasoning and, therefore researching on the process of clinical reasoning skills development is essential to understand the factors influencing the clinical decision-making process. Lack of studies on this phenomenon within the UAE and in the Gulf region created the purpose and research questions for this study which was described in the previous section(s) of this chapter.

1.9 Overview of the Thesis

This thesis consists of five chapters including this first introduction chapter in which the background, research problem and the purpose and the guiding research questions were discussed. The following sections of this thesis will include a literature review chapter that discusses the theoretical framework and detailed review of literatures and, a methodology chapter that will outline the research approach, design, methodology and ethical considerations. This will be followed by the fourth chapter that will present the result and findings of the study. The fifth and final chapter will discuss the findings of this study including its limitations and contributions to physiotherapy education and practice.

CHAPTER 2: LITERATURE REVIEW AND THEORETICAL UNDERPINNING

2.1 Review of Literature

2.1.1 Introduction

Informed clinical decisions are the cornerstone of effective patient care. All physiotherapists, whether novice or expert, strive to meet standards of practice established by the professional regulatory authority. Although previous experience may inform the clinical decision-making process, the type and length of experience required to develop clinical reasoning skills is yet unknown. But it is believed to develop in stages through academic and clinical education experience and plays a pivotal role in professional practice autonomy. The progress of clinical decision making is indicated by the transformation from the novice's hypothetico-deductive reasoning to the expert's forward and purposeful reasoning style. In the students' it is witnessed during the clinical education stage as they attempt to shift their preclinical biomedical knowledge to clinical knowledge during their patient encounter. They may struggle to recall the information relevant to the situation and make some errors whereas the expert clinician using their structured knowledge base and "if or then" rules are able to recognize the patterns quickly and accurately (Wainwright et al. 2011). Several studies have identified the difference in clinical reasoning abilities among the healthcare practitioners with different levels of experience, but there is not enough literature especially in the Middle East about how the reasoning skills develop through experience to the clinical education experience. This study draws attention to the same factor and aims to address the gap in literature by exploring the role of clinical education in developing the clinical reasoning skills among the undergraduate physiotherapy students. In this chapter the researcher aims to present the critically appraised relevant literatures on clinical reasoning in physical therapy and the role of clinical education

in developing the clinical reasoning skills in order to provide an insight into the factors affecting the development of clinical reasoning skills, strategies for developing clinical reasoning skills and the connection between clinical reasoning skills and the professional practice readiness of physiotherapy students.

When compared to other countries, the UAE's education system is relatively new. The public education system has a strong influence of Islamic and Arabic culture(s) (Gaad 2001). Country's leadership is committed to build a knowledge economy and they believe that education is the main driver to achieve this vision (Fox 2017). Higher Education Institutions (HEIs) need to be licensed by Ministry of Education with their program accredited by Commission for Academic Accreditation (CAA). There are few Federal, several Non-Federal Public and Private HEIs within the UAE which offers undergraduate programs leading to bachelor's degrees in a range of discipline. There are also master's and doctorate programs available for desired candidates (Knowledge and Human Development Authority 2017).

The Ministry of Education in the UAE is moving forward in line with the modern education philosophies with the aim of developing and comprehensively and radically changing educational frameworks and streams. In this context, the vision of the Ministry of Education is to educate the young generation about the skills for life in order to attain a knowledge-based economy and a sustainable development. The ministry also worked that its curricula align with the requirements of the labor markets with the aim of keeping pace with the UAE's plans to shift to the knowledge-based economy. At present there is a shortage of health professionals within the UAE especially the country depends on the foreign nationals for health services as there are only a few healthcare professionals available locally for them. Therefore, the ministry established a professional education stream by establishing professional and technical institutes

through the Knowledge and Human Development Authority and Abu Dhabi Center for Technical and Vocational Education and Training and aims to provide qualitative university education that matches the world's most prestigious universities (Ministry of Education 2019). At present, there are three Higher Education Institutions offering physiotherapy programs within the UAE and among them two institutions offer master's program as well, but there are no doctoral programs in this discipline within the country. However, there are opportunities for interdisciplinary PhD programs in the UAE that provides scope for academic research.

2.1.2 Clinical reasoning in physiotherapy and its significance in healthcare practice

Over the last four decades, there has been a remarkable advancement in the way the clinicians' reason, but there is no significant progress in the way it is taught and transferred to the next generation of healthcare practitioners. This may be mainly because of the limited knowledge transfer from the clinical reasoning literatures to the clinical teachers (Dhaliwal, 2013). Physical therapist need to observe the patients' posture in various positions and during activities in order to gather evidence and form hypothesis. This embodied-enactive model of clinical reasoning requires an "intersubjective bodily process" between the therapist and patient more than a dialectical narrative practice (Øberg, Normann & Gallagher 2015).

Clinical reasoning expertise determines the quality of patient care but the process by which the clinician achieves expertise in clinical reasoning is not well documented. Another debate on this area is if this skill can be taught? Given these challenges, it becomes extremely difficult to assess the development of clinical reasoning as it is not an observable skill. Though there are some controversies regarding the teaching and assessment of clinical reasoning, researchers strongly believe that the educational theories can help to shed light on this debate. Studies in deliberate practice argues that at least around 10000 hours of guided practice is required to

attain expertise in a practice domain and mastering the clinical reasoning skill cannot be an exemption to this rule. The script theories entail two kinds of system for clinical reasoning (Ericsson 2004). The system 1 uses non-analytical reasoning and has a lesser cognitive effort as it occurs subconsciously. This is like the forward reasoning or pattern recognition explained in the earlier clinical reasoning theories and adopted by the expert clinicians. System 2 which mimics the hypothetico-deductive reasoning, is a form of analytical reasoning and bound by rules. This is a slow process which requires a higher level of cognitive input and consciously controlled (Capaldi et al., 2015).

Clinical reasoning is promoted as a core competence in physiotherapy education. Recent research about the clinical reasoning process in physical therapy stresses the importance of collaboration, interaction and ethical reasoning (Cruz, Moore & Cross 2012). Because of this advancement in perception about the nature of clinical decision making, several other factors have come out as pertinent to clinical reasoning expertise. Those factors include but are not limited to the ability to link and apply thinking, learn from the others in a collaborative manner, make sense of the skills learned and generate new knowledge through innovative experiences. Considering these new developments in clinical reasoning in physical therapy, scholars interested in clinical reasoning call for education that concentrates on the development of self-directed learning to enhance the problem-solving skills of students (Christensen et al. 2008). But the findings of studies conducted with the purpose of exploring the ways to facilitate the development of clinical reasoning skills of entry-level physiotherapy students, shows that their reflective thinking skills are underdeveloped even at the exit point of the program. Literature that explored the similar concepts in other allied health professions also showed the same results and proves that the novice and/or student clinician rely much on their preceptors and just focus on the procedural aspect of clinical reasoning (Jensen et al. 2009; Hendrick et al. 2000). Hence,

they might develop a limited understanding of their role as well as the role of clinical reasoning in the context of clinical practice (Cruz, Moore & Cross 2012).

Pediatric physiotherapy involves handling children with disabilities and the decision-making process is complex which is influenced by several factors. The main factors contributing to the clinical decisions in this area are family dynamics, type of rehabilitation setting, sources available for reimbursement of the expenses incurred and involvement of multiple stakeholders and the factors that affect the growth and development of children. Customizing the treatment plan for a disabled child is a multifaceted process and it requires sophisticated clinical reasoning skills in this area of physiotherapy practice (Vereijken 2010). In these complex situations, clinicians may need to systematically consider the multiple components involved by referring to established models that could guide them in the decision making. The ICF framework which refer to “International Classification of Function, Disability and Health” issued by The World Health Organization (WHO) provides the “universal classification system” that best describes the overall elements of health. The terms “clinical reasoning” and “decision making” are interchangeably used in the literatures and considered to be a paramount skill for physiotherapist like all other health professional. The ICF framework is a useful tool for physiotherapist to think behind their action that is their clinical reasoning. However, we cannot argue that this is the only or best model or framework for effective clinical reasoning, so further research must be conducted in this area to determine the best model that guides the physiotherapist in streamlining their clinical reasoning skills (Furze et al. 2013). To become an expert in clinical reasoning, one must develop their problem-solving skills that are generic and specific to the clinical context. It also requires the clinician to use a different set of knowledge and several cognitive abilities in order to master their decision-making skills. University education focuses on teaching theoretical knowledge essential for future problem solving in real

life scenarios. Recent studies classify this diagnostic knowledge into three categories, namely 1. conceptual knowledge, 2. strategic knowledge and 3. conditional knowledge (Furze et al. 2013). The revised Bloom's Taxonomy brought a new fourth category called metacognitive knowledge for clinical reasoning. Though it is not possible to directly observe the metacognition in students, still it can be self-reported by articulating what one thinks. No model of clinical reasoning supersedes the other and Kiesewetter et al. 2016, recommended that it is a good idea to use a holistic model that utilizes all types of knowledge including the metacognition. It is important that the clinical educators realize this when they devise strategies to foster the clinical reasoning skills of their students. The focus of their teaching should be on how to use the "right sequence of knowledge at the right time" (Kiesewetter et al. 2016).

Most of the patients referred in today's dynamic healthcare context in the UAE are presenting with several comorbidities and at the same time their health insurance schemes have lots of restrictions for services providers. This puts a high demand on the clinical practice and to meet this challenge, the practitioners must have sound clinical reasoning skills as well as the understanding of its developmental process. The American Physical Therapy Association (APTA) recognizes clinical reasoning as an essential skill and expects it to be developed through the normative model of physiotherapy education. But the educational programs have not yet established a comprehensive approach to foster the development of clinical reasoning in physiotherapy. Dreyfus model (1980) proposed in medical education can very well be utilized within the physical therapy education. This model seems to be effective as the learner moves through 3 overlapping phases in achieving the expertise in clinical reasoning. First the learner relies on past experiences, then views the bigger picture and finally integrates himself/herself into the situation for making the clinical decision. If the clinical reasoning skills are expected to evolve throughout the physiotherapy program, then the learning opportunities provided to

the students should target the development of metacognitive skills and critical self-reflection. The aim of both didactic and clinical educational strategies should focus on the understanding of uncertain situations and how to act on those circumstances (Furze et al. 2015).

Many physiotherapy students face the difficulty in applying their theoretical knowledge during their clinical practice (Kalkwarf et al. 2005). Conceptual thinking that is how the concepts are developed, linked and stored for retrieval has a significant influence on clinical reasoning (Woods et al. 2007). “Encapsulation of ideas” is referred to as a concept. The knowledge about this as well as how these ideas are related to the ones that are already acquired is what is termed as conceptual understanding (Suaalii & Bhattacharya 2007). Conceptual development, a hierarchical process in which the new concepts are subsumed under the broader concepts. Clinical diagnosis requires organized patterns of information to make sense of the identified problem(s). Hence the problem solving as a part of clinical reasoning requires a complete understanding of the relationships between the concepts for pattern recognition and to generate the final case (Auclair 2007). Therefore, repeatedly exposing the students to multiple patients with similar problems could lead to competent diagnostic skills (Auclair 2007). In order to make good clinical decisions, the practitioner should be able to generalize their past learning to the new and apply their learning in a range of clinical situations (Murphy & Tyler 2005). This knowledge transfer requires a “process of mindful abstraction” in which the clinician recalls information from previous experience when they encounter a new case. Mindful abstraction does not happen automatically as it is an active process that requires conscious decisions using strategies (Maclellan 2005). One way of facilitating this process is “concept mapping” in which explicit effort is made in order to make the students’ understand the structure and production of knowledge (Clayton 2006). In concept mapping, the association between different ideas are recorded and during this explicit linking process, students are forced to think about the

information needed, and how to organize, sequence and fit those together (Clayton 2006). Thus, concept mapping is a powerful tool for the clinical teachers to foster students' reasoning skills. Placing emphasis on conceptual learning facilitates the development of students' clinical reasoning skills. Clinical instructors should encourage the students to map their understanding of pre-clinical knowledge so that it can be transferred to the present clinical situation. Supporting the students in retrieving their conceptual framework and apply it appropriately is the big challenge in clinical education (McMillan 2010).

According to Dror (2012), clinical experts may often use an intuitive approach when compared to the novice who predominantly takes the analytical approach for reasoning. But Dror believed that the main difference between the expert and novice is that the experts have the ability to identify the circumstances that would require them to move from their usual inductive approach to a hypothetico-deductive approach. Clinical reasoning skills development largely depends on the educational settings. Teaching hospitals that have the potential for students to practice in real-life scenarios with direct patient contact has a huge impact on the diagnostic process and provides an authentic experience for students. In addition to this, case-based learning using small group tutorials and simulated practice that facilitates the hands-on activities on human models or mannequins are the other ways to promote the students' reasoning skills (Pinnock et al. 2012). Gathering and organizing the data is the primary step in clinical reasoning process. Providing opportunities for students to summarize their finding may help them to create an illness script and retention of their learning. Allowing opportunity to articulate their clinical semantics can build strong clinical reasoning skills for the novice student practitioners. Stressing the significance of clear communication, focusing on differential diagnosis and providing an ongoing and immediate feedback are all the keys steps fostering the development of clinical reasoning skills (Posel, Mcgee & Fleiszer 2014).

Clinical reasoning is described as a context-dependent thinking process that guides the decision-making in clinical practice. More than the cognitive and metacognitive elements, it is the practitioner's ability to self-appraise and self-monitor is what determines the effective reasoning in clinical practice. Physical therapy research highlights that the physiotherapy practitioners tend to switch between the analytical and/or non-analytical approach while reasoning about their clients' physical complaints. The debate is whether the integration between these two distinct processes develops through experience or can this be taught during the clinical training? Teaching that aims to develop this complex ability is known as clinical reasoning and needs a careful planning of the curriculum and the scaffolding of clinical reasoning should happen throughout the curriculum, not just in segments. Research findings highlights the benefits of repeated and early exposure of students to real patients under the guidance of clinical instructors who understands the theoretical underpinnings of clinical reasoning development such as the dual process mechanism. This coaching model provides an opportunity to instantly point out the errors in students' thought process and allows time to reflect simultaneously. Hence training the clinical educators is pivotal to make sure they understand the differences in experts and novice's reasoning skills. Even though the recent researches have emphasized the significance of ethical and collaborative dimensions of clinical reasoning, the reality is that there are no or limited opportunities only available for this in the present physiotherapy curricula. In some of the entry-level physiotherapy courses, key clinical reasoning aspects such as dialectical thinking and/or reflective practice are under-developed (Orrock et al. 2014).

Professional ethics, socialization into the practice settings, knowledge of standards of practice and applying the clinical practice guidelines to individual patients requires good clinical judgement of the clinician. Clinical judgement uses both scientific knowledge and practical skills, but the transition from absorbing the textbook knowledge and hands-on skill to clinical

judgement is a demanding endeavor (Gaba 2015). Understanding the meaning of clinical judgement will be extremely complex. Sound clinical judgement includes not only the pathophysiological and diagnostic components of the illness but also the context in which it happened. It considers the environment of the family, their lifestyle, and the personal, emotional and the psychosocial resources that are available as treatment options for that patient (Gaba 2015). Clinical judgement, diagnostic thinking and clinical reasoning are often used interchangeably, and all of these uses the psychomotor, cognitive and metacognitive process in the given clinical context. It involves cognitive skills such as, the ability to define the problem, identifying the supporting evidence, analyzing the causal relationship, generating a hypothesis and drawing valid conclusions. Clinical judgement usually begins with an end in the mind of clinician and it involved some complex tasks with human attributes using an arguable framework of the reference in an uncontrolled practice setting (Gaba 2015). Cultural differences and social constructs have strong impact on the individual's faith about their health and illness, and difference in their belief and attitude will influence the clinician's judgement (McNiesh 2013). Training the students on critical thinking and clinical reasoning seem to rely a lot on the same educational philosophies since many decades (McNiesh 2013). However, the philosophical underpinnings necessary to develop the reasoning skills are linked to Aristotle's phronesis concept which highlights the need for an open-ended and flexible approach in decision making to determine the best possible treatment option. Gupta and Upshur (2013) believed that evidence-based practice has a significant impact on development of clinical reasoning skills, hence incorporating it into the physiotherapy curriculum will provide positive outcomes on students' clinical judgement abilities. (Gaba 2015). Clinical reasoning has been a topic of interest for researchers since many decades and it has brought in new knowledge to this peculiar topic. But to date there is no agreement on a single definition or a clear description of

what is clinical reasoning and how it could be taught and assessed. Also, the research and practice implications of clinical reasoning is still widely debated (Durning et al. 2013).

There is a fundamental difference between the clinical teachers and clinicians. Clinical teachers must ensure high-quality patient care and at the same time they are also responsible for assessing the clinical skills and reasoning abilities of the learners. They also have a big role in facilitating the students' progress towards autonomous practice in the hospital settings. Hence the clinical teachers have a dual role of diagnosing the patients' clinical problems, and the abilities and skills of the learners (Bowen 2006). During the practice placements, physical therapy or any other healthcare discipline, students usually face difficulty to recall their knowledge obtained from classroom teaching. This is because the knowledge gained from the classroom is organized in a structured way as a result of system wise approach to teaching. But in real-life settings it is not the case as the patients that the students' encounter may present with multiple pathologies, hence it will be extremely challenging to the students to recall relevant information instantly. But after a clinical encounter the students' will attempt to establish a new connection between the existing knowledge and the clinical scenario they are faced with, thus they can link the clinical features to the knowledge which is stored in their own memory. Understanding this phenomenon can be useful for the clinical educator to select appropriate strategies to enhance the learning process (Bowen 2006).

2.1.3 Clinical education models in physiotherapy and healthcare education

Lekkas et al. (2007) presented six models of clinical education in their systematic review and these broad categories of entry-level clinical education were adapted internationally in allied health education. Those models include, "one educator to one student, one educator to multiple students, multiple educators to one student, and multiple educators to multiple students, non-

discipline specific educator and student as educator”. Their findings were not conclusive to support the efficacy of one of clinical education over another because of the lack of evidences from randomized control trails. Each of these models have had their own strengths as well as the weakness which were unique to those models. From the findings of this study, it can be concluded that there is “no gold standard model of clinical education”. The authors recommend that the selection of a clinical education model should consider the applicability, generalizability and consistency.

According to Lekkas et al (2007), clinical education forms the core component of the undergraduate physiotherapy curriculum and it has a greater role in the development of students’ clinical skills and attitudes. Students appreciate learning in clinical setting and the belief is wide that therapeutic skills are crystallized by linking the theory to practice within the real environment. Clinical education offers scope for developing the professional skills through supervised practice, and it is appropriate for the courses that uses clinical setting as place for learning. The main aim of clinical education is to provide real-world opportunities to the students to achieve the competence of an entry-level practitioner by applying their knowledge and skills. In addition, it promotes progressive independence in students’ performance and responsibility through guidance of a qualified practitioner (Lekkas et al. 2007). However, the conceptualization of clinical education and the way it is delivered significantly varies from institution to institution in the UAE and the other countries.

2.1.4 Role of clinical education in developing clinical reasoning skills

Clinical education provides physiotherapy students with numerous opportunities to develop a broad range of skill sets thorough experience of handling patients with complex multifactorial problems. The advantage of clinical education is that it provides an opportunity for team

working and integrates the students to their future professional role. However, on the downside, clinical education is a bit haphazard and lacks evidence-based rigorous and observed practice. A growing number of students and change in healthcare needs puts a lot of pressure on the clinicians and they are unable to allot time to teach the student cohort on placement. Providing the necessary support for clinical educators and students is vital for effective implementation of instructional strategies designed to facilitate the learning in the clinical settings (Conn et al. 2012).

Clinical education experience is usually provided to the students towards the end of the curriculum within the physiotherapy education. This delayed opportunity for clinical training may allow them to enter the clinical placements with full knowledge acquired through the didactic coursework. However, the risk of this delayed placement is that it might hinder the students' ability to synthesize the required information during patient encounter and understanding the professional behaviors needed for clinical practice. In contrast, the early clinical education through an integrated curriculum framework has lot of benefits for the students' as there is a possibility to maximize the efficacy and productivity of both teaching and learning. John Dewey (1984 in Hakim et al. 2014), a pioneer educational theorist highlighted the need for experiential learning, and he claimed that the learners should be actively engaged in the learning environment for gaining knowledge that could be applied to day to day life (Hakim et al. 2014). Evidences suggest that the use of integrated curriculum and experiential learning methods for clinical education reinforces the cognitive, affective and/or psychomotor domains of learning (Hakim et al. 2014). When the students are exposed to real patients in early stages of their student life, it provides them with opportunities for critical thinking skill needs for their future professional practice in challenging clinical environments. In addition, it facilitates the transfer and application knowledge and reinforcement of the classroom-based

learning in clinical situations by providing exposure to variety of care pathways and promotes self-evaluation and provides opportunities for developing skills and professional growth (Hakim et al 2014).

Clinical placement denotes the period in which the physiotherapy and/or other healthcare students immerse in meaningful participation of patient care. The myth is that there may be a relationship between the number and type of clinical cases seen by the students during their clinical training and their clinical reasoning ability. During the practice placement, physiotherapy students are expected to actively engage in the process of decision making on their day to day physiotherapy practice. As a result of this repeated practice, it is assumed that there will be enhancement of students' clinical reasoning at the end of their clinical education experience. But findings from the literature support as well as refute these views. Hemmer et al. (2015) study showed poor correlation between the clinical training and reasoning skills. Although the authors were unable to pinpoint the cause for the lack of association between the variables, students' comfort with each case and their ability to engage in the task using the readily available information are said to be the reasons for lack of correlation. The other factor(s) that may contribute the difference is the limited time of placement may not provide the students with enough opportunities for seeing the breadth of cases. This is the main difference between the students and expert clinician in terms of patients seen and performance.

Physical therapy students spend most of their time in the university setting by learning the facts and a very little time is allocated for learning "how to think?". But the fact is that the ideal environment to pick-up or learn this skill is the clinical setting where the bedside teaching and learning induces the essential thought process for making decisions (Hemmer et al. 2015). Clinical reasoning errors may occur during the patient care and it should not be always

accounted for lack of knowledge and skills or the competence alone. But it is often related to the process by which humans make their decision in circumstances that involves uncertainty, challenges, complex, time restrained and/or emotional aspects of the patients. One of the main causes for this is that the practitioner overestimating their own ability to rightly deploy the clinical tests, interpret the findings and act appropriately to provide the needed intervention or looking for further investigations. Hence the clinical teachers should constantly critique their own reasoning methods and how they would like to teach it to the next generation of professionals. In addition to this it is also worth attending formal courses that will provide the theoretical background to teach clinical reasoning (Katelaris 2012).

Learning clinical reasoning is a continuous process throughout the physical therapy curriculum and the didactic as well as the clinical education play a pivotal role in fostering this skill. Physical therapist uses this critical skill for determining the appropriate assessment and treatment interventions for the problem (Seif, Brown & Annan-Coultas 2013). Learning through an example-based method that uses already solved case representations can be beneficial in fostering the clinical reasoning. When the clinical teachers use the worked example as an instructional tool, the learners can quickly grasp the steps involved in solving the clinical problem. It is a good idea to leave some parts of the example incomplete for the learners to solve using self-explanation prompts in order to achieve proficiency in problem-solving (Dyer et al. 2015).

The significance of clinical education as a part of professional physiotherapy education has been well documented in the literatures. Clinical education experience provides physiotherapy students with an opportunity to apply the knowledge and skills gained from didactic theory classes and practical sessions on the patient populace. In contrast to the classroom or

physiotherapy labs, the clinical settings offer the chance to the clinical educators to provide immediate feedback on the students' performance. Generally, the clinical education takes place outside of the formal university setting and the physiotherapy curriculum may follow either the concurrent or a non-concurrent approach to clinical education. In the concurrent approach, students attend clinical training along with didactic teaching, whereas the non-concurrent approach takes the block pattern of clinical placements which happens at the end of the didactic curriculum. Though both approaches have advantages and disadvantages, the concurrent pattern of clinical education seems to enhance learning, reinforce the development of clinical reasoning skills and promote students' enthusiasm for learning in the clinical context. Though this approach allows only a limited clinical practice opportunity and, gradual development of skills and professional behaviors, it stimulates the integration of classroom learning to the clinical context. It also facilitates the development of cognitive and psychomotor skills that are vital for future independent practice (Sherer et al. 2006). The part-time nature of a concurrent model of clinical placement is a drawback for the placement provider as they find it challenging to manage their time and staff routine, hence most placement providers would encourage the fulltime blocked pattern of placements. If a student attends clinical training parallel to the didactic learning, it becomes essential for them to have guided practice during their clinical attachment. This puts additional responsibility on the clinical instructors' as the students may not have the in-depth knowledge to indulge in self-directed learning. Thus, the physiotherapy academics and clinical educators must work in a collaborative manner to coordinate their students' learning in clinical placement. During the early stages of a student career, the academics can take the responsibility of providing the theoretical frameworks needed for patient care and guide the development of good professional behaviors and communication skills. The

clinical educators can reinforce all those concepts in the clinical environment through interaction with real patients (Sherer et al. 2006).

Physiotherapist primarily work in a healthcare climate that is becoming increasingly complex and rapidly changing. The fiscal restraint and scrutiny from various sources demands more accountability from the physical therapists. The ability to appropriately respond to these pressure circumstances is vital for professional survival as well as for the professional growth. Hence the newly qualifying physical therapists should possess more than the solid foundation of clinical skills. Physiotherapy education programs should aim to reinforce the students' attitudes and skills for lifelong learning and critical reflection of own practice that will equip them to build the physiotherapy profession (Strohschein, Hagler & May 2002). Clinical education provides the opportunity to teach and refine these attitudes and skills. Clinical education that is consistent and effective in approach has significant influence on the formation of the skills for lifelong learning and attitudes that impact on the future practice. To achieve this, the philosophical underpinnings that guides the effective clinical education should be communicated and understood by the clinical instructors and students (Strohschein, Hagler & May 2002).

Almost in all countries the title of physiotherapist is protected by a regulatory board, so the students graduating from physiotherapy program must pass the national licensing exam in order to practice as physiotherapist in the UAE (Department of Health 2017). Licensing examinations tests range of knowledge and skills through online multiple-choice questions and simulated clinical examinations. In either case the students must possess sound reasoning skills to integrate theory and practice (Department of Health 2017). Clinical education plays a major role in preparing students to succeed in these examination process (Cruz, Moore & Cross 2012).

Cruz, Moore and Cross (2012) conducted a study among twenty-eight Portuguese physiotherapy students to explore their views about clinical reasoning using an interpretative hermeneutic approach. They used focus groups to find out the co-construction of meaning of the students' experiences of clinical reasoning after attending musculoskeletal clinical placement. Participants were final year physiotherapy students and selected purposefully from 4 different institutions in Portugal. Single case analysis of the data of each focus group was carried out at first before grouping all focus groups into major theme clusters. Findings of this study concludes that the undergraduate physiotherapy students understand clinical reasoning as an instrumental process, which is clinician centered and depends on the subject knowledge and the context of physiotherapy practice. Hence, their actions were mainly focused on determining the cause and effect relationship, and their decision regarding the treatment choice was in line with the anticipated patterns of normality. From this it can be explained that the participants emphasized clinical reasoning as a cognitive process that guided clinical diagnosis and autonomous decision making. Students did not value the clinicians who were just confined to application of therapeutic techniques to address the patients' problems and rated those clinicians' to be "poorly qualified". Further the participants perceived clinical reasoning as a "thinking process" belonging to the clinician. The final year physiotherapy students who took part in this study stated that the patients' role is to provide information during the subjective and objective assessment. Patients input was not considered in establishing the "contributing factors" as the students felt this as a process owned by the physiotherapist. But it is vital to incorporate patient expectations into therapeutic goals and considering their previous level of function. In addition, physical therapy students indicated that there is a strong link between the effective clinical reasoning and clinicians' cognitive skills, theoretical knowledge, and clinical experience. Apart from these, the students' thought that the contextual factors have at least some

influence if not greater impact on the reasoning process. For an example, if the time available to assess a patient is inadequate, the quality of decision making may become poor. Results of this study concludes that the undergraduate physiotherapy students and novice physiotherapy practitioners have the tendency to adapt to the disease oriented model for their clinical reasoning and were keen on adhering to protocols or clinical practice guidelines to address the impairments and functional issues with their patients without attempting to integrate the patient problems' to their actual needs, life style and/or the environment (Cruz, Moore & Cross 2012).

Clinical prediction rules help the physiotherapists in their clinical reasoning process, and it is useful for making an accurate diagnosis, set up a prognosis and to decide on the best possible intervention for the problem. Physiotherapy students are expected to learn the clinical prediction rules from their clinical education in order to meet the demands of the contemporary physiotherapy workforce. As evidence-based practitioners, they are expected to apply clinical prediction rules in their day to day practice. But the Knox et al. (2015) study with physiotherapy clinical educators in Australia, concluded that only a few clinical educators are using the clinical prediction rules in their practice and teaching the same to their students. This “cross-sectional observational survey” explored the views and experiences of physical therapy clinical instructors about the use of clinical prediction rules in their clinical practice. The results of this study indicated that many clinical teachers were not aware of clinical prediction rules and many others have not utilized this tool in their practice. From the findings of this study, it can be assumed that most physiotherapy students may not be able to learn the clinical predication rules from clinical education as the educators themselves are unaware of this concept (Knox et al. 2015). Therefore, independent practice becomes a huge challenge for most of the newly qualified physiotherapist and it is assumed that the students in UAE may not be exempted from this challenge.

Many healthcare practitioners do not understand the impact of clinical context on the clinical reasoning process. Good clinical reasoning is determined by two interlinked but not interchangeable factors that are, diagnostic reasoning and therapeutic reasoning. Situated cognition provides the theoretical framework for explaining the relationship between context and clinical reasoning. According to this theory, learning of clinical reasoning occurs in a physical environment such as hospital settings and the social context involved in this process influences the way the learner learns. Looking from the angle of situated cognition, the outcome of a patient encounter does not always depend on the clinician's knowledge, instead it may involve the interaction of the therapist, client and clinical practice environment. In contrast to this, the script theory states that during clinical encounters, the clinician relies on their prior knowledge to develop hypothesis and an action plan. Lack of relationship between the diagnostic and therapeutic reasoning is the leading cause for errors in decision-making. Therapeutic reasoning is vital for devising a appropriate treatment plan, hence understanding of this phenomenon and its relationship with diagnostic reasoning will be helpful to clinical educators for selection of appropriate instructional strategies to promote learners' reasoning skills (McBee et al. 2017).

In the literature, two types of learning in clinical settings are described that are atomistic and holistic learning. Atomistic learning is fragmented in nature, whereas the holistic learning is deep, where the learner is keen to understand the meaning, connections, context and its implications on their future practice (Orban et al. 2017). Studies have shown a linear relationship between the reasoning skills and experience in clinical practice (Dawson et al. 2011; Williams et al.2014). Orban et al. 2017) observed an unsecure feeling in first year medical students who were often relying on textbook and/or reaching out to their clinical educators to confirm their findings. But the fourth-year students who have had prior clinical practice

experience were confident and demonstrated use of professional language with ease. In addition, the senior students were involved in advanced discussions by asking provocative and challenging questions to their peer. In all the disciplines of health sciences education, development in clinical reasoning is influenced by clinical education. Case method is one way of monitoring the students' progression in clinical reasoning and it continuously provides information to the clinical educator about the students' level of clinical reasoning and allows them to adjust their instructional methods according to the learners' capacity (Orban et al. 2017).

Clinical reasoning is the fundamental aspect of patient care and part of clinicians' every action that enables them to make best possible decision with rationale in a particular context. Clinical reasoning theories indicate that this process of clinical decision making starts as early as the history taking stage of patient care. History taking is the first and foremost important part of clinical reasoning process and if this initial phase fails then arriving at an accurate diagnosis is unlikely. This initial stage of data gathering could reveal the clinician's ability to establish diagnostic reasoning process (Haring et al. 2017). Clinical reasoning involves cognitive processes that connects clinicians' pre-existing knowledge and the information that they have gathered during the patient encounter. If this connection is not established, it may hinder the clinical reasoning process. Therefore, it is essential to monitor the development of clinical reasoning skills of physiotherapy students and novice practitioners within the clinical setting. Though the clinical educators are usually able to identify students who are weak in clinical reasoning, often it is based on their subjective judgements (Haring et al. 2017). Clinical educators are keen on knowing the students' ability to make differential diagnosis which is the end point of the diagnostic process and it is appropriate from the perspective of patient care. However, from an educational point of view, it may not be the right approach as they should

consider focusing on the cognitive elements leading to the decision. It is important for the clinical educators to observe the student's cognitive performance in order to provide adequate and focused feedback to their students for enabling further development of clinical reasoning skills. If they failed to observe this aspect of student performance, their feedback might not be adequately targeted and will not serve the real purpose of clinical education (Haring et al. 2017).

Clinical education is an integral and distinct part of undergraduate physiotherapy education and in these the students' have an opportunity to refine their knowledge and skills that they have learnt from classroom or skills mastery labs. Clinical education presents the circumstance, task and complexities associated with human bodily problems that are needed to integrate the previous knowledge and sets-up the context for the new learning. Clinical education is a complex process in physiotherapy education, and it is multidimensional in nature. Physiotherapy students aim to achieve their entry-level practitioner competence from this component of the education program. It is reported in the literatures that during clinical education, students' get the opportunity to recognize their roles and responsibilities as a physiotherapist. As a first-line practitioner it is essential that the entry-level physiotherapist demonstrates core competencies and wide range of skill sets that will enable them to act in a safe and satisfactory manner in their role. To achieve this goal, it is recommended that the physiotherapy students are placed in a variety of clinical settings for at least 1000 contact hours of clinical practice within their study period (HPCSA). Creating optimal learning opportunities to learn the relevant clinical skills can promote the development of graduate attributes. Though integrating the theory into real-life situation is the ultimate aim of clinical education, it should also include the interdisciplinary and holistic aspects of healthcare. But the rapid change in healthcare systems and complexity associated with service delivery, financial limitations and increased accountability are all impacting the learning opportunities for students in clinical

education. Several factors play a role in students' learning experience during clinical education. These include, the clinical education model used, attributes of clinical educators and their teaching approach, student evaluation methods and the healthcare facility environment, its facilities and safety. Hence the placement sites should be audited and authenticated for the purpose of providing clinical education (Williams et al. 2014).

Clinical education is unique to medical and allied health education programs because of the proportion of contact hours spent outside of the university settings when compared to other disciplines in higher education programs. Clinical education necessitates immersion of students' into real clinical practice apart from the didactic classroom based activities. In physiotherapy education, approximately 45% of the curricular components are devoted to clinical education (CAPTE 2012). Physical therapy education programs are responsible for developing the clinical education curriculum, but the information and resources required to provide clinical education experiences to physiotherapy students are out of their hands. This part of the education program is usually managed by the physiotherapists working in the healthcare sectors and the higher education institution may not have a direct control over the factors affecting the quality of clinical education. Hospitals with potential for teaching may be affiliated to universities and both parties might have written agreements on the provision of clinical education. Regardless of these agreements, there may be many factors affecting the students learning experiences during clinical placements and most of them are uncontrollable by the higher education institutions. However the sole responsibility for providing high quality clinical education is with the universities (CAPTE, 2012). Even though the responsibility of providing quality clinical education sits on the shoulders of physiotherapy education programs, yet the clinical education sites are given the freedom to develop contextualized clinical education programs for the students. Usually the center coordinator for clinical education and

clinical instructors together develop and implement the learning activities to engage the students in physiotherapy practice. It is the responsibility of clinical educators to assess the students' performance to determine their achievement of mastery in entry-level standards of skill sets. However, globally there is no consensus of what is considered as entry-level standards in physiotherapy practice. Regulatory authorities such as the American Physical Therapy Association in the United States (US), Chartered Society of Physiotherapy (CSP) in the UK and World Confederation of Physical therapist provides the standards to be followed in physiotherapy clinical education. For accreditation purposes, physiotherapy education programs must demonstrate quality in clinical education along with other aspects of the program and continuous improvement is needed in order to maintain their *status quo* with the accreditation body. CAPTE uses many criteria to evaluate the clinical education part of the physiotherapy curriculum and those include qualification of clinical education faculty, the environment that is conducive to students' learning, protection of the students' rights and safety, necessary resources to assist the clinical education curriculum and evaluation of the clinical education program. McCallum et al. (2013) reported in their review that there was no conclusive evidence for the authors to recommend best practice in physiotherapy clinical education. Yet their research identified five potential factors that include the clinical education framework, site, structure, assessments and faculty contributing to the quality of clinical education.

Physiotherapists in the UK are expected to demonstrate their ongoing commitment to continuing professional development. Health and Care Professions Council (HCPC) of the UK explicitly states in its standards of proficiency document for physiotherapist as well as the other registered healthcare professionals, that in order to remain as a registered practitioner, professionals are supposed to take part in relevant development activities within their field each year. During renewal of professional registration, the council may randomly audit the

physiotherapist to check on the continuing education activities of the registrant. This places the responsibility on the higher education institutions to support the entry-level physiotherapy students' in developing the habit of deep learning through critical reflection of their own practice. Therefore, the physiotherapy curriculum should ensure that the entry-level students are supported in development of these skills including commitment required for continuous professional development. Kell and Owen (2009) reported in their study that the physiotherapy students have taken the superficial approach to learning because of their "fear of failure" because of the involvement of multiple clinical instructors and assessors in clinical education. Clinical educators must understand that they have the responsibility of developing future physiotherapy professionals who are capable of critical self-appraisal and can adapt the deep inquiry-based approach to their practice. Hence the clinical educators must reflect about the influence of the learning experiences they provide to the students and how it affects their commitment to life-long learning. Thus, the learning environment plays a great importance in supporting the development of life-long learners and the placement environment that is both physically and psychologically safe and provides remedial measures to ensure the students understand the importance of their own learning and development (Kell & Owen 2009).

Assessing the entry-level physiotherapy students' performance during clinical placements presents numerous challenges to the physiotherapy teachers. As a part of undergraduate curriculum, physiotherapy students' may attend their clinical training in multiple clinical sites. They are required to complete rotations covering different specialties in which there is a scope for physiotherapy practice. Hence, they may be supervised by many clinical educators over the course of their journey in clinical placements. Clinical educators working in different specialties possess different skills sets and they differ in their background as well as in their qualifications. This may lead to differences in the way they assess the students' performance and give

feedback. In order to meet the standards of practice, undergraduate physiotherapy students are expected to complete at least 1000 hours of clinical practice as a part of undergraduate curriculum, which is almost equivalent to one year of fulltime study. Clinical education demands continuous performance assessment rather than a one-off objective structured clinical examination and the students continuously monitored by their clinical educators. This provides an opportunity for two-way formative feedback which helps the students' in their future learning. However, at the end of a placement, clinical educators mark the students' performance to provide the summative feedback towards to overall course requirement. Clinical placement grades may account at least 25% weightage towards the program requirements, thus the process by which students are graded needs to be clearly stated, valid and reliable. But the nature of clinical education which involves several clinical educators from multiple sites brings the challenge for validating the assessment process in clinical placement modules. Most educators tend to assess the cognitive domain alone and ignore the psychomotor and affective domains in their evaluation. But assessment of physiotherapy practice should ensure that the students are assessed for these multitude of abilities to feedback on their overall clinical performance. Clinical educators must understand that the student evaluation is not just a competency check, rather it should be considered as performance evaluation which indicates what the students are able to do in the present situation. But the competency assessment finds what the student knows or could do in an ideal circumstance. This is a global "challenge of the century" for all those involved in assessing the students' clinical performance. Meldrum et al. (2008) reported in their study that the clinical educators needed extensive training and, clear guidelines outlining the competencies and expected behaviors of students for standardization of the student placement grades. Though the reliability of the assessment instrument(s) can be a factor in causing the variation in performance evaluation, the major issue on their findings were the huge differences

in the grades between the assessor(s). The authors recommended that the use of standardized assessment forms with explicit guidelines to evaluate the students' performance in clinical placement is the ideal way to demonstrate high reliability level in grading the undergraduate physical therapy students' performance during clinical placements (Meldrum et al. 2008).

High quality healthcare education is vital for providing a high-quality healthcare service to clients. Clinical practice includes assessment, diagnosis, planning and treatment of patients with versatile health problems, hence clinical education of entry-level health professional students should be done on real patients and there cannot any substitute for this gold standard of clinical education. Every patient visit should be considered as a potential educational opportunity for a clinical student on the placement site. Clinical educators must understand the secrets behind involving patients in the educational process along with the students and the instructors should value the need for proving a comfortable atmosphere for everyone involved in this process including the learner, patients and the educators themselves (Salam et al. 2011).

The focus of clinical education has shifted from completing a prescribed length of clinical training and acquiring knowledge towards the attainment of learning outcomes of the module and preparing the healthcare professional to meet the demands of the healthcare needs of the population. An educational approach that is outcome based, expects the learners to attain certain milestones in the form of competencies throughout the learning process. During clinical education it is essential that the learners receive in-depth and timely feedback on their performance along with opportunities to improve. Thus, the feedback is vital for the physical therapy students to achieve the competencies for safe and independent physiotherapy practice. Feedback is defined as information that describes learners' performance in an assigned task that could potentially guide the students' performance in a similar or somewhat related activity in

the future. Feedback is an important part of the learning process and supports learners to achieve their maximum potential. It enables students to attain the module and program learning outcomes through reinforcement of good performance and provision of corrective measures when needed. Feedback demonstrates the teachers' commitment towards their students' and connects the teacher's role in assessment and learning (Krackov & Pohl 2011). Feedback should be regular and constructive in nature as it helps to students to enhance their skill set in the process of achieving the placement learning outcomes (Ericsson 2004). There are several barriers hindering the possibility of providing effective feedback to the students' during their clinical placements. Prominent among them is, when the purpose of feedback is unclear to the clinical educator and/or the student (Ericsson 2004). In addition, time constraints and lack of proper place for providing feedback has an impact on this process. Apart from these, clinical educators who do not have adequate experience and formal or informal training in clinical education, may not understand the role of clinical educator and the importance of feedback, therefore they may have difficulty in providing a constructive and nonjudgmental feedback. General feedback may not be beneficial to the learners who are keen on improving their performance. The hierarchical nature of medical and allied health education facilitates unidirectional flow of information rather than promoting the two-way conversation between the student and educator (Ericsson 2004). Thus, the feedback may cause a negative experience to students when they feel their performance is often criticized without any objectivity. Providing feedback to the students' is a big challenge for clinical educators and even the experienced ones feel the same because of the difference in views between the clinical educators and students about what is adequate and effective feedback. For clinical educators to be comfortable in providing feedback, higher education institutions must consider offering continuing professional development opportunities for all potential educators (Krackov & Pohl 2011).

Cole and Wessel (2006) found in their study that the learners were able to “learn best” when they were directly involved in patient care by their clinical instructors. Students appreciated the educators who have prepared them for challenging clinical encounters by asking questions to check on their “knowledge and skills”. More importantly, students valued the educators who have respected them and treated them with dignity (Cole & Wessel 2006). Clinical placements provide the ideal environment for cultivating reflective practice and the relationship between the student and educator and also the workplace environment influences the way by which students learn reflective practice (Trede & Smith 2012). Clinical educators are responsible for creating a supportive environment for learning. According to Trede and Smith (2012), there are various factors that drives reflective practice during clinical training that include, intellectually demanding and respectful place for learning, opportunities for group discussion and voicing opinions with freedom, and a learner-centered workplace that accommodates learners with different learning styles. Reflection is not an automated process in the students’ mind, and it needed pedagogical facilitation from clinical educators. Reflective practice helps the clinical educators to identify the gap in students’ clinical reasoning skills and educators should understand importance of guidance and supervision in developing reflective practice (Trede & Smith, 2012).

In the literature, clinical reasoning and decision-making skills have been reported as essential attributes of entry-level physiotherapy practitioners (Jette 2007). A day 1 new graduate is expected to possess adequate theory knowledge, critical thinking skills, ability to research and apply evidence-based practice and practice safely with minimal supervision (Jette 2007). Therefore, clinical education plays a major role in developing these essential skill sets required from the entry-level physical therapist (Jette 2007). According to Melrose, Park and Perry, higher education and the clinical teaching has less importance on the practice of how to teach.

Academic faculty in the universities were honored more for their subject knowledge than for teaching strategies. However, since the time of Socrates, educational researchers were keen on understanding how learning occurs, what instruction methods that facilitate the learning, and the context where learning occurs best. In the contemporary education, content knowledge alone may not be enough, so the clinical teachers must develop their understanding of educational processes (Melrose, Park & Perry 2016).

2.1.5 Factors affecting the development of clinical reasoning skills

Most of the literature on clinical reasoning have emerged from the western part of the world and all of them have conceptualized it as a cognitive and reflective process. However, the recent research in this domain suggests viewing the development of this skill as an interactive, context specific and multifactorial process (Findyartini et al. 2016). Several strategies were employed to develop this critical skill among the students, and it is believed that all of those strategies may facilitate the acquisition of clinical reasoning skills. The cultural differences may have a significant impact on this process and almost all the pedagogical approaches adopted are from the western countries, hence it is worth looking into the influence of culture in clinical reasoning development in Middle East Universities (Findyartini et al. 2016).

Belongingness is a key for the students' to confidently engage in the learning activities. The duration of the placement plays a pivotal role in setting the tone for belongingness as there should be enough time for the students to settle in the clinical environment, familiarize themselves with team members and recognize the cultural diversity (Levett-Jones et al. 2009). It is quite common at the start of a placement; students may feel lost because they are unsure of their roles and responsibilities and not knowing the practitioners and patient's day to day routine might push them to feel like an outsider. However, once they are settled to the place then they

would develop the feeling of belonging to the team which is vital for their learning. It is important to provide a consolidated period of clinical placement for the physiotherapy students to allow time to settle to the clinical environment and establish collegiality for effective participation in learning. Practice placements that are less than 4 weeks duration may not be fruitful for the students and the educators should take this factor into account while planning the clinical placement rotations for the students (Levett-Jones et al. 2009).

Research about clinical reasoning generally focused on the cognitive dimension. Clinical decision making is an inseparable part of the clinical reasoning process. Considering the pivotal role of clinical reasoning in physiotherapists' day to day professional life, it is crucial to recognize and understand the factors that affect the decision-making process either on a positive or negative note. As a result, the quality of healthcare services may be compromised if those factors that influence the decision making contributes to medical errors which in turn can lead to adverse outcomes for the patients (Smith, Higgs & Ellis 2008). Considering the complex and multidimensional nature of clinical reasoning, factors influencing the decision-making process may arise from several sources which can cause differing effects on the individuals. The findings of the study conducted by Smith in 2006 highlights that the decision making depends on attributes such as the complexity, difficulty level and uncertainty around the task involved. In addition to these there are some "practitioner factors" that can also influence the clinical reasoning. These factors include "frames of reference" for the clinician involved in decision making, individual skills and their experience of physical therapy decision making within the relevant context. Traversing these factors and to manage as well as make sense of them, physiotherapists must possess sound cognitive, reflective, social and emotional skills. When the physiotherapist is familiar with the condition and certain of the situation which has limited variables, more stability, low risk and congruency then it becomes easy for them to decide for

their clients. In contrast, the decisions become difficult when they are unfamiliar, uncertain of the changing condition which has multiple variable and high risks. It also has ethical and emotional dilemmas which the practitioners' found challenging (Eraut 2004).

Hamm (1988 in Smith, Higgs & Ellis, 2008) proposed a theory for decision making and clinical judgement known as "cognitive continuum theory". This theory links the different modes of cognition to features of the task in hand. According to this phenomenon continuum of cognition, modes of cognition occurs in between intuition and analysis. For example, an analytical approach is induced when the tasks are structured well and consists of full information that can be broken down into compartments. On the other hand, poorly structured task with high levels of uncertainty may rely on the intuition approach to integrate the information. Lack of familiarity to the condition and uncertainty of the situation may slow the health professionals' intuitive decision-making process (Bucknall 2003). In an acute care setting, when there is difficulty in decision making, clinicians tend to experiment more, consult other professionals in the team and attempt to follow protocols, but in the case of simple decisions they usually adopt the novel approaches for intervention using their creativity. So quality decision making is an integral part of good clinical practice, hence in order to improve the clinical reasoning, it becomes essential to consider the contextual and other factors that influence the decision making process in addition to the elements of the clinical problem itself (Smith, Higgs & Ellis 2008).

Clinical reasoning is an essential skill for physiotherapists to engage in the process of patient care and it also contributes to their professional development. According to the literature from Western nations multiple factors such as knowledge, teaching approach and culture etc., influence the clinical reasoning development. Recent literature from the Philippines highlights

another important factor influencing the physical therapist clinical reasoning. The finding of the study concluded that the physical therapists were lacking autonomy in their practice because of the prescription-based referral system. The authors of this study recommended that the professional regulatory authorities reconsider their policies to enhance autonomous practice thus to promote the practitioner's clinical reasoning abilities (Rotor & Capiro 2018).

Karvonen et al. (2017) study aimed at understanding the physical therapist's decision-making process in patients with lower back pain and concluded that the physiotherapist tended to critically analyze their own choice of clinical tests and draw a conclusion based on sound reflection of the entire process. Patients' behavioral changes can have significant influence on the physiotherapists' clinical reasoning; hence the choice of biopsychosocial approaches and behavior change strategies are inevitable to address the health problems in current healthcare context (Elven et al. 2015). Thinking well is essential to be successful in a professional role as it allows one to be inquisitive and fair as well as open-minded. Thinking well helps the clinician to be skeptical about immediate solution for the problems and encourages them to know in-depth before making their decision. The one who thinks well will be less impulsive, good listener, appreciate the views of others and understand their own limitations and compensate (Andrews 2012). Clinical reasoning helps to narrow the gap between the students' knowledge base, experience and the approaches they may use to solve the problems in clinical settings. It requires good observation skills, ability to judge, reflect and make appropriate inference and problem-solving skills. In addition to these, clinicians should recognize the factors that are related to patients' progress (Andrews & Syeda 2017).

Student preparedness is an important indicator of students' readiness to learn in the clinical environment. This is determined by the students' foundation knowledge and their attitude at the

start of clinical education. Though many authors have explored the knowledge, skills, attitudes and experiences of good clinical educators, there has not been much research done on this dimension in the students. Chipchase et al. (2012) conducted a study on this aspect using the Delphi approach and the finding of their study identified several characteristics accounting for students' readiness to learn during their practice placements. Further the authors state that the relationship between the student and their clinical educator is of paramount importance for creating a successful learning opportunity during the clinical placement period. In addition, students are expected to be actively involved in determining their learning needs in line with the principles of adult learning theory. Paying enough attention to pre-clinical preparation permits students to take advantage of the placement opportunity by making sense of their own experiences.

Clinical education is an integral part of physiotherapy programs and it relies on the association between the university and placement providers. The challenge for the practice placement coordinators at the university is securing enough high-quality clinical placements in a variety of clinical settings. In a growing number of physiotherapy programs, patients moving towards primary care and self-management of symptoms are all the factors contributing to the challenge of securing the enough placements for physiotherapy clinical education. The student and clinical educator ratio need to be flexible in some cases to accommodate more numbers. Clinical educator to student ratio may range from 1:1 to 1:6 and all sort of ratios have their positives. For an example, 1:1 student to teacher ratio provides an opportunity to for the students to develop independence and autonomy required for their future role, whereas the small groups creates opportunity for peer learning and the large group provides the opportunity for collaborative and team work (Dean et al. 2009).

Knowing the factors influencing the clinical reasoning has a positive effect on the decision-making process and to provide a high-quality patient care (Hoffman, Donoghue & Duffield 2004). Researchers found that the formal university education has a crucial role in physiotherapists' and other health professional clinical decision making (Hagbaghery, Salsali & Ahmadi 2004). Clinical experience has been the most important factor that influences the reasoning process (Traynor, Boland & Buus 2010). In addition to these three more environmental factors such as patient circumstances, resources available and interpersonal relationships were influencing the clinical decision in critical care settings (Bucknall, 2003). A supportive institutional and social context has the potential to produce effective clinical decisions (Offredy, Kendall & Goodman 2008). More than the formal education and experience, it was the "value of role" that had the significant effect on the clinical decision-making skills of nurses (Hoffman, Donoghue & Duffield 2004). There seems to be a relationship between the clinical reasoning skills and work environment, interpersonal relationship and stress. Structural empowerment is essential for making successful clinical decisions, so accessibility to social structure within the clinical settings will enable clinicians to accomplish their work in a meaningful way (Wu et al. 2016). Empowered practitioners have less stress related to their role; hence they are in a better position to accomplish their work.

Physical therapy clinical educators are usually assumed to be competent practitioners in their field. They need to possess good knowledge in order to teach the students under their supervision. There is a belief that the expertise in clinical practice would automatically translate into proficiency in teaching. It is expected that the experienced clinical educators have sound understanding of teaching and learning apart from the repertoire of instructional methods. Good clinical educators possess the knowledge of content specific to pedagogy which is usually developed through observation and real-life experience in clinical practice. From their

expertise, most clinical educators understand, how to teach but only a few understand the pedagogical behaviors. Understanding the basic principles, educational theories and concepts can sensitize the clinical educators to the process of teaching and learning. Awareness of core pedagogies and educational theories will allow the clinical educators' to be cautious and avoid pitfalls in clinical teaching. Therefore, it is essential to initiate faculty development programs to the clinical instructors to highlight the learning styles of students, cognitive processes associated with learning in the clinical context and assessment of clinical practice (McLeod et al. 2003).

Some clinical students may receive excellent supervision and support from their clinical educator while others may not receive the same level of support during the clinical placement (Grant et al. 2003). In order to effectively supervise the students, clinical teachers must possess additional qualities other than the general competencies expected from the clinical educators. Because the clinical supervision includes more than teaching as there is a need for the clinical educators to ensure the patient and student safety, providing an informal and formal feedback on students' performance, planning the clinical education, monitoring the student progress, offering career advices and assigning appropriate caseload to the students. Hence clinical supervision should fulfill the learning objectives for the placement (Kilminster et al. 2009).

In the view of a novice educator, teaching and learning is just transactional. This kind of a naïve view is not good for clinical education. Clinical teaching should ensure that the students are supported well and have full access to the physiotherapy practice so that they can actively engage in the learning process rather than merely observing the practice of their educators. Student needs and their characteristics significantly differs, so the clinical educators are facing a stiff challenge if they attempt to address the individual needs of their students. Teaching

strategies should aim to address the evolving needs of students, therefore understanding the pedagogical principles is vital to support the diverse student needs (Kinchin, Baysan & Cabot 2008). Clinical students often need to juggle the information between the clinical environment such as hospital settings and the non-clinical contexts such as the educational institution. They are forced to learn things twice, at first for exams then to understand what they were examined, but there is not much time or attention to the understanding part of the curriculum. Linking these two concepts within a pedagogy of expertise is needed to enrich the clinical education experience of the students (Kinchin, Baysan & Cabot 2008).

Wijbenga, Bovend'Eerdt and Driessen (2018) conducted a study on physiotherapy students studying at Amsterdam University of Applied Sciences in the Netherlands. The purpose of the study was to explore experiences of the physical therapy students' and clinical educators about the development of students' clinical reasoning skills during clinical placements. Their research was focused on answering, how entry-level physical therapy students develop clinical reasoning skills during the clinical placements and what are the factors affecting the development of this skill? They employed a qualitative exploratory research design and, used focus groups and semi-structured one to one interview to explore the students' and clinical educators' experiences respectively. They recruited 22 volunteering students into 4 focus groups using purposive sampling method and 8 willing clinical educators were included for the semi-structured individual interview. The researchers have conducted thematic analysis of the qualitative data collected from the focus groups and semi-structured interviews. The learning environment, the role of the clinical educator and individual students learning styles were the main factors identified to influence the development of clinical reasoning skills. The findings of the study concluded that the quality of the clinical education environment plays a crucial role in providing a positive learning experience during the practice placements. The need to abide with healthcare

regulations of the region or the country dictates the accessibility for students within the learning environment. In some countries students may have direct access to all information pertinent to their patient but in other regions it may not be the case. This seems to limit the clinical reasoning development. However, working within a multidisciplinary team provides enormous opportunities for the students to see various clinical reasoning approaches used by their clinical instructors as well as other healthcare professionals in the team. Gathering multiple views on problem solving through case discussions with their clinical educators and/or other allied health professionals enhances students' clinical reasoning skills development. The authors argued that adequate and repeated exposure to real patients, and preclinical preparation has positive effect on the development of clinical reasoning skills. On the other hand, lack of patients or understaffing were identified as barriers for the successful learning during clinical placements. Open minded clinical educators who explicated their own thought processes were appreciated by the students as they had the habit of giving regular feedback on the students' performance. It is not uncommon for the students to expect that their clinical instructors initiate the decision-making process and extend their support for students' to integrate theory knowledge into actual practice. In contrast, the clinical teachers felt that the "learning-by-doing" method has potential to stimulate reflection in students, so they encouraged students to be self-directed learners (Wijbenga, Bovend'Eerd & Driessen 2018). The results of this study indicate that both shadowing and active participation in clinical practice developed the students' clinical reasoning skills. In addition, the authors found from their analysis that the rapport between the students and clinical educators is vital for learning in the clinical setting, and the participants confirmed that the mutual trust and confidence from clinical educators was a key to learn clinical reasoning skills.

Clinical reasoning is often influenced by practitioners' experience and expertise in the field. It is expected from an experienced practitioner to demonstrate sound clinical reasoning when compared to the novice. This is because of the experienced clinician's ability to recognize the patterns and consider the patient perspectives through narrative reasoning in their decision making. In contrast, the novice is focused on problem-solving rather than being a patient-centered practitioner. King et al. (2018) study with osteopaths supported this argument and their findings concluded that the experienced osteopaths demonstrated different clinical reasoning approach to the novice ones. The results of this qualitative study that included 10 experienced and 10 novice osteopathy practitioners showed that the novice osteopaths have had the tendency to ignore the holistic aspect of patient care. This is mainly because of the knowledge difference between the experienced and novice clinicians, and the understanding of contextual factors that influences the decision making evolves over a period and more likely to develop with experience (King et al. 2018).

Preparing the students adequately for clinical practice either in practice placements or professional practice is wise to eliminate the barriers of learning. The skill set required to work in today's modern healthcare environment differs significantly from what was needed three decades ago to practice as a physiotherapist. But the focus of physiotherapy education programs has been on developing competencies instead of building their capability. This is not adequate to prepare graduates for contemporary physiotherapy practice. Inadequately prepared graduates are a threat for patient safety and burden for employers. Therefore, the educational institutions should consider changing their approach of preparing the students to enhance their learning experience. Macauley (2018), believes "simulation experience" is beneficial in improving students' clinical decision-making skills. The finding of their study conducted on first- and second-year physiotherapy students supports this notion and the simulation experience causes

change in behavior that could assist the patient care. A clinical decision-making tool was used to assess the level of clinical decision-making skills of students prior to and after the simulation experience. The result indicated that there was significant difference between the groups, where the simulation group demonstrated significant change in clinical decision-making score and the control group did not show any change.

In universities worldwide, physiotherapy student numbers are increasing every year to overcome the current shortage and this it is putting enormous amount of strain on the clinical education providers (Sevenhuysen et al. 2015). Shortage of physiotherapist means there is lack of resources for providing good quality clinical education. Students often feel anxious and their learning experience is confined to observation of their clinical educators. Too many students on placement may force the educator to supervise more than one student at a time which could be burdensome for them. Sevenhuysen et al. (2015) recommend clinical educators to consider “peer assisted learning” approach for clinical education to enhance the students’ learning experience during placement. In their study 22 physiotherapy students and 12 clinical educators were randomly assigned to either a traditional paired model group or a peer assisted learning group. Participants of this qualitative study described their “clinical education as a stressful experience” and the analysis of the data gathered from focus groups identified that the structured support available during the peer assisted learning alleviated the anxiety factor associated with clinical placements. Clinical educators also felt less burdened when the students were in pairs as there is an opportunity to for students to support each other with their queries and needs rather than looking for their clinical educators for every piece of information they need. Students reported that in a peer assisted learning environment, discussions tend to happen honestly without much fear of educator assessment which may be negative at times. The success of peer assisted learning depends on the “cohesion of student-student relationship”. Though peer

assisted learning has its advantages, it cannot replace the clinical educator coaching, guidance and feedback (Sevenhuysen et al. 2015).

Patients have the right to expect the best possible treatment available for them and it is service providers' responsibility to ensure that their clients receive care that is informed by relevant evidence. Otherwise the risk of patients' receiving inappropriate treatment is higher. In healthcare practice, always there seems to be a gap between the knowledge available and the one that is applied to the patients, which is referred as "know-do gap" by the World Health Organization (WHO, 2006). Several studies (Kajermo et al. 2010; Grimmer-Somers et al. 2007; Iles and Davidson, 2006; Jette, 2005; Maher et al. 2004; Tracy et al. 2003; Summerskill & Pope 2002; Freeman & Sweeney 2001 in Holdar et al. 2013) have confirmed that time management is the most important barrier for implementing evidence-based practice in healthcare, apart from which, lack of skills to comprehend the research finding and its applicability as well the contextual factors also play a crucial role limiting the opportunities for evidence-based practice. Thereby these barriers influence the clinical reasoning as well as the clinical decision-making process. Holdar et al. (2013) were interested in identifying the factors influencing physical therapists' clinical reasoning in patient care and they conducted a qualitative study using phenomenography design. Analysis of the data gathered from 11 physiotherapists' through non-participation observation and semi-structured interviews, identified various factors affecting the implementation of evidence-based practice, thus affecting clinical reasoning and decision-making process. The main factor that affected the clinical reasoning was "situational circumstances" which were not under the control of physiotherapy practitioners. Physiotherapists are bound by a set roles and hierarchies; thus, their clinical reasoning was influenced by the context of practice. Apart from these, organizational factors such as operational needs and the healthcare cost associated seem to limit the clinical reasoning process,

for an example, reduced length of stay for cost cutting purpose affected the physical therapist reasoning and decision making. The results of this study also identified other factors such as, knowledge gained from undergraduate physiotherapy education, clinical experience in handling patients and physiotherapist thrust for research-based knowledge to keep abreast of latest developments in their field, to affect the clinical reasoning process. Universities and educators in physiotherapy should carefully consider these factors and build in the art of using evidence-based practice from the student hood to produce culturally competent evidence-based physiotherapy practitioners who can make sound clinical judgements based on thorough clinical reasoning.

Clinical reasoning errors can occur from inadequate knowledge and/or faulty data gathering or data processing and faulty metacognition. Clinical educators should consider this and identify where the gap is actually. Understanding of the cognitive processes involved in decision making can provide the basis for guiding the development of effective clinical reasoning skills. Cutrer, Sullivan and Fleming (2013) states that promoting clinical reasoning skills development is a challenge for clinical educators as it is not explicitly conveyed in the medical education curriculum. If the clinical educators can make the components of clinical reasoning explicit to the students, then the chances of error in decision making will be minimal. Clinical educators should be able to identify the students' clinical reasoning level and understand the strengths and weaknesses of the learner in order to facilitate the development of students' clinical reasoning expertise. Clinical teachers usually place more emphasis on the depth of the knowledge that a student has, but the amount of knowledge is not the important factor as the organization of knowledge is what determines the effectiveness of clinical reasoning. Hence the clinical instructors should consider using the approaches that helps the students to organize their existing knowledge in way that it is easily recallable during the decision-making process. Using

“illness scripts” to activate the prior knowledge to find the solution for the problem at hand activates the already stored network of knowledge and guides the reasoning process. Scaffolding is another way for clinical educators to help their students to organize their clinical knowledge. Educators may think that the students may struggle to find a solution for the problem on their own and maybe it is beyond their capacity, hence adapting the scaffolding phenomenon is very much useful to enable the learners to be actively involved in the clinical decision-making process. They can achieve this through prompts, questions and real time feedback during the clinical education. Most of the times the learners struggle with data gathering even though they may have the adequate knowledge required for clinical practice. The main reason is their inability to collect the data from the patients in an accurate and effective manner, as they may have difficulty in obtaining relevant history, conducting the physical examination and interpreting the findings. Clinical educators should be consistently observing the student’s performances in these encounters and provide immediate feedback so that they can correct themselves and master these skills. Clinical students struggle more in processing the information or data they have from the patient evaluation and are unable to extract the key information to devise a care plan. Clinical educators may use the “RIME framework” (reporter, interpreter, manager and educator) to find out the stage in which a learner struggles with their data processing and provide the needed input for improvement (Cutrer, Sullivan & Fleming 2013). Clinical teachers may employ SNAPPS (summarize, narrow, analyze, probe, plan and select) or semantic qualifiers to promote the problem representation and enhance the data processing ability (Cutrer, Sullivan & Fleming 2013).

Student readiness for clinical education is crucial for an effective learning experience during clinical placements. Physiotherapy schools follow different patterns or models of clinical education which may vary from integrated placement opportunities throughout the curriculum

to blocks of clinical placements towards the end of the curriculum. Though both types have their own strengths and weaknesses, the later approach to clinical education seems to be stressful to the students, because of sudden swerve in environments. Shifting from a controlled classroom context to the dynamic clinical environment is challenging for the undergraduate physiotherapy students as they face difficulty to transfer their theory knowledge to practice, and most students feel cognitive overload due to the change in learning environment. This indicates a “lack of preparedness” of students for clinical education. Jarecke, Taylor and Gusic (2013) conducted a study with medical students and their clinical educators in a medical school in the United States to explore the students’ readiness for clinical training. They have interviewed clinical educators and students to identify their perceptions of “readiness to practice” and found that from the educators point of view, students were active learners who have the in-depth reproducible knowledge and were demonstrating adequate professionalism for clinical practice. But the medical students who took part in this study were not able to distinguish their readiness to lack of readiness. However, they expressed that lack of awareness of hospital culture, their ambiguous expectations and the decontextualized classroom experience were the factors attributing to their un-readiness. The finding of this study highlights the clinical faculty expectations of student readiness to clinical placements, and these points should be considered in designing the physiotherapy curricula. An ideal curriculum that aims to prepare the students well for clinical education, should include contents of applied basic sciences that stimulates the knowledge transfer with ease in real life settings, and the willingness to learn independently and professionalism are not the hidden concepts, rather they are observable behaviors that are clearly communicated to students and mutually agreed. If there are no explicit expectations set at the start of clinical education, it will have a serious impact on the learners’ readiness, thus they may feel “unprepared for the unknown”. Anxiety is not an exemption factor for

physiotherapy students and addressing this element in the curriculum is vital for effective preclinical preparation. Physiotherapy programs may consider incorporating contextualized transition to health practice courses with experiential learning opportunities to enrich students understanding of clinical context and develop the ability of applying relevant concepts to their clinical practice.

The influence of human emotion on clinical decision making was confirmed in the research findings. It is believed that emotions play a crucial role during risky decisions by decreasing cognitive fixation and improving the attention span. Simultaneously, in conflicting situations cognitive processes may get compromised as a result of uncontrolled emotions. In these circumstances, “emotion-imbued” model of clinical reasoning can help the novice and/or expert clinician to recognize the role of emotional intelligence in decision making. According to this model, emotions may lead to good or poor clinical judgements and the interaction between cognitive and motivational behaviors are of paramount importance for efficient and effective decision making (Kozlowski et al. 2017). Clinical decisions are usually made in an emotionally challenging environment and this demands the health professional to actively manage their own emotions as well as their clients. Recently Heyhoe et al. (2016) stated in their research paper that emotions affect the patient safety and they have encouraged the clinicians to acknowledge this factor and recognize that their emotions may have an influence on their practice. Though this is not accepted universally, Heyhoe et al. (2016) confirmed in their systematic review that health practitioners experienced the influence of emotion in their clinical decision making. They presented ample evidence in their article to support this argument that both cognition and emotion have a role in clinical reasoning process. However, there is no clear theoretical framework to support the connection between emotional intelligence and decision making.

Therefore, educational preparations may not reflect the significance of emotion as a competence for physical therapist or any other healthcare professionals.

In patient care, “there is a link between perceived level of competence in clinical skills and ability to perform adequately”. Hence physiotherapy students’ perceptions about their own skills sets or competence is an important predictor of their actual performance. Preparedness is vital for successful clinical placements and one of the concerns during placements is how the students transfer the knowledge gained from classroom and apply it in the clinical context. In circumstances where there is lack of interaction or coordination between the academic faculty and clinical educators, there may be high chances of expectation mismatch. In such cases the taught curriculum may not be aligned to the needs of the clinical placements and results in lack of readiness of students to perform at an adequate level in clinical practice. Especially, if the clinical educators did not have enough pedagogical training, their contribution to students’ learning may not be satisfactory. The physiotherapy education program is obliged to prepare the students for clinical practice in dynamic healthcare settings of varied contexts and socially interactive teams. Talberg and Scott (2014) studied the readiness levels of pre-final year physiotherapy students for clinical education and found that most students felt well prepared for their first block of independent clinical placements. The findings of this study were contradicting the authors’ expectations as well as the existing literature. Despite feeling well prepared for the practice placements, confidence levels of students at the start of placement were very low, because they have not any patient contact earlier. It is expected that the students would gain confidence as they move along the placement experience. Based on the findings of this study, it can be argued that self-reports on clinical readiness and/or performance may not be realistic. There is a chance that the students can overestimate themselves on some or all aspects of performance. Therefore, it is vital to compare the students’ clinical placements

feedback and performance marks with that of the self-reported scores to identify any mismatch. Presence of a clinical educator with academic background may be useful to bridge the gaps in student supervision and bring a standardized approach to clinical education.

Clinical education provides a multitude of benefits for the physiotherapy and other allied health students. These include but not limited to the hands-on skills, interpersonal skills, inter-professional skills, team working skills and the ability to handle stress, thus contributing to improved patient outcomes and satisfaction level. But this may not be the case with all students' as some might demonstrate declining performance which might be related to poor supervision during clinical training, conflict between the student and their educator and failing the clinical placement. Emotional intelligence competencies play a pivotal role in overcoming these shortcomings (Gribble, Ladyshevsky & Parsons 2016).

As the nursing students prepare for their graduation, they tend to develop a lot of anxiety, stress and depression by thinking of their professional practice in real-life situations (Chernomas & Shapiro 2013). This "transition shock" otherwise known as "imposter phenomenon" most likely results from self-doubt, insecure feeling and self-induced thoughts of inadequacy in meeting the expectations of the registered nurse roles and responsibilities (Christensen et al. 2016). The knowledge level that a new graduate likely to possess also contributes for the transition shock. Readiness to practice and the "imposter phenomenon" are inversely related and if the student reports less feeling of imposterism, their readiness for practice is expected to be higher. It is reported in the literature that the amount of time spent in clinical practice during university education has a positive impact on readiness for practice. But Christensen et al (2016) reported in their study on nursing students from the United Kingdom, Australia and New Zealand that the potential graduates from New Zealand who had 1300 hours of clinical practice as student

reported less imposterism than their counter part in the UK and Australia who have attended 2300 and 800 hours of clinical practice respectively. From this it can be concluded that the number of hours spent in clinical practice does not necessarily contribute to the student readiness for practice. Instead it is the responsibility of the regional curriculum of nursing or other health professional education program to prepare work ready graduates.

The undergraduate health education curriculum can be designed in such a way that it facilitates the smooth transition to work as a health professional. Bleakley and Brennan (2011) conducted a study on medical students from two medical schools that were following a different curriculum. The foundation year students from one institution reported high levels of preparedness compared to the students from the other school. The difference was attributed to the curriculum design which provided early and structured experiential learning opportunities for the students with real patients. This innovative curriculum promoted the medical students' smooth transition to work as junior doctors as they were better prepared to cope with uncertainties in the real-world medical practice.

It is important to understand the conceptualization of readiness from clinical educator and student perspective. Clinical educators expect that the students to begin their clinical placements with an established knowledge base (Jarecke, Taylor & Gusic 2013). They would also like to see students who are motivated and active learners and professional in caring the patients. In contrast, students try to find out the expectation of their clinical teacher, understand how the healthcare system functions and try to apply their theory knowledge into clinical practice. These are clearly curricular issues and should be addressed while designing the physiotherapy curriculum to prepare graduates ready for contemporary practice. When the learning objectives are developed it should address the challenge of transferring the knowledge gained into clinical

contexts. The need for active learning and professionalism should not be established as an underlying phenomenon, rather it should be observable behaviors throughout the curriculum. More importantly clear communication of these expectations is needed and common agreement between the clinical educator and students must be established (Jarecke, Taylor & Gusic, 2013).

Finding a solution for clinical placements shortage is a major challenge for the placement coordinators and the directors of clinical education working in the higher education institutions. Currens and Bithell (2000) stated in their study that the stakeholders' perception of clinical education is influenced by pressures arising from various factors within and outside of their organization. It is important for the universities and clinical education directors to understand these perspectives, in order to be better informed of the various solutions that are possible for overcoming the shortage in placements.

Self-assessment is an "inward-looking activity" and was seen as individualized process in the past. But the recent trends have made it a guided or informed process which draws up information from both internal and external factors about the performance of an individual. However, informed facilitation is needed to direct the students' in this process and to prevent surface learning and ensure meaningful experience for the learners (Sargeant et al. 2011). Informed self-assessment is a dynamic process which is influenced by several factors and tensions related to it. Although the students may not be accurate enough in their self-assessment, but it is worth to consider their perceptions to improve their performance (Sargeant et al. 2011).

Achieving high quality in practice and safety in demonstrating competencies during clinical encounters is possible for students in "facilitative learning environments" and setting up optimal conditions for students' learning during clinical placements remains a global challenge. There are many causative factors reported in the literature contributing to those challenges which

included, shortage of clinical staff resulting in failure of close supervision of students, lack of cooperation between academic and clinical faculty, insufficient sites for clinical placements, increasing number of students, other disciplinary placement needs and, shortage of clinical educators who have academic qualifications and clinical expertise. The results of Asirifi et al. (2017) study indicated that the nursing students should get enormous opportunities for hands-on practice in order to develop their communication and psychomotor skills, and also to engage in integrated evidence-based practice. Clinical educators who are well prepared are required to challenge the students in real-patient care settings to hone their clinical competencies. Clinical teachers who have pedagogical knowledge seem to be motivated to teach the students with innovative strategies during the clinical placements. Several studies have reported the importance of facilitating students to develop their own learning needs for the placements and involving them in the process of clinical performance evaluation, and also providing timely constructive feedback are essential for learning in clinical placements.

Lawal et al. (2015) stated that clinical experience takes the center stage in nursing education because it facilitates the process of transforming the academic knowledge into practical application, therefore the clinical education is considered to be nursing professions' cornerstone. To gain an effective and rich clinical experience, the environment in which the clinical education takes place should be supportive in nature. The finding of a quasi-experimental study conducted among a group of Australian nursing students suggested that the students' learning was positively influenced by good mentoring, rapport and sufficient opportunities for practice.

A learning environment that is comfortable and mentoring in nature will certainly enhance the students' clinical education experience. Establishing such an environment is vital to provide

effective clinical education. Also, there should be strategies to promote clinical reasoning skills for the students. There are many clinical instruction strategies utilized globally and the ones that enhance the clinical reasoning are the silent treatment, generating differential diagnosis, focused demonstration, focused observation, compare, teachable moments, pitfalls to avoid and coaching model (Mulligan et al. 2005).

Clinical education is a core component of physical therapy programs. Transition from classroom-based education to clinical environment for learning is an uphill task for most students. It offers extensive scope for learning through experience, opportunity for professional socialization and to link the theory to practice while developing the clinical competence. Learning in a clinical environment is complex and multimodal in nature. This is totally in contrast to the classroom-based learning where the learning activities are pre-planned and conditions are controlled (Ernstzen, Statham & Hanekom 2014).

Levett-Jones et al. (2009) states that clinical placement provides an opportunity for “professional socialization and experiential learning” and it is of great importance to medical, nursing and allied health education. They argue that belongingness is vital here as it affects the levels of motivation and unquestioning agreement is possible if there is no meaningful interpersonal relationship between the clinical educator and the student which is not beneficial for either parties. Creating a supportive, nurturing and welcoming clinical environment and its importance are widely debated since many years, but the ways by which students’ belongingness could be enhanced is yet to be defined well. Students in healthcare expect the clinical education environment to be student-centered, creative, individualized and innovative in nature and allows the freedom for the students to make mistakes and learn from their experience. A supportive clinical education environment will make the students to feel as an

integral part of the healthcare team. The fact is that every student is different, and it is important to appreciate the individuality which facilitates the learning (Levett-Jones et al. 2009).

Culture has a significant impact on the way that a physical therapist would assess, communicate, apply and measure the outcomes of interventions. Professional core values and code of ethics developed by APTA (2006) mandates the development of cultural competence within the physiotherapy profession. Physical therapy programs have many ways to develop the cultural competence among which providing clinical experience that is diverse in nature and incorporating reflective practice into the physiotherapy curriculum is a good way to inculcate the cultural competence of the professionals (Black et al. 2015). Cultural competency of healthcare professionals is topic widely debated in the recent times and the reports show disparity in healthcare between the general and minority population. Integrating the cultural competency into the curriculum of allied health program is sought after in the last decade. Training on cultural competency had a positive effect on the knowledge and skills as well as the attitudes of healthcare practitioners. However, there is a gap in literature which fails to identify an effective method to enhance the cultural sensitivity in a given context. Steed (2014) believes that the learners' characteristics should drive the teaching methods to maximize the learning and the World Federation of Occupational Therapists (2019) acknowledges the significance of cultural diversity and encourages the professionals to value the individual difference in culture.

A good practice demands the medical and allied health professionals to teach and mentor the students and their junior staff. In order to be an effective clinical educator one needs to have range of skills which includes sound clinical knowledge, competence in clinical as well as technical skills, enthusiastic, effective teaching and good communication skills (Goldie et al.

2015). Every learner is different, and students may adapt various styles of learning and teachers might use different methods to teach, therefore it is essential to consider the learning preference of each student. Teaching strategies determines the academic success as well as the student performance and using appropriate methods will enhance the learning. Generally, students in healthcare education tend to learn lot of information within a short period of time, therefore the academics in health sciences education need to understand their learners' preferences and use appropriate teaching methods to be effective and optimize the overall learning (Alshami & Al Maghraby 2013).

There were some studies conducted mainly in Australia and Canada on physiotherapy students preferred learning styles, but such studies are lacking in the Middle East and Asian region as there are no significant literatures found on this topic in these regions. A study conducted in Canada to determine the physical therapy students learning styles and identify their problem-solving skills showed that the final year undergraduate students preferred to study theory first and then apply their knowledge into practice. This study also proved that there was no significant correlation between the learning styles and problem-solving skills. Another study conducted in Australia to compare the learning styles of physiotherapy, occupational therapy and speech therapy students reported that an optimal learning environment would consider how the students learn. Authors of this study also stated that there is no consistency in the students learning style and each program had students with different learning styles. This study highlighted the need for investigating the relationship between academic performances, teaching strategies and learning styles of healthcare profession students (Hess & Frantz 2014).

Ernstzen, Statham & Hanekom (2014) stated that observation is a good learning opportunity and a non-threatening one. According to the "social cognitive learning theory" observational

learning is a central component for any learning activities as it is an important transitional strategy between different learning environments, because it provides the mental adjustments needed to apply the skills taught into practice. However, observation alone may not provide all the learning opportunity to develop the core competencies for the physiotherapy students. Hence “learning by doing” that is practicing on real world settings and assessment of such performance is essential in order to enhance the students practice. Findings of this study confirms that learning in a clinical environment is more authentic and situated because there are enormous opportunities for the learners to apply their knowledge and skills.

Practicing in the clinical setting is considered is an ideal method to socialize the entry-level physiotherapy students into their profession. In addition to these it also provides opportunities to develop attitudes and behaviours needed for successful physiotherapy practice. Apart from this clinical training develops negotiation, assertiveness, organizational and administrative skills. So, the clinical training that is rigorous will ensure that the physiotherapists are socially responsible (Talberg & Scott 2014). Gordon & Meyer (1992) developed tips for effective clinical teaching which is referred as “five micro skills”. The tips given in micro skills helps the educators to be efficient in assessing, teaching and providing feedback. To be a successful clinical educator, one should ask the students to show strong commitment, probe when and where needed, instruct the rules to be adhered, reinforce good behaviours, attitude and correct their mistakes.

Christensen et al. (2008) argues that reflective practice and critical thinking are the key factors that determines the clinical reasoning ability of physical therapist in their practice. Zipp and Maher (2013) believes that in order to develop these skills faculty should explore different teaching and learning strategies and assess the efficacy of those approaches. “Mind mapping”

is becoming a popular teaching and learning strategy in which the learner is actively involved in synthesizing and linking the information through a non-linear approach so that it becomes meaningful storage within the learner's mind (Zipp & Maher 2013). Critical thinking is vital to be an autonomous and evidence-based physiotherapy practitioner. Hence the responsibility on academicians and clinical educators is high to create a learning environment that fosters critical thinking skills in the learner. This forms the basis for the academic scholars to research on the various teaching and learning strategies and inform the academic world to their roles is not only to give knowledge to students but also to teach them on how to act upon their knowledge (Zipp & Maher 2013).

Research in the past suggested that allied health students seems to have a specific learning style and that the physiotherapy students are not an exemption (AlShami & Maghraby 2013; Hess & Frantz 2014). Therefore, the physiotherapy education should provide opportunities for mastering the theoretical knowledge and clinical skills to best prepare the students for contemporary physiotherapy practice. There are no enough literatures on teaching and learning strategies in physiotherapy especially in the Middle East. Though there were some research studies (Brown, Cosgriff & French 2008; Wessel et al. 1999) conducted in western countries on preferred learning styles on physiotherapy students no much insight was given into effective teaching methods and/or strategies especially in clinical education. This warrants further research into this area to explore effective strategies for physiotherapy education especially in the clinical context. Diversity in cultural and educational background are the key factors to be considered in the entry-level physical therapy education. Students differ in their intellectual abilities, orientation to studies, learning style and approaches. To provide the best possible learning opportunities as well as to optimize the students' learning it is important that both the students and their educators are aware of the individual students' learning styles and problem-

solving skills. A clinical environment which is non-threatening in nature would certainly allow the novice learner to apply their skills in the process of achieving clinical congruency and develop the mastery over the skills in a progressive way known as scaffolding as stated in the behaviourist and social cognitive learning theories (AlShami & Maghraby 2013). Clinical educators must understand this phenomenon as competencies required for professional practice develops over a period so the responsibilities assigned to the students should be progressive in nature to boost their self-confidence and to motivate them to learn (Hess & Frantz 2014).

98 students from 2 continuous batches enrolled in “Doctor of Physical Therapy” in the US were recruited to participate in a qualitative study that aimed to assess the linear development of clinical reasoning skills among the students. Data was collected through CRRQ (clinical reasoning reflective questionnaire) and CPI (clinical performance indicator). Analysis of the data showed that the clinical reasoning develops from internal to external where the learners’ showed more focus on themselves and building their technical skills at the beginning then shifting their focus towards patient-centred care and developing an awareness of the circumstances at end of their study (Furze et al. 2015).

Moodle learning management system seems have strong influence on teaching clinical reasoning. Faculty administered a lesson on clinical reasoning through Moodle to the physiotherapy students at the school of physiotherapy in South Carolina University. The task included various activities such as watching a video clip of patient interview, some guided questions, perform literature search and find an article for review and develop a home exercise program. Students were asked to complete SACRR (Self-Assessment of Clinical Reflection and Reasoning) before and after the Moodle lesson and a survey only at the end. The result of the

study showed that this interactive method with a guidance of clinical reasoning fostered the development of clinical reasoning (Seif, Brown & Annan-Coultas 2013).

A qualitative study conducted by Wainwright et al. (2011) using the grounded theory approach recruited 3 pairs of physiotherapists in which each pair had one novice and one experienced therapist. The study aimed to identify the difference between the two levels of participants' that is the novice and expert in their clinical decision-making skills. This study concludes that the novice mostly relies on informative factors whereas the experienced ones use the directive factors in making their clinical judgement. Authors of this study recommend that employers and educators consider these factors in devising the teaching and mentoring approach to enhance the clinical reasoning skills of students and entry-level employees.

Babyar, Pivko & Rosen (2010) conducted an online survey to know the physiotherapy students' views about the development of their clinical reasoning skills. They targeted students who are on their final clinical placement and asked them to complete the online survey which consisted on open-ended as well as come forced-choice questions focusing on learning experiences and clinical reasoning development. 91 students completed the survey and the results showed that the participants preferred and were able to be more independent practitioners during their final placement experience.

Hendrick et al. (2009) conducted a qualitative study conducted among 31 physiotherapy students in a university in New Zealand emphasizes the need for the clinical educators to understand the students' conceptualization of the clinical reasoning phenomenon. This will form a steppingstone for them to teach based on the students' level, experience, metacognitive and critical reflection skills. This study concludes with a recommendation for future research to focus on investigating the development of clinical reasoning, exploring the effective strategies

and methods to teach and assess the clinical reasoning skills. Kiesewetter et al. (2016) thought that knowledge alone may not be adequate for problem solving and conducted a mixed-method study on 21 medical students. All participants were introduced to 3 clinical case scenarios which are different in nature and all the students were asked to “use the think aloud method” to solve the problem and the sessions were audio-recorded. All participants stated a diagnosis for each case even though it was not a mandatory requirement. The data analysis showed that there is a correlation between using the metacognitive knowledge and application of conceptual knowledge but not with strategic and conditional knowledge.

Strowd et al. (2016) conducted a study with the purpose of exploring the possibilities of using “the think aloud method” to teach clinical reasoning concepts for medical students in the specialty of neurology. 38 students were included in the pilot study that tested the flipped-curriculum and they were measured at the baseline as well as at the end of the instruction. There was significant difference in the mean scores of baselines and after training which showed 29% increase in mean score with 95% confidence interval. From the literature review it can be concluded that clinical reasoning is a multifaceted process and a contextualised phenomenon. Clinical reasoning is highly influenced by the context, learning styles and teaching strategies. Culture seems to be playing a key role in the development of clinical reasoning as it influences the students’ learning style. Further clinical education plays pivotal role in development of clinical reasoning skills and it is a linear process (Strowd et al. 2016).

The healthcare needs of people of rural areas are unmet and it is mainly due to unwillingness of health professionals including new graduates to work in the primary care in nonmetropolitan areas. Evidences suggest that the reason for the metropolitan affinity of the healthcare workforce may be from lack of placement experiences and/or some negative experiences during

their rural community placements is likely to reduce the chance of students taking up healthcare roles in the community. Understanding these challenges that students face during their clinical placements will help the universities and placement providers to prepare in a better way to engage student and offer good quality clinical education (Francis-Cracknell et al. 2017). During clinical placements, the physical therapy student undertakes supervised clinical practice by a clinical educator, who is usually a physiotherapist with the responsibility of supervising students and they also play a crucial role in teaching and assessment of the practice placement. Most of the healthcare institutions would have appointed a clinical education coordinator to oversee the clinical education process, coordinate practice placements, provide necessary support to the students and clinical educators and to liaise with the student's home universities. One of the strategies to improve clinical education experiences to the students' is to assign a dedicated clinical education coordinator to streamline the processes and act as a channel of communication between the university and clinical education sites. These clinical education coordinators should be allocated with adequate time and resources to ensure successful placement experiences for the students (Francis-Cracknell et al. 2017). The findings of Francis-Cracknell et al. (2017) concluded that the universities should provide comprehensive preparation for both the students and clinical instructors and provide intentional support whenever needed during the placement to enhance the placement experiences.

Globalization has significantly influenced the medical practice and this warrants globalization of healthcare education. Kikuwa et al. (2013) conducted a study to determine the characteristics of good medical teachers with Japanese and Western medical students and found that both groups of students differ in their expectations of what characteristics constitutes a good clinical educator. The findings of their study concluded that the local education system, educational environment and culture influences the students' perceptions about the characteristics of good

clinical educators. Seif et al. (2014) reported in their study that students attending an “inter-professional service learning” module along with hands-on patient care opportunities seems to show significant improvement in their attitudes and behaviors to work in the interdisciplinary team and also demonstrated enhanced understanding of their own clinical reasoning skills compared to their peers who did not have the opportunity for inter-professional training or practice. When the students work as part of an interdisciplinary healthcare team and provide direct patient care, they seem to attain significant change in their clinical reasoning and problem-solving skills. These are important outcomes of clinical education which provides the opportunity for inter-professional learning. The clinician needs to be effective and efficient in their clinical reasoning skills in order to be competent in providing care to their patient population. Treatment depends on the accuracy of diagnosis; therefore, clinical reasoning is a fundamental part of problem-solving. Advanced clinical reasoning skills develop through experience. It is the backward reasoning process that develops first in which the clinician tries to confirm or refute their assumptions using biomedical concepts. With experience they advance in their reasoning skills by organizing the knowledge and pattern recognition. Noll et al. (2001) reported in their study that the forward reasoning process was evident in the Mckenzie therapists with closer to two decades of experience after becoming an accredited Mckenzie practitioner.

2.1.6 Strategies for developing clinical reasoning skills

Clinical reasoning presents plenty of challenges to both students and the clinical instructors during the clinical training (Charlin et al. 2012). This embedded diagnostic process requires critical thinking skills from the clinician to identify relevant information. It is essential for the practitioners to unlock their memory structure by networking with the knowledge that developed over a long time. The necessity to develop these skills is the main driving force behind the selection of appropriate instructional strategies for the physiotherapy schools. When

compared to classroom based didactic teaching, it is believed that the problem-based learning helps to develop skills essential for coping in uncertain situations, acknowledging the legal and ethical features of healthcare, self-directed learning and communication skills (Koh et al. 2008). However, many researchers have questioned this approach because of the poor methodological quality of the published studies (Polyzois Claffey & Mattheos, 2010; Hartling, Spooner, Tjosvold & Oswald 2010). Anecdotal evidence present poor critical thinking and clinical reasoning skills among the physiotherapy students and warrants additional approaches to promote the development of these skills. Weighing the need for this, physical therapy researchers in South Africa's Stellenbosch University decided to test the concept mapping strategy among their physiotherapy students. Novak and Canas (2008) believes that when generating concept maps, students tend to develop ideas and try to relate hierarchical natures between those ideas, hence this method is believed to bridge the theory-practice gap (McMillan 2010). The limited evidence about the success of problem-based learning as a lone method in developing the critical thinking, leads to question the need for combining these two approaches to improve clinical reasoning skills (Keiller & Hanekom, 2014).

Ericsson (2007) believed that experts in many fields grew to greater heights because they have had coaches who gave them consistent feedback and motivated them to succeed. Clinical educators in physical therapy or in any other healthcare discipline could adopt this coaching model as great coaches have always had a significant impact on the clinical students (Weise 2010). A coach acts as a role-model beyond providing the feedback and motivation to the learners. Every learner is unique, and they differ in their skill sets, hence the clinical educators should act as a coach who will assist them in setting a challenging SMART goal and offer step-by-step guidance to achieve expertise in clinical reasoning (Rencic 2011).

Students may encounter problems in clinical reasoning because of their lack of knowledge, mistakes in collecting the data and inability to process information in the right way. It is the responsibility of the educators to consider the right strategies to foster clinical reasoning skills. Exposing the students to a variety of conditions in clinical settings, triggering their previous knowledge and developing illness scripts, sharing strategies to find a possible diagnose, pushing the students to think of differential diagnoses, encouraging reflective and deliberate practice using metacognitive abilities and an ongoing formative feedback are some of the instructional strategies used to facilitate clinical reasoning skills among students in India (Modi et al. 2015). Experts would agree with the need for developing this essential skill at the very early stage of clinical training and fine tuning it continuously throughout the professional education program. The quest for lifelong learning and continuously updating oneself with the recent trends in clinical practice is the key for sound clinical reasoning. Deeper understanding about the clinical reasoning development process will help the clinicians' in eliminating any cognitive errors thus it will prevent the potential diagnostic errors. So, it is vital for the physiotherapy educators in academic and clinical areas and also the students to pay much needed attention to this concept to establish themselves as successful educators and/or learners (Modi et al. 2015). Since its inception, the decision-making process is extensively explored by educational psychologists and perceptions have changed in recent times. The widely known, Croskerry's model proposed a dual processing theory that guided the clinical decision-making process (Croskerry 2009). According to this theory, clinicians tend to utilize two distinct cognitive processes for formulating a diagnosis. The intuition-based system 1 approach relies on the previous experience to recognize the patterns or heuristics. In contrary to this, the analytical system 2 approach involves deeper thinking and deliberate practice before arriving at a conclusion for a clinical condition. Physiotherapists tend to switch between these approaches depending on the

complexity of the cases that they are referred with, especially during the early stages of training the learners would like to use the system 2 approach as this analytical approach may guide them step-by-step in making a diagnosis. But the expert clinician is more comfortable to use the system 1 approach which is quicker and time saving for them. Evidences suggest that more emphasis is placed on the system 2 for teaching purposes, however it is vital to train the physical therapy students' to use the system 1 approach from the beginning as they are expected to use it mostly in their day to day professional life (Modi et al. 2015).

Over the last two decades healthcare students are expected to become a competent health professional as entry-level practitioners. This has shifted the focus of teaching from just delivering the facts to more of a problem-solving approach that facilitates deeper learning. Problem-based learning helps the students in integrating the knowledge gained from pre-clinical education to the clinical context in a meaningful way (Gesundheit et al. 2009). Problem-based learning is useful in fostering the self-directed learning and interpersonal skills (Loyens, Magda & Rikers, 2008). The module leaders of clinical courses are facing a big challenge of providing a timely feedback. To achieve the learning outcomes of clinical modules, it is necessary for the clinical teachers to include formative assessment tasks as part of clinical education and provide a constant feedback from the early stages of clinical education (Kogan et al. 2012). However, the evolving nature of clinical cases and students' expectation for flexible learning opportunities are making this as a difficult task for the clinical teachers (Wojcikowski & Brownie 2013).

There is a renewed interest in the pedagogy for developing physiotherapy students' clinical reasoning skills because of the need to attain the physical therapy outcomes. Hislop's four steps theoretical framework for achieving the optimal clinical performance manifests the progression from memory to knowledge, knowledge to competence, competence to performance. Selection

of an appropriate pedagogical tool is vital in facilitating the development of clinical reasoning skills among the students. Specific pedagogical strategies aimed at developing the reasoning skills are more effective than the generic strategies that are commonly used. Competence oriented and/or performance-based instructional strategies are mostly preferred by the clinical teacher as it enhances the learning experience in clinical context, whereas the knowledge-based didactical approaches such as lectures, practical demonstrations, written assignments and other formative assessment tasks are not among the best and/or preferred methods for clinical education by the clinical teachers (Babyar, Pivko & Rosen 2010).

Contemporary physiotherapy practice demands patient-centered care, and this does not mean just involving the patients and/or their family in goal setting, instead it extends to co-creation of knowledge that informs the practice. According to this principle, the therapist should not hear their patients' voice as a complement to their own professional knowledge rather they should be seen as an experienced partner who can contribute to the treatment plan (Levesque, Hovey & Bedos, 2013). Narrative reasoning skill is an essential attribute for the patient-centered care model. Physical therapist should possess the ability to apprehend the patient stories and understand their illness experiences and the therapist should be ready to value their patient's cultural beliefs. Narrative reasoning helps to achieve all these core elements in the client-centered decision-making process. Traditional educational strategies for fostering the clinical reasoning skills seem not enough to achieve the skills required for patient-centered practice. Incorporating the reflective writing strategies seems to be effective in developing the narrative reasoning skills that is vital for the patient-centered model of practice (Caeiro, Cruz & Pereira 2014). This in turn helps to provide a customized treatment plan for each individual and optimize the outcomes for each patient (Foster & Delitto 2011). When compared to expert clinicians, undergraduate physiotherapy students and novice practitioners tend to just focus on

the patients' signs and symptoms, physical impairments and problems in functional activities. This is more of a therapist-centered model of practice that focuses on the instrumental aspects of decision making. Students and novice physiotherapists assume their roles and responsibilities in practice is to reassure the patients and treat their impairments, they do not make the necessary effort to understand and incorporate their patients' perspectives during the process of clinical reasoning (Cruz, Moore & Cross 2012). It may be due to their inability to engage in the complex dialectical reasoning that is the ability to interplay between the divergent paradigms of knowledge and the clinical reasoning processes (Edwards et al. 2004). The main cause for this difficulty is associated with the educational process which focuses on the biomedical aspects of health and illness in the undergraduate physiotherapy curricula and the powerful impact of clinical placements on the students' mind about their future professional role. So, it becomes critical to identify instructional strategies that facilitates the development of narrative reasoning abilities which is essential for the patient-centered practice model (Cruz, Caeiro & Pereira 2013).

Physical therapists need to use critical thinking, which is considered to be a key problem-solving skill that utilizes the knowledge and reflective inquiry for diagnosing clinical problems. It is a challenge for the educators to teach these skills within orthodox settings for a larger group of students especially when they expect more flexibility in learning. Interactive approaches to facilitate learning can be beneficial in promoting critical thinking skills. One method of interactive learning is e-learning using online platforms in which many students can interact with each other on a specific topic through the online forum and share ideas. Physiotherapy students must use their critical thinking skills frequently in order to master their clinical reasoning (Snodgrass 2011).

Schon introduced the reflective practice concept to health professionals in 1982 and it consists of 3 stages. The first stages highlights that the professionals need to be aware of the thoughts and feelings of their clients, the second stages involve a critical analysis of the circumstances and the last stage involves developing a new dimension to that situation. Reflective practice is a vital component of physical therapy education as it is necessary for developing autonomous practitioners who can make appropriate clinical decisions by thoughtful integration of knowledge and experience into their practice. To learn from reflection, the students need to be open minded and feel challenged by the new inputs they receive in clinical practice and more importantly they should be ready to change their current beliefs in order to accept the new. Evidence from systematic reviews suggests that reflection is very much useful as a learning strategy and the educators must enhance reflective practice if its experience is perceived to be meaningful by their students (Constantinou & Kuys 2013).

The primary goal of physiotherapy education is to develop the students' diagnostic competence. This is a major challenge to all clinical educators because of the lack of understanding of how clinical reasoning should be taught. There is not much empirical evidence available about successful approaches that the clinical educators could use to foster the development of students' clinical reasoning. Successful reasoning is essential for accurately diagnosing the clinical problem and this depends on the interaction of several factors that are associated with the context and case and the clinician's expertise. Extensive knowledge which is well organized and the illness script that is the mental representation of features of the diseases are an important part of this reasoning process. Students' knowledge about the disease transfers into an illness script during their clinical training while they attempt to apply their theoretical knowledge for problem solving. To foster the illness script development in students', clinical teachers may

consider exposing their students to a broader range of cases with a variety of problems (Mamede et al. 2014).

Developing expert clinical reasoners warrants educational interventions that have “robust theoretical grounding”. Dual process theory of decision making, knowledge encapsulation and the role of schema formation are all contributing to the theoretical underpinnings for selecting the instructional methods. Learning will be enhanced when the type of processing needed during the phase of knowledge acquisition matches with the processing that is required for future performance. Hence the educators should consider the “PFL approach” known as preparation for future learning as an intervention for teaching clinical reasoning because it aims to prepare students for future learning instead of just an immediate processing of the clinical cases (Wood & Mylopoulos 2015).

Yamamoto et al. (2017) conducted a study on physical therapist clinical reasoning process for selecting the Cervical Spinal Manipulation as an intervention. The findings of their study showed that the physiotherapists’ clinical decision-making process to perform the cervical spinal manipulation was mainly oriented towards mitigation of the potential risks involved. Clinical reasoning concept is similar to “science” and performing the spinal manipulation is an “art or feel”, so it is vital for the therapist to achieve excellence in the science of clinical reasoning and also master the technical skills required to perform the cervical spinal manipulation to mitigate the potential risks. It is also essential for safe practice, so integrated use of art and science methods to facilitate the clinical reasoning process may boost the confidence of the physiotherapy practitioners. Therefore, the PT educators can consider it as a useful tool for teaching clinical reasoning to the students during their practice placement.

Postma (2015) conducted a study on undergraduate healthcare students in a university in South Africa with an aim of developing the clinical reasoning skills through an innovative case-based learning method as an educational intervention. The results of the study showed that the clinical teachers would be to promote the reasoning skills of some students through systematic scaffolding, integration of pre-clinical knowledge and problem-solving approach to learning. However, some students did not show any progress and further analysis identified the lack of self-regulation as a reason for those who did not show progress in their clinical reasoning skill. From the findings of this study it can be argued that more than the teaching and learning strategies used, the learner's characteristics plays an important role in the development of clinical reasoning

Clinical educators in physiotherapy employ numerous instructional strategies to teach the process of clinical reasoning to undergraduate physical therapy trainees. Clinical reasoning is a core skill and competency that should be developed as a part of undergraduate physiotherapy program. Even though there are many proven approaches to facilitate the development of clinical reasoning, the process-oriented approach in which the students are motivated to understand their own thought process through active learning is favored by the educators (Strowd et al. 2016). Evidences suggest that the think-aloud approach promotes active learning as the students need to verbalize aloud the process of problem solving during the interactive group discussion. This method has been proved effective in enriching clinical reasoning skills and diagnostic knowledge in nursing and allied health education in the United States (Strowd et al. 2016).

Peer assisted learning seems to be beneficial in clinical education. Ladyshevsky (2002) conducted a study to evaluate the use of a reciprocal peer coaching model on clinical reasoning

and performance of novice physiotherapists. The aim of this quasi-experimental study was to measure the clinical performance of individual students compared to the performance of dyads on a simulated patient with shoulder pathology. 62 physiotherapy students from the third-year program level were assigned to 2 groups in which one group consisted of 20 individual learners and the other had 21 pair of students. The findings of this study concluded that the reciprocal peer coaching group demonstrated better performance and good clinical reasoning compared to the individual students group. They argue that the cognitive support that is readily available in peer learning is valuable for novice learners to develop their clinical reasoning skills. Hence it is recommended that the clinical educators consider incorporating the peer coaching approach to enhance the students' learning in clinical environment. Clinical reasoning is significantly influenced by the personal and contextual factors. Peer coaching opens the door for discussions between two learners, hence it has an influence on the learners' metacognition so that greater insight and learning occurs.

Using blogs, an online document which is in the form of a web-based forum that allows the participants to share their experiences with each other can have a positive impact on students' metacognition and clinical reasoning skills. Peer assisted learning using blogs can create numerous opportunities for physiotherapy students to develop their metacognition and clinical reasoning skills. The primary goal of undergraduate physical therapy education is to produce independent practitioners who possess the skill sets of a competent physiotherapist. Novice physiotherapy practitioners such as students and/or the newly qualified physiotherapist, often rely on the "biomechanical model" of clinical reasoning and use the hypothetico-deductive approach in their decision-making process. Blogging is particularly beneficial for this group as there is an opportunity to interact with each other in an online forum. Reflective practice and peer assisted learning are proven approaches that enhances clinical reasoning skills. Blogs

provide the opportunities for that and the students can write their individual reflections and share with others. Tan, Ladyshevsky & Gardner (2010) studied the impact of blogging on the clinical reasoning of physiotherapy students in Australia and found that the students applied a variety of clinical reasoning strategies in their practice as a result of observing the other students' experiences and reflecting on their own practice.

Is there an effective way or a gold standard approach to teach clinical reasoning? Research has identified various strategies that clinical educators could use to foster the development of clinical reasoning skills of medical, nursing, physiotherapy and other allied health students. Delany and Golding (2014) believes that the “making thinking visible approach” has the potential to assist clinical educators in teaching clinical reasoning effectively. They carried out an action research study with twenty one experienced clinical educators working in acute care setting in Australia, in which the participating clinical educators reflected on their own approaches for teaching clinical reasoning in challenging clinical scenarios, and the authors facilitated this process to develop a thinking routine a tentative heuristics of their own clinical reasoning. Then the clinical educators were encouraged to use the steps involved in their thinking routine to teach clinical reasoning to the students. This action research motivated the clinical educators to assess the impact of their new teaching style – “making expert thinking visible” derived from their own reflection on students' learning. Though many scholars have stated that the clinical reasoning features are subconsciously stored and impossible to describe it accurately, the findings of this action research confirms that the “making thinking visible approach” is beneficial for clinical instructors as it helps them to teach students the steps involved in clinical reasoning process.

Practical experience with real or simulated patients plays a key role in assisting the development of clinical reasoning. But the experiential learning from practical sessions involves some complex processes that are difficult for the student to understand. Wu et al. (2016) conducted a study on medical students in China to find out the effect of a cognitive mapping approach in teaching clinical reasoning and the findings of their study in which 52 medical students participated confirms that the computer based cognitive mapping strategy was more beneficial in teaching clinical reasoning to medical students compared to the “verbal text approach” that was used in the control group. However, both approaches were equally effective in understanding of knowledge factors associated with the clinical reasoning process. The results of this study indicated that the difference in reasoning process of cognitive mapping group was linked to students’ improved ability in data gathering, hypothesis generation and rationalized decisions which improved their performance in problem-solving. The computer assisted visual mapping activities were reported to be influential in engaging the students in the task. In order to improve the “problem-solving performance” students must make sense of their practice experience, and this requires an undivided attention to the key areas of that experience.

Another way of fostering clinical reasoning skills of students is “worked examples” which provides thorough guidelines for solving the patient problems. However, the research findings suggest that this alone as a strategy to develop clinical reasoning may not be effective, instead combining it with other activities may assist the learners in deepening their understanding of the problem. Considering this argument, combining the worked example approach with cognitive mapping strategy may be a good method to boost the learning of clinical reasoning (Montpetit-Tourangeau et al. 2017). Example-based learning strategy using worked examples has the potential to foster clinical reasoning skills in physiotherapy students as it helps them to attain problem solving skills by learning from the already worked out solution for the clinical

problem. This approach was proved to be more efficient than the traditional classroom teaching methods and/or the problem-based learning tutorials on the physiotherapy students in Canada. The advantage of learning from the worked example approach is that it places less demand on the cognitive skills of the learner and the “cognitive load theory” insists on the fact that the working memory of an individual has a limited space and any activities that may overload the working memory of the learner could impede the learning process. Therefore, the worked example method is considered effective in developing the clinical reasoning skills as it allows additional room for fostering the cognitive process while compared to the problem-solving approach. However, the challenge for the learners using this approach is on, how they would apply their learning in this context in new situations. Physiotherapy students must ensure that their learning from a given opportunity is meaningful and it should make a sense in their future practice. This transfer to knowledge is extremely difficult for students as the context of learning is not always like the new situation(s) that they may get involved in future practice. Learning is not meaningful when it does not stimulate transfer of knowledge. Studies on physiotherapy students showed that the example based learning improved retention of knowledge but did not show much effect on the transfer of knowledge and recommended that including additional learning activities such as “concept maps” can benefit the students in developing knowledge that can be applied in a different context.

A medical education theory postulates that for clinical teachers to become an expert and competent educator it is essential for them to continuously review their own understanding of what is considered as good teaching. Possessing the subject knowledge and teaching skills are important but not adequate to become an expert and competent clinical educator. Embodying one’s own understanding of what constitutes good teaching and integration of the same into their practice is vital to become competent educator (Masunaga & Hitchcock 2010). Student-

centered approach to teaching requires a paradigm shift in understanding “the role of the educator”. Traditionally the teachers were keen on didactic approaches to teaching and the emphasize was on what the teacher wants to teach. But the pedagogical shift forced the educators to consider what the student wants to learn and adapt the role that is more of a facilitator of learning rather than being a didactic teacher. Several adult learning theories supports this view and recommend favoring the student-centered approach for clinical teaching to enhance the quality of clinical education. Student-centered education promotes deep learning, provides peer learning opportunities and encourage the students to learn from the reflection of their own practice and of the others (Baxter & Gray 2001).

2.2.7 Connection between the clinical reasoning and professional practice readiness

Growing numbers of healthcare complaints in New South Wales Public Health System related to poor patient outcomes identified 3 main reasons for this which include failure to correctly diagnose, failure to apply appropriate interventions and “inappropriate management of complications” (NSW Health 2008) and all of these factors are directly associated with substandard clinical reasoning skills. Levett-Jones et al. (2009) study proved that the students with high levels of self-efficacy were able to learn these skill sets better during the clinical placement as they were confident, engaging and had the ability to negotiate learning opportunities within their placements. It is expected that health professions possess this critical skill which is vital for the autonomous practice because it enables the practitioners to make wise decision according to the context (Higgs & Jones 2008).

Higgs (2006) asks the fellow researchers to look at the clinical reasoning as a “contextualized phenomenon” rather than a unique process. Attaining expertise in clinical reasoning is like a journey without a destination. Hence clinical reasoning should be viewed in accordance with

the level of the practitioner. So clinical reasoning should be easily accessible for novice practitioners such as students to learn, the experienced ones must portray sound clinical reasoning skills, educators should be able to teach it, clinician are able to demonstrate in practice and the researchers could explore it. Higgs & Jones (2000) presented a an upward and outward spiral clinical reasoning model that helped in achieving a progressive and in-depth understanding of any clinical problem under investigation. This deeper understanding is vital in making right decisions about the intervention and whole process involves an interaction of 3 core dimensions which includes knowledge, cognition and metacognition. Apart from these there are also other factors such as making decisions mutually, contextual interaction and the task impact seems to affect the clinical reasoning (Anderson 2006). There is no model that defines clinical reasoning well in different contexts and workplaces because of these various underlying factors.

The inherent mystique for clinical reasoning is associated with the fact that as healthcare practitioner one should be able maintain the autonomy, be accountable and responsible, and able to make wise decisions in conditions. Expert clinician may encounter multiple episodes of clinical reasoning for each patient they care for and they might perform this with ease due to their expertise in it. However, for the student to master this skill, it requires active participation, strong determination and willingness to learn continuously because clinical reasoning is a skill that is learnt and effective reasoning will not occur serendipitously (Ericsson, Whyte & Ward 2007).

According to Andrews and Syeda (2017), devising and implementing interventions to clients is a complex process that requires consultation and teamwork. They stated that clinicians should have the knowledge of recent advances in order to apply evidence-based interventions that are

tailored to suit the clients' individual needs. Therefore, understanding of the clients' condition, environmental factors and the systems that influence the development of interventions and, its implementation and evaluation is vital. Like the assessment skills, clinical judgement as well as the reasoning skills also develops from the clinicians' training and previous experience. From these arguments it can be understood that clinical reasoning skills are essential for safe and competent physiotherapy practice. Thus, clinical reasoning skills is believed to be the main determinant of newly qualified physiotherapists professional practice readiness.

Thinking as a physiotherapy professional involves understanding the roles and responsibilities, expectations and values of a physical therapist. Professional culture has a role in shaping the way physiotherapist think and perform their job. For an example, senior professionals in the field ask questions to the junior fellows or students during the case discussion to promote them to take an objective and authoritative stand as well as an emotionally distant view of the patient problems. Though the formal university education helps to develop the professional identity, apprehension of self occurs easily through professional socialization that is through conversing with mentors and colleagues (Peters et al. 2016). The influence of clinical culture and the social environment on clinical reasoning has not been explored well. When compared with other aspects of clinical reasoning, clinical cognition seems to be distributed while considering the cultural context and social environment, as it is produced by group of people working to achieve a shared goal (Peters et al. 2016).

Physical therapy programs are expected to produce graduates who are reflective practitioners. Many scholars (Donaghy & Morss, 2000; Williams et al. 2002; Larin et al. 2005; Wessle & Larin, 2006) consider reflection is a key component of physical therapy practice and essential for clinical decision making. Therefore, the physiotherapy curriculum should emphasize on

preparing the students to be reflective practitioners. Several strategies are used to promote reflection, and the clinical placements and the learning experiences within the clinical settings seems to have huge influence on “the way the students think”. Wessel and Larin (2006) conducted a study on undergraduate physiotherapy students using phenomenological approach to identify the changes in reflection for the students following their clinical placements. Fifteen female participants were asked to write their reflections in a diary everyday as a part of their course work for the clinical placement and the investigator analyzed the qualitative data collected from student’ reflective diaries. Findings from this study highlight only a minimal increase in students reflection levels between the first and third clinical placements, however it has changed the nature of their reflections as they started to reflect on more complex topics towards the end of their third clinical rotation, and the shift of focus from self to the patient was evident. Authors of this study argue that the concept of reflective practice must be developed at the early stages of physiotherapy program by means of integrated curriculum that links the academic activities and clinical training throughout the physiotherapy educational program. They felt that the students’ widened their views about the physiotherapist roles and responsibilities and the impact of their action on the patients as they advance through various placements. At first, the students were self-centered and were keen on their own “learning and development” but at the later stages of clinical education they have become patient-centered which is what required for a good clinical judgement.

Reflective practice has become an important aspect of professional development and it is an essential competence for healthcare practice. Reflective practice is vital to bridge the theory-practice gap and in preparation of work ready graduates (Patrick et al. 2008). It is a key attribute for practitioners and clinical placements provide the ideal opportunity to nurture reflective practice skill set (Bandaranaike et al. 2012). Reflection promotes lifelong learning (Harvey et

al. 2010), thinking through the process of learning, active learning and changes in behaviours as a result of reflection (Chambers et al. 2011). It is widely used by healthcare professionals in medicine, nursing, physiotherapy and other allied health disciplines (Kuiper & Pesut, 2004; Donaghy & Morss 2007). Reflective practice during clinical placements helped the physiotherapy students to develop self-awareness, critical thinking, and skills for clinical reasoning and decision making within the clinical environment (Donaghy & Morss 2007).

The need to produce self-directed learners and reflective practitioners has been supported well in contemporary education literatures (Higgs et al. 2004; Kilminster & Jolly 2000). Though there is a consensus on the main curricular goal that is to develop students' abilities in self-regulation, there is not much evidence or information available to the educators' and/or students to provide the necessary guidance to achieve this goal (Baxter & Gray 2001). The literature emphasises the purpose of producing self-directed learners but not the process of producing the learners' who are self-regulated. Scaffolding of these skills should happen within the safe academic environment by the academic staff in order to ensure smooth transition to professional practice within a dynamic healthcare setting. Pre-clinically students should be taught the skills of providing feedback and openness to receive feedback as a part of academic curriculum so that they do not hesitate and/or react while giving and receiving feedback on clinical performance (Henderson et al. 2005). Clinical educators are often concerned with the incoming students' readiness to engage in professional practice and experiential learning (Denniston et al. 2010). Gap in clinical reasoning skills of the incoming students' have been identified by both clinical educators and students' and reported in several medical and nursing education literatures (Van Gessel et al. 2003; Gordon et al. 2001; Prince et al. 2000 & Windish 2000 in Molloy & Keating, 2011). Clinical practice involves complexities and uncertainties, and most of the undergraduate students from different disciplines of health profession including

physiotherapy feel underprepared to face this challenge (Clarke & Molloy 2005). Healthcare work is often unpredictable and inexact in nature. Physical therapy students' entering the healthcare settings for clinical practice are expected to apply the knowledge gained from university education to patient care activities, ensure safety for the patients and develop positive relationships with colleagues, patients and their families including caregivers (Delany & Molloy 2009). Students are assessed to determine their achievement of these expectation and it requires closed supervision and continuous monitoring which can cause anxiety to some students (Keating, Dalton & Davidson 2009 in Molloy & Keating, 2011). Several studies acknowledged the anxiety factor in healthcare students when they move from university setting to clinical environments. The causative factors for the students' stress were mainly the difference between the learning environments, that is, the student-centred and safe university settings differs significantly from the patient-centred clinical arena, and the other factors includes the changes in teaching styles of the academic and clinical instructors, workload assigned to the students and performance expectations (Small et al. 2008; Prince et al. 2005; Radcliffe & Lester 2003 in Molloy & Keating, 2011). Clinical educators and students often felt that the curriculum for clinical education is hidden and the expectations of professional practice were implicit (Small et al. 2008; Henderson et al. 2005; Rose & Best 2005 in Molloy & Keating, 2011). Making the curriculum expectations explicit to the students and clinical educators and, proving the students with knowledge and skills required for self-directed learning and reflective practice is like facilitate students learning in practice placements. Possessing these skills would "soften the sharp-edged transition between academic and clinical learning environments" (Molloy 2009 in Molloy & Keating, 2011). It is worth noting "the gap between the intended, enacted and experience curriculum" (Molloy & Keating 2011). There seems to be a discrepancy between the comprehensive purpose of teaching and learning, the strategies that educators use to deliver

the curriculum and how the students themselves experience the program of study. Reflective practice needs to be assessed formally as a part of health professional curriculum, otherwise it may create a negative impact on the students, and they may consider reflection as a peripheral skill rather than the core competency which is vital for practicing effectively (Molloy & Keating 2011). Reflective practice is another important and essential skill for effective physiotherapy practice apart from clinical reasoning skills. Clinical education plays a crucial role in developing this skill and thereby enhances the professional practice readiness of the potential graduates as early as from their student life.

Teaching clinical reasoning to the future clinicians is a challenge to the current clinicians because all clinicians undertake clinical reasoning involuntarily and it is more of a cognitive approach that underpins the diagnosis and treatment. Therefore, it requires some amount of experience to develop expertise in clinical reasoning which brings the question on new graduates' professional practice readiness. Clinical placements have a major role in developing the attributes required for providing a compassionate care which includes critical thinking, hands-on skills, applying the theoretical knowledge according to the situations and the core competence. Therefore, the healthcare practitioners who are involved in clinical teaching should provide the positive experience to the students to facilitate their progress from the level of a novice practitioner to expert clinicians who can meet the competency standards.

Traditionally, physical therapy undergraduate students received their clinical education in large teaching hospitals where the focus was on acute care. Globally the health service sectors have undergone huge changes in its structure as well as the service delivery. If the newly qualified physiotherapist is supposed to work in primary care settings and to be an effective first contact practitioners, they have to be exposed to primary care environment during their clinical

placements as a part of undergraduate physiotherapy education. This experience will help students to make an “informed career choice” and many may want to work in primary after graduation rather than thinking unidirectional towards a role in tertiary care hospitals. McMahon et al. (2014) were keen on exploring this concept and the factors limiting and/or enhancing the provision of clinical education of undergraduate physical therapy students. They have conducted a three round Delphi mixed methods survey with physiotherapist working in primary care settings and found that the lack of tradition and resources as main barrier for clinical placement in primary care. In addition, unmotivated students were a concern for clinical educators in primary care setting as they felt that having students limit their productivity which increases their stress level. If academic institutions can provide necessary support to their clinical education partners in primary care setting, the culture of clinical education may be fostered in these settings and preparing students for contemporary physiotherapy practice will be an easy task for universities.

The role of the clinical instructor is vital as far as the clinical learning of entry-level physiotherapy students are concerned. They have the huge responsibility of training the physiotherapy students to meet the growing challenges in contemporary physiotherapy practice. Clinical training should be aimed at preparing the students to work as the providers of primary healthcare. Clinical teachers must consider using the best available teaching strategies and create a comfortable learning environment to enhance the development of good clinical reasoning skills in the students. Inclusion of multiple clinical educators with different areas of expertise and/or specialization is vital to enrich the clinical education experience within the dynamic healthcare context. It is common for the students to expect certain qualities from their clinical educators. Several characteristics of an ideal clinical educator were reported in the literatures as perceived by the clinical students. These characteristics include professionalism,

acting as a role model, explaining the clinical reasoning process, valuing the self-respect of students, willingness to help the students, possess in-depth knowledge in the field of expertise and the ability to disseminate their knowledge to others are some of the essential qualities reported (Al-Yousuf, 2013; Oyeyemi et al., 2012; Williams, Brown and Winship, 2012). Showing disrespect, unrecognizing the effort of students and not allotting a defined time for teaching are some of the educator behaviors that are reported to be limiting the clinical learning experience of undergraduate physical therapy students (Ehsan, Butt & Umar 2017). The structure of clinical placements may have an impact on the students' professional socialization. When compared to the traditional block type, continuous clinical placements have a better influence on students' learning and their professional socialization (McKenna, Wray & McCall 2009). Understanding this concept can help the education and placement providers to maximize the learning opportunities for students and preparing graduates who are ready for contemporary physiotherapy practice.

Physical therapists occupy an integral role in the healthcare team which consists of multidisciplinary professionals. Thus, they must understand the roles and responsibilities of other disciplinary professionals and ensure effective communication in place in order to coordinate smooth delivery of services and maintain a high-quality patient care. It has been reported that the skills needed for collaborative working can be enhanced through inter-professional learning. Clinical placements offer the opportunity for physiotherapy students to work with interdisciplinary teams where two or more healthcare practitioners from different disciplines engage in providing health and social care to population and simultaneously learn from each other. Licensing bodies of physiotherapy profession and the higher education accreditation authorities of physiotherapy education advocate that the entry-level physical therapy students are prepared for these challenges and recognize the value of collaborative

working. Universities may have multiple ways to promote inter-professional learning, but the research findings suggest that students will be able to recognize the importance of team working and achieve effective communication skills from real-world experience in patient care in a dynamic clinical environment (Davies et al. 2011).

Literature search revealed that the influence of environment and culture on clinical reasoning is not explored to great extent. Professional culture plays a major role in shaping the way a clinician thinks about their work as well as how they carry out it. McCarthy (2003) claims that clinical reasoning is strongly influenced by the practitioner's attitude, preconceptions and philosophical assumptions. It is not a linear process because clinical reasoning involves series of connected and evolving clinical encounters. Clinical reasoning skills are vital for health professionals because if they are effective in their clinical judgement it will have a positive influence on the patient outcomes, on the other hand poor decision-making abilities might result in failure to detect the worsening conditions and thus fails to rescue the patients.

Clinical education creates the environment in which the healthcare students develop their clinical competencies required for entering professional practice (Holmes et al. 2010). But the ways to facilitate students' engagement in learning from professional practice has not been addressed well in the literature. Identifying the "threshold concepts" that the students engaging in clinical education may face will address the gaps in curriculum contents and helps to better prepare the students for clinical education (Tanner 2011).

There seems to be a tension between the healthcare industry and universities because of the differences in opinions between the education providers and clinicians. El Haddad, Moxham and Broadbent, (2013) reported the differences in understanding of preparedness from the employer and education providers perspectives. Preparedness is a complex process that is

individualistic and depends on the context. Clinicians' often question the readiness of newly qualified registered nurses for meeting the challenges of the contemporary health services. However, it is not realistic to expect the day 1 new graduate nurse or any other allied health profession to perform the duties of an experienced practitioner. But they should be able to work in core areas as novice practitioner and understanding these differences will be beneficial for the educators in the curriculum review process, and it is worth involving the stakeholders in the process to understand their expectations of a day 1 new graduate in order to produce work ready graduates (El Haddad, Moxham & Broadbent 2013).

One of the purpose medical and allied health educations is developing clinical competencies and the term competence is defined as “the integration of knowledge, skills and attitude” (Baartman & De Bruijn 2011). The aim of physiotherapy education program is to prepare its graduates to work as physiotherapy professionals within the complex and dynamic clinical settings. According to Duvivier et al. (2011) deliberate practice is essential for the development of expertise in professional practice. Expert performance can be achieved by continuously practicing the skill sets in challenging clinical contexts for long duration. Focused feedback helps the learners to achieve expertise in clinical practice (Duvivier et al. 2011). Vygotsky theory insists that the primary “aim of education should be the development of psychological functions” (Vygotsky 1997 & Chaiklin 2003 in Wijnen-Meijer, 2013). Healthcare students need support from their peers and also the clinical educators who are expected to be more competent, in order to develop their psychological functions through scaffolding (Dunphy & Willamson 2004 in Wijnen-Meijer, 2013). When too many newly qualified healthcare graduates start working in the same sector, there are more possibilities for increased safety risks for the patients during the induction period of the newly qualified workforce (Young et al. 2011; Jen et al. 2009; Haller et al. 2009).

Transition to health practice has been considered be “critically intensive learning period” for health professional students (Kilminster et al. 2010) and it matches with de-automation stage of Dunphy and Williamson model (2004 in Wijnen-Meijer, 2013). This concept is essential to understand the hurdle around transitions and it was reported that transferring the knowledge and skills learned in a particular setting and applying in another setting was the main challenge for the learners in healthcare practice. In order to be efficient and adapt quickly within the ever-changing clinical environment, health professional students should be prepared adequately, and the curriculum should equip the students with transferable knowledge and skills required for professional practice (Wijnen Meijer 2012).

The transition from a university setting to the clinical education setting is accepted to induce a “period of stress” to the students because of the reality shock arising from the clinical context and the role adjustment needed for the learners (Casey et al. 2011). In literature, graduate nurses have reported the lacunae of the nursing education program and felt that they were not adequately prepared for clinical education. They acknowledged their weaknesses in pathophysiology, pharmacology, electronic record keeping, managing multiple patients, understanding the changes in the patient condition, and delegation, leadership and managerial skills and stated that their professional education curriculum did not provide enough insight into these areas. Preparing the health professional students to practice effectively, safely and compassionately in the rapidly changing modern day healthcare setting is a big challenge for education providers. When the new graduate enter the healthcare workforce, they find themselves at the bay as they may think that they do not possess the clinical practice expertise required for safe practice and also lack confidence to navigate through the highly intense and dynamic clinical environment and the humongous workload (Duchscher 2008). In order to understand the “practice readiness” of healthcare students including physiotherapy and nursing

students, it is essential to explore the learners' perceptions of their own readiness for professional practice (Casey et al. 2011). Many graduate nurses have stressed on the importance of additional time for clinical education to develop their technical skills and get wide range of real-life experiences from the nursing education program (Chappy, Jambunathan & Mamocha, 2010). The difficulties that the new graduate encounter during their transition to health practice may force many health professionals out of their profession. Several studies have confirmed that nearly 30 to 60% of graduate nurses and other allied health professionals change their jobs and/or leave the profession altogether within the first year of their clinical practice. This is mainly because they feel underprepared to cope with the pace of acute hospital care, challenges of treating high-acuity patients, and overload as a result of understaffed work environments (Candela & Bowles 2008; Kovner et al. 2007; Beecroft et al. 2004 in Casey et al. 2011). It is assumed that most of the competencies and skills required for entry into professional practice is acquired through the professional education program that the physiotherapist, nurses and other allied health professionals attend (Hickey 2009). But the literature has identified practice-education gaps which puts pressure on the educators and education providers to improve the way these healthcare professionals are educated. Findings of Harrison et al. (2007) and Wieland et al. (2007) studies confirmed that the students receiving intensive preceptor facilitated clinical experience demonstrate enhanced confidence levels as professional graduates.

To produce high quality healthcare professionals, it essential that the students are adequately supported and mentored during their clinical experiences. Health sciences students undergo clinical training to develop the competence and skills necessary for both healthcare practice and accreditation. In the recent time, there are several challenges in ensuring safe clinical practice experience and providing rich learning opportunities for entry level physiotherapy students in Australia which is mainly attributed to the increasing student admissions in physiotherapy

program at various universities in Australia (Blackford, McAllister & Alison 2015). Reduced physiotherapy workforce in healthcare sectors impacted the number of student placements offered. Both higher education institutions and the health service providers should find alternative ways for delivering clinical education without compromising the students' learning opportunities for them to achieve entry-level practitioner competencies (Voelker 2009). According to Parry and Brown (2009), students' learning in clinical settings depends upon their pre-clinical skills and confidence level at the start of clinical placements and Jones and Sheppard (2011) shared similar views. McCallum (2007) reported that the students' who lack confidence often try to avoid embarrassments by staying away from the challenges that are intrinsic to the clinical settings and this has been their biggest barrier for successful learning in the hospital settings. Simulated patient experiences were helpful for the students to learn the skills through experience and, gain confidence and competence in a systematic way as simulation facilitates critical thinking, theory-practice connection and enhances active learning among students (Blackford, McAllister & Alison 2015; Nestle et al. 2011 and Gordon et al. 2001).

2.2 Theoretical Framework

There are numerous theories evident in the literatures to describe how the clinicians reason during the consultation session with their patients and also how an expert clinician reasons differently to a novice practitioner (e.g. some references). There are number of clinical reasoning models presented by (Higgs & Jones 2008) which includes "Hypothetico-deductive reasoning, pattern recognition, forward and backward reasoning, knowledge reasoning and intuitive reasoning" are all based on the cognitive process model. The authors also present other types of reasoning as a model of interactive process and this includes "multidisciplinary reasoning, conditional reasoning, narrative reasoning, interactive and collaborative reasoning,

ethical reasoning and teaching as a form of clinical reasoning”. This broad categorization of models helps to understand the theoretical framework and underpinnings of the clinical reasoning research. According to the cognitive models, clinical reasoning errors are associated with cognitive functions alone whereas the interactive model looks beyond this dimension as the decision making is a shared responsibility in case of interactive reasoning.

2.2.1 Dual process theory of clinical reasoning

Modern research about clinical reasoning considers the “dual-process theory of clinical reasoning” to explain the development of clinical reasoning skills. Dual-process theory (Evans 1975) of reasoning which has its origins in 1970’s forms the fundamental theoretical framework for this study. Though these theories are existing close to five decades, still it is widely used in contemporary research that focuses on human reasoning especially in the psychology of learning (Evans & Stanovich 2013). According to the dual-process theory, clinicians combine their intuition and analytical skills to arrive at a diagnosis. When they use this approach to diagnose there are two possible ways the clinician can arrive at a conclusion about the medical condition. For an example, if a physician is assessing a client with a throat infection and it is likely that they might have seen many similar cases in the past and the symptoms may resemble unique, so they may conclude it quickly based on their previous experience otherwise their intuition. But in unfamiliar situations and rare medical conditions they take more time as they must collect more information and analyze it in order to find the diagnosis. Students who are still a novice practitioner may need to use the second approach which is a “hypothetico-deductive” way of diagnosing the case. Clinical educators may consider this framework to facilitate the development of clinical reasoning skills among the students.

Scholars focusing on medical education research identified two different systems involved in clinical reasoning. System 1 which is quick, context bound, subconscious and intuitive in nature on the other hand there is also a contrasting system 2 which is slow, conscious, analytical and concept based. There is an assumption that the system 1 has a potential for heuristic bias which may result in decision making errors and this could be corrected only by means of system 2. Hence clinicians are forced to learn the analytical strategy in order to avoid bias through use of system 2 reasoning. However the recent researches in this discipline indicates that scholars moved away from the model of bias avoidance and are keen on finding the role of experience, memory and context which are the key components of decision making according to system 1 and the findings could be as good as or more accurate than the system 2 findings. Thinking as a professional involves understanding ones' roles and responsibilities, recognizing the values, completing tasks and meeting the expectations of being a healthcare practitioner. Evidence-based practice favors clinical reasoning that is based on deductive approach which could be articulated with analytical language. Hence it can be argued that the evidence-based practitioners predominately use system 2 reasoning strategies to arrive at a conclusion about a case (Peters et al. 2016).

2.2.2 Medical decision-making theory

Theory of medical decision making (Raiffa 1968 & Elstein et al. 2002 in Higgs 2008) is another theory that focuses on clinical reasoning skills development. According to this theory, patients has the right to choose their therapy, therapist and the place in which the service will be offered that mainly depends on the anticipated outcomes. This highlighted the need for the patients to be informed about the range of treatment choices available for them to choose the best one for themselves. Clinical reasoning is an important skill required to make such informed decision and thus this theory has an influence on the development of this skill (Karni 2009).

Fishbein, Prochaska & Reyna (in Reyna 2008) have developed three different approaches to the evidence-based theories of medical decision making. Fishbein was interested in theory of reasoned action, Prochaska was keen on trans-theoretical model whereas Reyna presented the fuzzy-trace theory. All three approaches share some similarities, for example, in all three approaches the decision making is not a conscious process and they can be applied to patients and healthcare settings. These theories are important as they determine the cost effectiveness and patient-centered decision making (Reyna 2008).

2.2.3 Ethical Theory

Ethical theory is another theory that forms the theoretical framework for this study as it is very much connected to the medical decision making as it provides a framework that informs and guides the clinical reasoning process (Beauchamp & Childress 2001 in Higgs 2008). Clinicians need to adhere to certain bioethical principles such as allowing independence in practice for the students, beneficence, do no harm and justice because they help to overcome the ethical dilemmas if any and justify the decision made.

2.2.4 Transformative Learning Theory

Transformative learning theory (Mezirow 2009) which a theory of adult learning also contributes to the theoretical framework for this study. According to Kitchenham (2008), learners generally would like to know the best way to learn and want to understand when and where the learning will take place and most importantly why they are learning the phenomenon. This is mainly the result of self-reflection based on their previous experiences and to explain the concepts, their beliefs and judgement as well as their feelings to develop a new meaning. Mezirow (2009 in Illeris 2010) claims that change in view occurs as a result of the learner wanting to authorize and redevelop the meaning through a process of critical self-reflection. Hence this theory is strongly linked to practice readiness as critical reflection is vital while

learning skills such as clinical reasoning or attempting to change someone's views and participation.

Jack Mezirow (1978, 1981, 1997 & 2009) an adult educator proposed the “transformational learning theory” as the framework for “teaching and learning”. According to Mezirow's views “learning involves meaningful and transformative shifts in students' established beliefs and assumptions”. This can be interpreted as, when the learners are deeply affected by their experience, they can see profound transformations in themselves. Clinical settings provide numerous opportunities for the students to innovatively think and experience the transformational learning. According to Melrose, Park and Perry (2016), the educators who base their practice in transformative learning must find ways to challenge the students. The clinical teachers who believe in this approach look for opportunities in the clinical settings that has the possibilities to stimulate fresh insights and activate the critical reflection. These kind educators often encourage the students to ask questions and promote the inquiry-based learning. The strength of transformative learning framework is that it promotes critical thinking and reflection (Melrose, Park & Perry 2016).

2.2.5 Social Learning Theory

Clinical education plays a crucial role in determining the professional practice readiness of the healthcare students. Thus, the learning theories forms the conceptual framework and guide the delivery of clinical education. Social learning theory (Lave & Wenger 1991; Wenger 2009) assumes that learning happens as a result of “lived social experience” and in healthcare settings learners need to work with interdisciplinary team and at multiple levels. Irrespective of the context, from a psychological point of view, the social learning theory incorporates learning as “belonging, becoming, experience and doing”. When a novice practitioner grows into the role,

social learning theory provides the needed guidance for evolution of views, activities and thinking as a healthcare professional and a ‘life-long learner’ (Gyoh 2011).

2.2.6 Experiential Learning Theory

Kolb believes that learning is holistic when the learner is exposed to experiential learning and hands-on experiences will develop the skills required for professional practice. Kolb’s theory is connected to clinical education because the clinical placements and its associated clinical experience provide opportunities for healthcare students to develop and demonstrate new knowledge and leaves the educators with number of teaching strategies to teach the students with different learning styles (Engels & DeGara 2010).

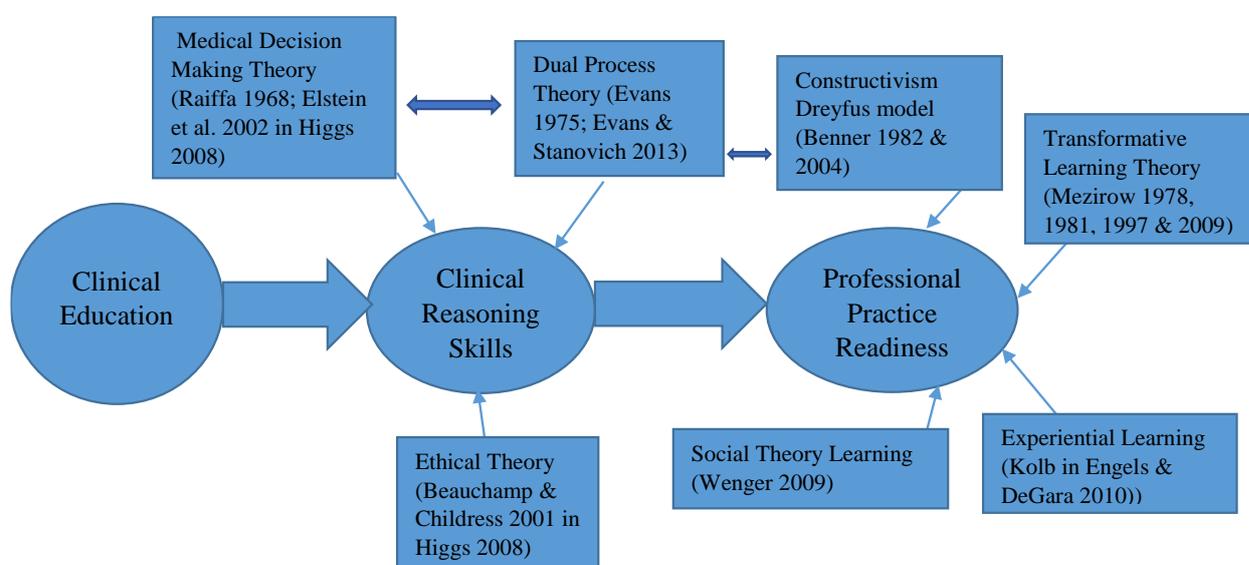
2.2.7 Dreyfus model

Benner (1982) supports the Dreyfus model (1980) which explains the nursing students’ skill development from the level of a novice practitioner to an expert clinician. Benner asks the educators to believe in constructivism principles and understand the level of students’ in order to support and enhance their learning because the existing knowledge is used to construct the new knowledge. For an example, the knowledge of human anatomy about the medical condition is essential to promote the intuitive and critical thinking skills needed to make the differential diagnosis (Kaminski 2010).

Numerous educational theories stress the importance of teaching clinical reasoning during the studentship. Adult learning theory argues that the learners learn better when they are exposed repeatedly and deliberately to the real cases. This theory also stresses the clinical educators to provide immediate feedback to their students’ for enhancing their clinical reasoning skills (Kassirer 2010). Earlier research on clinical reasoning was based on observing the clinician’s action not on the mental processes the clinical specialists use. But the cognitive scientists did

not accept these personal theories because of its poor reliability. However, observing the actions and behaviors of an expert clinician can inform the teaching and learning of clinical reasoning. Regardless of all arguments about the best ways to develop clinical reasoning, clinical knowledge is the foundational requirement for an effective clinical reasoning. Frequent exposure to carefully selected cases is the best way to engross such knowledge that can be retained in long term memory (Kassirer 2010). Educational theories indicate that to be a good clinical reasoner, one must be an expert thinker who can make this complex, tacit and concrete process in their thinking visible to others (Ritchhart & Perkins, 2008). When the expert clinical educators make their clinical reasoning visible to the students, which is by revealing the underlying questions that they ask themselves and/or the others during the reasoning process, the novice students can adopt the same approach which may provide a scaffold for them to master clinical reasoning. Otherwise it would remain as an “inaccessible black box” (Delany, Golding & Bialocerkowski 2013).

Figure 1 Theoretical Framework Diagram



The main theoretical framework for this research is drawn from the dual-process theory of clinical reasoning and transformative learning theory. The purpose of the research is to explore the contribution of clinical education in the development of clinical reasoning skills of undergraduate physiotherapy students in the UAE, the conceptual framework for this study evolved from the said clinical reasoning theory. The aim of the research also extends to understand the relationship between the clinical reasoning skills and professional practice readiness of the physiotherapy students in the UAE, several learning theories are contributing to this study and the transformative learning theory is the cornerstone for this study because of it promotes the self-reflection and critical thinking which are vital for professional practice readiness. In addition, the ethical theory and medical decision-making theories are contributing to this study's theoretical framework as they stress the significance of patient-centered decision making that abides with bioethical principles. Clinical reasoning is an essential skill for healthcare practice and clinical education is believed to have an impact on building this cognitive skill. Therefore, this study draws its theoretical framework from both the learning and clinical reasoning theories. The theoretical framework diagram above highlights the link between the different theories underpinning this research and its connection to the research purpose.

2.2.8 Research Paradigms in Mixed Methods

Physiotherapy is an interactive process which involves inter-subjective encounters between the patients and physiotherapists. Hence it is essential to explore the lived experiences of all those involved in the clinical encounter to understand physiotherapy practice (Shaw & Connelly 2012). The central purpose of clinical reasoning in physical therapy is establishing the connection, thus exchange of ideas, knowledge and experience can occur and prosper. It is not possible to get clear answers and the explanations for the same at all times but becoming

familiar in these grey areas of physiotherapy seems to be a prerequisite for compassionate physiotherapy practice. Therefore, the lived experience of a therapist is vital to improvise their own action and adapt to the practice demands in a tactful and sensitive manner (Chowdhury & Bjorbaekmo 2017).

Groves et al. (2013) recommended in their study that use of different methods that are complementing each other as the best means to evaluate clinical reasoning. These combined strategies for assessing clinical reasoning helps in making a qualitative appraisal and comprehensive analysis of this phenomenon. Chowdhury and Bjorbaekmo, (2017) have adopted phenomenological approach in their study to explore the lived experience of physiotherapist in their day-to-day life of practicing physiotherapy. Phenomenological approach provides insight into intellectual competence and practical capabilities of the physiotherapist, and both these attributes of the practitioner is essential in determining the clinical reasoning skills of physiotherapist. Phenomenography is one of the research approaches, which attempts to explain “how someone experience a phenomenon, not how it actually is” and the main aim of this approach is to describe, analyze and understand the lived experiences but not to explain the relationship among them. Phenomenography focuses on identifying the variations in individuals’ experiences and attempts to acknowledge different ways of understanding and perceiving learning as a phenomenon. Phenomenography attempts to find what the learners’ have learned from situation by retrospectively asking the learners to reflect on their experience (Skoien, Vagstol & Raaheim, 2009).

2.3 Conclusion

To conclude, this chapter on literature review supports the arguments for this study. As the study attempts to find the contribution of clinical education in developing the clinical reasoning skills and professional practice readiness of undergraduate physiotherapy students by exploring the views of students and clinical educators from their lived experiences, the appropriate theoretical frameworks with the focus on the dual-process theory and transformative learning theories were discussed in the chapter two. According to Creswell (2012), adopting both descriptive and inferential methods along with the interpretative approach will provide the rich knowledge about the research problem. Therefore, the mixed-methods approach has been chosen as the research approach for this study which is presented in the following chapter.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

In the chapter two, relevant literature and the gaps in the current literatures about clinical reasoning skills development and its connection with professional practice readiness were presented. The aim of this chapter is to identify the appropriate research approach for this study and justify the research methodology selected for the purpose of this study. It includes the research design, instruments used for data collection and the procedures adapted for conducting this research. This chapter starts with the research approach section which will explain the research paradigms (Creswell 2012; Johnson & Christensen 2008) for both the quantitative and qualitative aspects of this study which is followed by a discussion about the triangulation design as the most suitable research design for this study. A mixed methods approach is selected for the purpose of this study and the researcher strongly believes that the combined use of both quantitative and qualitative methods is likely provide rich data that can complement each other and paves way for an in-depth understanding of the research context and the participants experiences during clinical education. The second section of this chapter presents the research methodology and discusses the selection of the site and participants, methods used for data collection and identifies the appropriate data analysis methods for this study. Following this is final sections of this chapter highlights the role of the researcher, validity of the study and, the ethical dilemmas for the researcher and how the researcher overcame the bias during the process of conducting this research.

3.1 Research Approach

The researcher believes that both quantitative and qualitative data will be useful to understand the contribution of clinical education in developing the clinical reasoning skills of undergraduate students in the UAE in preparation for their professional practice readiness.

Denscombe (2008) strongly argues that the researcher should not make an exclusive decision when selecting between the positivist quantitative paradigm or the interpretivist qualitative paradigm instead the research approach must be guided by what would serve the research question(s) best in each stage of the research.

Johnson and Christensen (2008) present three major approaches or paradigms for conducting educational research which includes quantitative, qualitative and mixed method researches. Quantitative methods tend to employ strict sampling techniques and use validated instruments or questionnaires to gather numerical data that is mainly used to monitor changes in performance of individuals or a group (Polit & Beck 2006). Quantitative studies help to "shape individual perceptions of a problem, their conceptualization of potential problems and their understanding of experiences" (Devadas 2015). In contrast to this "qualitative research methods are used to understand phenomena from the perspectives of those involved, to contextualize issues in their particular socio-cultural-political milieu, and sometimes to transform or change social conditions" (Glesne 2011, p.4). Quantitative methods use an inferential paradigm which aims to find out the relationships between the variables by collecting explanatory information which can be analyzed using statistical tests. These data are collected through quantitative methods can provide measurable, replicable and generalizable evidences that usually tests the cause and effect of a phenomenon (Creswell et al. 2010). But the qualitative methods use the interpretative paradigm which mainly focusses on the context and lived experiences of people in that context (Glesne 2011). These contrasting views between the quantitative and qualitative methods brought the difference in schools of thought mainly in the social sciences research such as educational research. This warrants the educational researchers to collect data using multiple methods and since the early twentieth century social sciences researchers were using multiple methods for data collection (Creswell 2012).

Creswell et al. (2010) stated that the issues arising in health sciences research are complex in nature and reflecting on this experience the onus is on the health sciences researchers to recognize the need for methodological diversity. According to the authors' mixed-methods is a research approach that focusses on, "... research questions that call for real-life contextual understandings, multi-level perspectives, and cultural influences; employing rigorous quantitative research assessing the magnitude and frequency of constructs, and rigorous qualitative research exploring the meaning and understanding of constructs; whilst framing the investigation within philosophical and theoretical positions" (Creswell et al. 2010 p.4). Mixed methods act as a bridge and connects the gap in the two pioneering research paradigms and draws the philosophical position together (Green 2007). In mixed method studies the researcher not only aims to collect the two forms, quantitative and qualitative data, and they focus on "mixing" the data collected in order to answer their research questions (Creswell 2012). Inquiries using mixed methods gathers both quantitative and qualitative data that complements each other and helps to provide the best possible answers for the research questions under study. The inception of mixed methods approach was because of need to converge the results (Teddlie & Tashakkori 2010). The numerical data generated through quantitative methods relies on the descriptive and inferential statistical measures, hence it alone may not be enough to explain a particular phenomenon under investigation as it does not take into account the views of multiple sources. But the qualitative data serves the later purpose and provides multiple perspectives about the research problem and the context. Therefore, the mixed methods approach is believed to be the appropriate design to report the detailed views about the research problem (Creswell 2012).

While analysing the strengths and weaknesses of different research approaches mentioned above, it was necessary to look for an approach that would provide the best answer for the

research questions of this study. Mixed research seems to be an appropriate choice for this study because the intended study is exploratory in nature. The advantage of using mixed-methods approach is that it provides an opportunity for explaining the relationships between the variables in-depth. It also helps to collect rich and comprehensive data which can assist in triangulation of the findings in order to achieve better results. According to Higgs (2011), the process of developing the clinical reasoning skills is a complex phenomenon and using only a qualitative or quantitative method to study this phenomenon in-depth will not serve the purpose. Hence the researcher believes that the selection the mixed methods will provide a deeper understanding of the problem under investigation. Pragmatist argues that the “research design should be planned and conducted based on what will best help you answer your research questions” (Johnson & Christensen 2008). Fraenkel, Wallen and Hyun (2015) states that “pragmatists believe that quantitative and qualitative methods can be mixed in a research endeavour and might be more informative than using only a single method”. According to Johnson and Turner (2003 in Johnson & Christensen 2008) quality of studies will improve while using the mixed approaches and it is less likely to make errors while using the multiple methods, theories and views. Lincoln and Guba (1985 in Johnson & Christensen 2008) argued that causality is well demonstrated in experimental research, but the realism is limited whereas in ethnographic studies it is a vice-versa phenomenon. From this it can be concluded that if both approaches are combined and used in a single study it will be more authentic as the causality is strong and the realism is rich. Bryman (2006) listed sixteen reasons for the researchers to consider the mixed methods approach ahead of the single method approach and many of these items such as purposive sampling, enhancing credibility and understanding the contextual relationships etc., that are closely associated with the purpose of this study. This in turn directs the researcher to select the mixed methods as a research approach for this study.

The proposed research for doctoral thesis did not test a cause and effect phenomenon instead it will focus on investigating the participants' views about the clinical education and its contribution towards the development of clinical reasoning skills and professional practice readiness. This ruled out the possibility of conducting a pure quantitative study which is worthwhile to analyse the cause and effect relationship of variables. In addition, the role of quantitative research in exploring a new phenomenon is very much limited. While considering qualitative research as an approach for the said study, though it could possibly generate a rich and in-depth data from the physical therapy students and clinical educators about their experiences in clinical education and how it contributed to the development of students clinical reasoning skills and job readiness, it still has a disadvantage that the findings of the qualitative study might have challenges while attempting to generalize the research outcomes. It is essential to gather some quantitative data mainly the variables that affect the development of clinical reasoning and practice readiness in order to analyse the strengths and weaknesses of the current model before exploring an appropriate model for clinical education (Gardner in Fraenkel, Wallen & Hyun 2015). Therefore, this study used mixed-methods approach involving both quantitative and qualitative methods. "The use of both methods provides a more complete understanding of research problems than does the use of either approach alone" (Gardner in Fraenkel, Wallen & Hyun 2015).

3.1.1 Research Design

Several types of mixed methods design exist and Gardner in Fraenkel, Wallen and Hyun (2015) presented three major types. These include the "exploratory design", the "explanatory design" and the "triangulation design". In the exploratory design, qualitative methods are applied at first to explore the variables underlying the phenomenon in which the researchers are interested, and this informs the subsequent quantitative methods. Whereas in the explanatory design, the

researcher starts off with the quantitative study and then uses the qualitative methods as a follow up and to refine the findings of the quantitative methods. The exploratory design has high priority for the qualitative study and the explanatory design has higher priority for the quantitative study (Creswell & Clark 2006). In contrast to these designs, the triangulation design has equal priority for both quantitative and qualitative studies, and the researcher utilises the combined methods to investigate the same phenomenon in order to determine if they both converge upon a common understanding of the research problem that is being investigated. In this study the quantitative method is used first to collect the data from the undergraduate physiotherapy students. This is done at two stages, that is, before the start of clinical placements and after completion of 12 weeks of clinical placements. Then the qualitative method is applied to both undergraduate physiotherapy students and clinical educators after the completion of 12 weeks of clinical placements for the students. So, the data collection process followed a sequence and the first set of data collected using is the quantitative methods informed the next set of data collected through qualitative methods. The research design in mixed methods studies is also informed by the time when the data are collected, that is, whether both quantitative and qualitative data are gathered parallel or sequentially (Onwuegbuzie & Collins 2007). Therefore, the researcher believed that the mixed methods research approach using sequential explanatory design with methodological triangulation is the most appropriate choice for the purpose of this study. In the following section the concept of triangulation and how it is applied in this research context is explained.

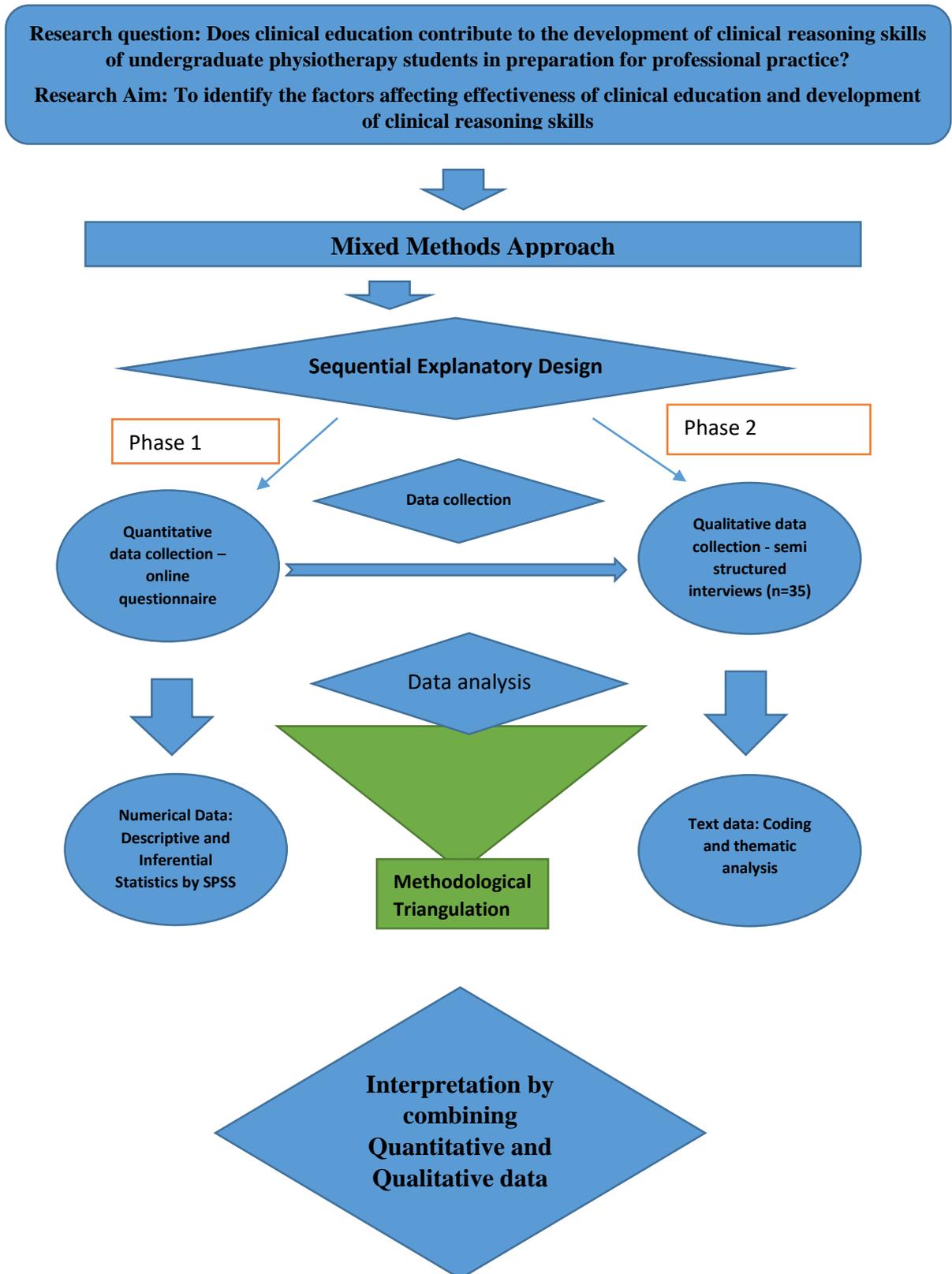
3.1.2 Mixed Methods: Sequential explanatory design with methodological triangulation

Standing from a pragmatist view it was necessary to use an approach that works best to answer the research questions. This study would benefit from both qualitative and quantitative data and therefore it is appropriate to choose the mixed research approach. Integrating the quantitative

and qualitative methods will certainly enhance the quality of this study because there is a possibility to confirm the findings of one with another. In the context of this research, quantitative data alone will not provide an in-depth understanding of the research problem. Clinical reasoning skills development is an intrinsic process and the cognitive nature of this phenomenon necessitates the students' self-assessment to explain the role of clinical education in developing the clinical reasoning skills. To fulfil these criteria, it was necessary to collect the quantitative data using self-assessment questionnaire. However, the process of clinical reasoning is complex and students' skills in clinical reasoning cannot be determined only by their self-assessment. An in-depth understanding of how this skill developed during clinical education and what is its relationship with professional practice readiness is needed to answer the research questions of this study. Therefore, it was inevitable to include the qualitative methods using interviews. Polit and Beck (2006) claims that the interviews are useful because it can extract great deal of information by means of just questioning the participants about it. So, the "mixing" both quantitative and qualitative data will provide a more complete information and an in-depth understanding of the research problem being studied. A triangulation is formed here with mixing of data and integrated interpretation of the result and this methodological triangulation will enhance the quality of this study. According to Fraenkel, Wallen and Hyun (2015), to get a full understanding of the research problem under investigation it is wise for the researcher to use both methods in the same study. Further they argue that the mixed-methods is useful in explaining the existing relationship between the variables and to explore its characteristics in-depth and to cross-validate the findings. It is assumed that the present clinical education model has inconsistencies which arises from the varying nature of environment in which the clinical placement takes place. The learner as well as the educator characteristics plays a crucial role in making the learning process effective. In order to identify

a unique clinical education model which could help the students to prepare themselves better for contemporary physiotherapy practice, it is essential to have a deeper understanding of the learner characteristics, educator background and environmental factors that affect the students' learning. For this purpose, it is appropriate to conduct a survey, focused group and in-depth interviews which justifies the selection of mixed-research approach that allows the opportunity for methodological triangulation. According to Muijs (2004), many scholars prefer to follow pragmatist approach to their research and use various methods based on their research questions which they are attempting to answer. In this study, different processes are used to generate the data sets, and this includes surveys to find out clinical reasoning skills development and effectiveness of clinical education, and semi-structured interviews with clinical educators and undergraduate physiotherapy students to gather similar information about students' clinical reasoning skills development and factors affecting it. Though the researcher considered focus group for data collection, in-depth interviews were preferred ahead of the focussed group in order to understand the lived experience of each participant in this culturally sensitive context of this study. The information collected through the surveys informs the next stage of data collection and the qualitative data obtained in this stage helps to address any gaps in the first set of data by explaining the factors affecting clinical education and clinical reasoning skills development that are aims of this study.

Figure 2 Research aim, approach, design, data collection methods and analysis



The figure 2 provides an overview of the research aim, the research approach and design used in this study and also the data collection and analysis methods including how the interpretation of the findings are made in this research which had the purpose of exploring the contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students' in preparation for their future professional role.

3.2 Research Methodology

Creswell (2008) states that when a researcher combines the qualitative and quantitative data then it is a “powerful mix” which can assist in developing “a complex picture of social phenomenon”. The proposed research aims to investigate contribution of clinical education in developing the clinical reasoning skills and professional practice readiness of physiotherapy students and recommend an appropriate clinical education model for the physiotherapy program to adequately prepare the entry level graduates for contemporary physiotherapy practice. This kind of research will require flexibility for which the mixed-research approach would be suitable. Denscombe (2008), argue in favour of a research paradigm which is flexible enough, permeable as well as multi-layered is what the twenty first century researchers should be looking at especially in social sciences research. Most of the health sciences research are quantitative in nature until “a quiet revolution” that happened in the late 20th century. Inclusion of a qualitative study to address the questions that were unanswered by the quantitative research was the main agenda of this revolution which prompted the health sciences researchers to use mixed approach in their studies (O’Cathain 2009). According to Doyle et al. (2009) the 3rd methodological movement that is mixed research has plenty to offer for studies focusing on the health and social sciences disciplines. It is difficult as well as challenging to answer the research

problem using a single method study and, in such cases, mixed-methods research is beneficial. Since the philosophical underpinning of this approach is based on the pragmatist views it allows the freedom to the researchers to use combined approaches to address the questions. Mixed-methods research could eliminate the complexity of the research question because it converges the findings of the quantitative and qualitative elements. Quantitative approach emphasis on generalizing the finding and they tend to be objective and deductive in nature whereas the qualitative research is context bound and they stress upon subjective and inductive approach. Mixed approach has an advantage as it can negotiate these tendencies and integrate the two paradigms (Lingard, Albert & Levinson 2008).

This methodology section includes three sub-sections. First subsection discusses the site and participant selection procedure in order to explain the context of this study. The next subsection will present the data collection methods that includes the online administered questionnaire and semi-structured interviews. This is followed by the third subsection that briefly discusses the data analysis methods used in this study.

3.2.1 Site and Participant Selection

This study was conducted at a Higher Education Institution that offered health sciences education in the United Arab Emirates. Presently, the institution offers Bachelor of Science degree programs in 5 different disciplines of health sciences education, which includes Nursing, Pharmacy, Physiotherapy, Radiography and Medical Imaging, and Emergency Health. College of Health Sciences was established in 2006 and the nursing program is the oldest among all the disciplines and it has multiple branches within the United Arab Emirates which are in different emirates (Host Institution 2018). This research focuses on physiotherapy education in particularly the clinical education component of the physiotherapy program. Physiotherapy

program was established in 2013 and the first cohort of students were enrolled in the academic year 2013/14. Physiotherapy program is offered in 2 two campuses campus that are in Abu Dhabi and Ain (Host Institution 2018).

A transnational curriculum was adopted for physiotherapy education and the institution was working in partnership with a university in Australia. The physiotherapy curriculum was developed by the Australian University and offered to its students in Australia. The college of health sciences has got the permission to use the physiotherapy curriculum for their students and academic support was available for the physiotherapy faculty during the initial stages of the program delivery at the host institution. “The physiotherapy degree is based on a fully integrated curriculum and includes interdisciplinary studies” (Host Institution 2018). The curriculum was not contextualized but there were additional courses offered to the students at the early years of study. The original curriculum from Australia comprises 4 years of study for physiotherapy degree, whereas the physiotherapy program in the host institution is 5 years long. The difference is in the first year in which the students are asked to attend a foundation year to complete general requirement unit modules that constitutes for 36 credit hours. Whereas the students studying at the university in Australia do not study these modules. The next 4 years of physiotherapy curriculum, that is from year 2 to year 5 at the host institution is like the physiotherapy curriculum run at the university in Australia which is only for a period of only four years.

Physiotherapy program is taught in English and the students enrolling into the college of health sciences are expected to achieve a minimum score in English language testing. Arabic is the first language for all the students who took part in this study, however it was a requirement for the students to attain a level of proficiency in English in order to get enrolled into the Higher Education within the UAE. The medium of instruction for physiotherapy education at the host

institution is in English and the students need to complete modules on English for Health Professionals as a part of their foundation curriculum. Most clinical educators who participated in this study were also non-native English speakers and few were native English speakers, hence it was not difficult for the researcher to conduct the interview in English with the participants. However, the researcher acknowledges that the transcripts derived from “participants’ interview” have had few non-English sentences that are most commonly used between English words, for an example the participants often used the Arabic word “yani” when they wanted to insist on a particular meaning of something, which is quite natural for people to speaking English as colloquial spoken language. But the researcher was cautious in transcribing and removing unwanted words in the transcripts to give it a clarity. Further the researcher confirmed his interpretation with the participants to ensure the accuracy of information provided and the interpretation made. Hatim and Basil (1990, p.258) stated that translators needs to know two languages and two cultures in order to extract the intended meaning without altering any information (Card, Hatim & Mason 1999, p.182). But in the context of this study, there was no requirement for translators as the interview was conducted in English and the researcher lives in the UAE for more than 7 years and previously also he had experience in other Arabic speaking country, thus it was not difficult for the researcher to understand the perspectives of the participants and interpret the exact meaning based on the information provided in the interviews.

“Bachelor of Physiotherapy curriculum” at the host institution “encompasses five themes” that are presented below, and these themes are run “longitudinally throughout the course and built on in a hierarchical manner in progressive units” (Host Institution 2018),

“Theme 1: Personal and professional development”

“Theme 2: Population, society and health”

“Theme 3: Fundamental knowledge of health science”

“Theme 4: Applied practice”

“Theme 5: Research”

In the first two and half years of physiotherapy study, that is from the year 2 until the mid of year 4, “the curriculum is structured around patient-centered learning” (Host Institution 2018). The clinical “conditions for which people typically seek physiotherapy, provide the context for integrating learning about biomedical sciences and physiotherapy skills” (Host Institution 2018). In the first year of physiotherapy study, the curriculum is aligned to musculoskeletal concepts of physiotherapy and in the second year of the physiotherapy program, emphasize is on the neurological and cardiorespiratory physical therapy concepts. During the first half of the third year of physiotherapy studies, the focus is on advanced modules that focuses on preclinical preparation. Physiotherapy students usually enroll for 14 to 18 credit hours of academic courses in the first and second semester, and the short third semester has the cap of 6 credit hours course work during the summer term. In the areas of musculoskeletal, neurology, cardiorespiratory and advanced practice, curriculum consists of human biosciences, physiotherapy practice and integrated evidenced based modules. In the last eighteen months of the program, the focus shifts from campus-based learning using the patient scenarios to learning within a dynamic clinical environment. Graduates of physiotherapy program are expected to develop range of skills set and are well-equipped to continue life-long learning. Transition to health practice modules run parallel to clinical placement modules or soon after the completion of clinical modules, and it

helps in preparing the physiotherapy students for their future professional role as physiotherapist. The present study aims to explore the contribution of clinical education in developing the clinical reasoning skills and professional practice readiness of the undergraduate physiotherapy students. As per the study pathway of the program, students spend the last one and half years of their program outside the university setting for clinical education. Students attend 8 placement rotations to complete 26 credit hours for the program requirements during this period, and cover a variety of areas of physiotherapy practice within these clinical rotations. Students usually attend fulltime clinical training from Sunday to Thursday and work for 35 to 40 hours per week while on placements in the associated hospitals and/or healthcare settings. Clinical education is led by the physiotherapy clinicians working in healthcare institutions with whom the host institution has a partnership for providing clinical training to their students. Before sending the students for clinical education to any of the tie-up facilities, faculty members of the college of health sciences conduct a workshop for all the potential clinical educators to provide an overview of their curriculum and expectations of the clinical placements. In this workshop, the potential clinical educators are introduced to teaching philosophies, instructional strategies for effective clinical education, assessment of student performance during clinical placements and tips for providing feedback to the students on their performance. During this full day workshop, the potential clinical educators are expected to develop an insight into physiotherapy curriculum taught at the college of health sciences and the expectations of clinical education. Physiotherapists taking part in this workshop are certified as clinical educators and are authorized to supervise and assess the students on placement. Clinical educators attend periodical updates through symposium and refresher courses for clinical educators which is organized by the physiotherapy department at least 3 times in a year. Academic support is

provided by the physiotherapy faculty as an ongoing measure to facilitate the learning experiences for the students and to assist the clinical educators in their role.

This study was conducted from November 2017 to July 2018. Students of the second and third cohort of physiotherapy program were invited to participate in this study. The second cohort was admitted to the program in the academic year 2014/15 and were in their final year of study. The third cohort was enrolled in 2015/16 academic year and were in the third year of their program. There were 23 students in the senior cohort and 30 in the junior cohort. During the above-mentioned periods, all the students from the above-mentioned cohorts were attending the clinical placements in either a government, semi-government and/or a private hospital. Their clinical training was supervised by qualified physiotherapists working in the partner organizations where the students were placed for practice placements. Students were sent to nine different hospitals for clinical placements among which five are government institutions, three are private hospital and remaining one is a semi-government organization. For ethical reasons the names of those hospitals are not disclosed. Study included all the willing physiotherapy students who are on clinical placement across the two campuses of the college of health sciences and their clinical educators who were working in partner organizations who the main stakeholders were providing clinical education to the students of the host institution. The main aim was to explore the experiences of the physiotherapy students on clinical placements and their clinical educators to know their views about clinical education role in developing the students' clinical reasoning skills and work readiness.

The target population for this study includes physiotherapy students on clinical placements, clinical educators and/or supervisors and academics in physiotherapy. The student population include year 4 and 5 cohorts who will be attending the clinical training in the hospital settings

as a part their physiotherapy education. The clinical educators are the ones licensed by Health Authority Abu Dhabi as physiotherapist and identified by the college to teach students on clinical placement. Clinical educators are employed with the strategic partners of the institution where the study was conducted, and they receive formal training from the college to be a clinical educator. Physiotherapy academics are the ones who are based in the university campus and teach the theoretical and practical components of physiotherapy before the students step out for clinical training. They are also involved in curriculum development and planning of the program. All student participants are females because of this government entity where the students are currently enrolled has a restricted intake of female students only and there are no male students in any of the disciplines offered here. However, the clinical educators who would take part in this study includes both males and females.

A convenience sampling was used to recruit the participants for the study and the researcher targeted the entire population available to be included in this study. According to Johnson & Christensen (2012), when the researcher asks people with some specific characteristics to be a part of their study then the researcher favours convenience sampling to recruit participants for their study. For this study undergraduate physiotherapy students who have completed all classroom based taught modules and are currently attending their clinical placements were only included in this study. The clinical educators and/or supervisors needs to be certified and should have attended necessary training from the college regarding clinical education expectations. This means the participants for this study were required to fulfil certain criteria in order to be included in the study hence convenience sampling is appropriate. The table below shows the willing participants who have taken part in the study. All the 34 physiotherapy students who took part in this study were females and the clinical educators represented both sex with 10 males and 16 females.

Table 1 Distribution of sample in this study and data collection methods

Data collection methods	Physiotherapy Students		Physiotherapy Clinical educators	Total
	Year 4	Year 5		
Questionnaire	16	18		34
Semi-structured interviews	04	05	26	35

3.2.2 Data Collection Methods

In mixed-methods research, both quantitative and qualitative methods are used for data collection. Within the quantitative research there are several methods for data collection, and it includes questionnaires, self-checklists, achievement tests, personality inventories and close-ended interviews etc., (Fraenkel, Wallen & Huyn 2015; Creswell 2012). Similarly, the data collection method in qualitative research includes interview, focus group, observation and document analysis etc., (Meriam, 2009; Glesne 2011). Since the main purpose of the study was to investigate the contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students, the researcher was keen on extracting the students' perceptions about their own clinical reasoning skills before the start of clinical education and after the completion of 12 weeks of clinical placement experience. Several reliable and valid instruments such as the clinical reasoning problem, the script concordance test, mini clinical evaluation exercises, long case examinations and oral examinations etc., are available to assess the clinical reasoning abilities within a clinical environment and outside of it (Modi et al. 2015). However, the authors also acknowledge the challenges of these measures of clinical reasoning in different contexts and suggests carrying out clinical reasoning assessments in real clinical environments in order to ensure higher reliability. Groves et al. (2013) used the script concordance test and the clinical reasoning problem and concluded in their study that it would have useful to have included a "self-report measure of clinical reasoning" in order to enhance the "self-reflection and analysis". They believed that this self-assessment process would

enhance the subjects' understanding of their own reasoning approach and the cognitive process associated with it. Further they recommended to the future researchers to incorporate the "self-reporting measures" to stress on the significance of the metacognition in clinical reasoning and decision-making expertise. Based on the finding and recommendations of these literatures (Modi et al. 2015; Groves et al. 2013), a self-assessment questionnaire is used to evaluate the undergraduate physiotherapy students' clinical reasoning and reflection abilities. The findings of Groves et al. (2013) study also suggests that use of additional methods for assessing clinical reasoning skill to provide an in-depth and qualitative appraisal of this phenomenon instead of single method studies. Therefore, this study includes the qualitative research methodology as an additional measure of clinical reasoning. Several factors such as the context, culture, knowledge, individual characteristic and the environment may affect the effectiveness of clinical education, development of clinical reasoning skills and thus the professional practice readiness. It is vital to explore the participants "lived experience" in clinical settings to explore the factors influencing effective clinical education and development of clinical reasoning skills. Interviews are useful tool to extract the participants' lived experience (Stalmeijer, McNaughton and Van Mook 2014). Wijbenga, Bovend'Eerdt and Driessen (2018) incorporated qualitative research methods and, used focus groups and semi-structured interviews in their study on entry-level physiotherapy students in European School of Physiotherapy at Amsterdam to explore how these students learn the clinical reasoning skills during their clinical placements. This study included semi-structured interviews to gather the relevant information from the undergraduate physiotherapy students and their clinical educators. The reason for choosing the semi-structured interviews over the focus group was because of the student participants were at different year levels in the physiotherapy program, that is, year 4 and year 5 physiotherapy students were recruited for the study. The intention was to collect rich data with anecdotal evidences from

each participant and at the same time avoid any potential inferences of other participants. Therefore, the personal interview using a semi-structured interview guide was preferred as a qualitative data collection method for this study. The instruments used in the study are explained in the following subsections.

Questionnaire:

The questionnaire for the purpose of this study was developed after an extensive literature search on physiotherapy, allied health, nursing and medical education. The focus of literature search was on clinical education, clinical reasoning, decision making and professional practice readiness of physiotherapy and other healthcare students. The questionnaire was administered online, and it was sent twice to the physiotherapy student who took part in this study, first before the commencement of clinical placements (survey 1) and then after the students have completed the 12 weeks of clinical placements (survey 2). The first survey questionnaire had 2 sections that include the researcher developed demographic questionnaire section and the self-assessment of clinical reasoning and reflection questionnaire that was developed by Royeen et al. (2001). The second survey questionnaire had an additional section in which the physiotherapy students' perceptions about clinical education was included. The following subsections explain both these instruments and the rationale behind the selection of these tools for the purpose of this study including how the validity and reliability of these instruments were tested before administering it to the actual participants of the study.

Self-Assessment of Clinical Reflection and Reasoning (SACRR):

Roth (1989) postulated theories that had implications for teachers in preparing reflective practitioners and based on those theories Royeen et al. (2001) devised questionnaire known "The Self-Assessment of Clinical Reflection and Reasoning (SACRR)" (see appendix A) for

assessing the students' perceptions about their own clinical reasoning. This instrument was used in this study as it was appropriate for the research purpose that explored the contribution of clinical education in developing the physiotherapy students' clinical reasoning skills. The SACRR tool has 26 items that are "rated on a 5-point scale" in which 1 stands for "strongly disagree" and the 5 represents "strongly agree". Physiotherapy students on clinical placements were asked to complete this survey just before the start of their first clinical placement at the beginning of the semester and then after they have completed 12 weeks of full-time clinical placement at the end of the semester. According to Scaffa and Wooster (2004) and Coker (2010), SACRR is an appropriate instrument for assessing the students' perspectives about the teaching strategies on their own "clinical reflection and reasoning" and they have predominantly used this instrument to measure the clinical reasoning skills of occupation therapy students. SACRR is a reliable and valid tool, and the internal consistency of the psychometric properties of this instrument was measure using Chronbach's alpha that demonstrated high values for pre-test (0.87) and post-test (0.92) (Royeen et al. 2001; Musolino & Mostrom 2005). This shows that the 26 items in the SACRR instrument are closely related to each other and tool is reliable. The test and re-test reliability of SACRR tool was moderate and the "Spearman rank order correlation coefficient" score was 0.60. Though this tool was developed by an occupational therapist, it can still be used on physiotherapy students as well because Royeen the author of SACRR had the knowledge of both occupational therapy and physiotherapy curricula which was noted in his contribution to "the clinical doctorate: a framework for analysis in physical therapist education" (Threlkeld, Jensen and Royeen 1999). According to Musolino and Mostrom (2005), SACRR is an effective outcome measure for assessing the clinical reflection and reasoning. Therefore, the researcher believed that the selection of SACRR tool as a measure of students' clinical reflection and reasoning was appropriate for the context and purpose of this

study which aimed to explore the contribution of clinical education in developing the undergraduate physiotherapy students' clinical reasoning skills in preparation for their professional practice.

Students' perspective about clinical education:

As discussed above the post placement survey had an additional section which included the questionnaire about the students' perspectives about their clinical education. The aim of this of additional questionnaire on the post-clinical placement survey was to identify the factors underlying effective clinical education. In the context of this research, clinical education happens outside of the traditional university setting, in a real hospital and/or a healthcare facility. Clinical education is led by the clinical educators who are licensed physiotherapists working at the healthcare settings with whom the host institution is tied for clinical training of its students. Physiotherapy faculty of the host institution is also involved in clinical education, but the academics have limited control over this process which is mainly due to the legal restrictions within the United Arab Emirates (UAE). Healthcare practitioners in the UAE need to be licensed with one of the three authorities that are Department of Health, Abu Dhabi, Dubai Health Authority and Ministry of Health, in order to practice their profession within the country. So, the academics are unable to be fully involved in supervision of their students during the clinical placements, therefore, the college of health sciences relied on their stakeholders for clinical education. Physiotherapist working in various hospitals where clinical education is conducted represent a diverse culture and differ significantly in their background that include their education and background. This means the clinical education may be influenced by various factors that arise from clinical educators, environment, supervision and feedback, apart from the physiotherapy curriculum. To understand the potential factors underlying effective clinical education, the researcher developed an additional questionnaire to be included in the second

survey that was conducted after the completion of 12 weeks of clinical placement. The questionnaire included 13 statements in total regarding the learning objectives of the physiotherapy curriculum, clinical educator, supervision, performance feedback and environment. Participants were asked to respond on a scale of 1 to 5 for each item in which 1 means participant strongly disagrees with the statement and 5 means strongly agree with it. These questionnaire was based on the tool developed by Heidari & Norouzadeh (2015) (see appendix B for the original tool) but the researcher did not use the original questionnaire as it is, instead the themes of the questionnaire was taken into account for developing the questionnaire for the purpose of this study which aimed to explore the factors underlying effective clinical education. Permission to adapt the original tool have been obtained from the original authors through email correspondence.

Questionnaire validity and reliability:

The SACRR tools reliability and validity was already established by Royeen et al. (2001). But the questionnaire also included the demographic information in section 1 which asked for students' year level in the program and location of their clinical placement (in both pre-clinical and post-clinical placement surveys) and the specialisation completed during their clinical rotations (only in the post-clinical placement survey). Additionally, the third section on students' perspectives about clinical education was included in the post clinical placement survey. The questionnaire was administered online using google forms as a survey platform and the respondents needed to consent by clicking "yes" for confirming their willingness to participate in the study. In addition, the respondents needed to provide a "valid email id" to enter and complete the survey. In the entire questionnaire only the section (SACRR tool) had pre-established reliability and validity. In order to establish the content and face validity of the entire questionnaire, the draft version of the questionnaire was sent to physiotherapy faculty

members involved in clinical education and an expert in the field of education by email and the purpose of the study was explained to them and they were asked to complete the survey online and provide a feedback to the researcher about the structure and content of the questionnaire. The responses received included the criticism about the need for asking the “email ids” of the participants and two questions were repeated in the second section of the questionnaire. It took approximately 15 to 20 minutes for completing the survey as reported by the respondents. The duplicated questions were removed before sending the final questionnaire to undergraduate physiotherapy students. However, the researcher did not remove the identifier that is the “participants email id” component as it was necessary for the researcher to contact only the first survey respondent for the second survey. Considering the smaller sample population that was available for the researcher it was necessary to include only the participants of the first survey in the second survey, and also include the responses of participants who have completed both the surveys to avoid any misleading interpretations by including the responses of participants who might have completed only one survey. Further explanation on how the researcher overcome this important ethical dilemma is provided in the later section of this methodology chapter that exclusively discussed the ethical considerations of this study.

Semi-structured Interview:

According to Polit and Beck (2006), interviews are most commonly used qualitative data collection method and it can collect in-depth information about a specific topic by asking people about it. The type of questions in an interview may vary according to the purpose of the research and it may include questions about people behaviours, their experiences, feelings, opinions and values, and the research may also include questions about participants’ background and demographic details as required to gather the relevant information for their study (Paton, 2002). In order to achieve data saturation while using the interviews as a method of data collection in

a qualitative study, Kvale and Brinkman (2009) suggests including thematic questions that are powerful, effective and extract range of information from multiple dimensions. Hence the researcher selected the semi-structured interviews as a qualitative data collection method for this mixed methods study which aims to explore the factors affecting the development of clinical reasoning skills and effectiveness of the clinical education. When the researcher does not have any idea about the research problem that is being investigated, it might be ideal to use “non-structured interviews” as a method for qualitative data collection, but when the researcher possess some knowledge and understanding of the research problem it is appropriate to use the “semi-structured interviews” as qualitative data collection method (Polit & Beck, 2006). In the context of this study the researcher already possesses the knowledge and understanding of the research problem through extensive literature review and the findings of the first phase quantitative study. Therefore, the semi-structured interviews are appropriate choice for the purpose of this study which explored the clinical education’s contribution in developing clinical reasoning skills of undergraduate physiotherapy students’ in preparation for their future professional practice.

The “interview guide” (see appendix C and D) for conducting the semi-structured interviews with the undergraduate physiotherapy students and their clinical educators was prepared by considering the findings of the questionnaires administered in phase 1 of this study. Patton (2002) suggests three things for the interviewers to fully engage the interviewees in the interview process. According to this, the interviewer should first ask questions about facts and present, and then move to the past and, any sensitive and controversial subjects. If the past and present and/or fact and sensitive questions are interspaced throughout an interview, the interviewees may be distracted and disengaged in the interview process. These factors are considered while developing and structuring the interview guide for this study. Two interview

guides were developed for the purpose of this research, one to interview the undergraduate physiotherapy students and the other for interviewing their clinical educators. Upon constructing the interview guide, the researcher sent these questions for peer review with two colleagues who are experienced in physiotherapy education and clinical practice and to an expert in qualitative research in the field of education. All feedback received about the draft interview guide questions were considered and necessary changes were made in the final interview guide. In the draft version of the questions, some questions were looking closed and some were not easy to understand as noted in the peer review and expert feedback. These were rewritten and/or reworded as needed in the final version that was used for interviewing the physiotherapy students and clinical educators.

The interview guide used to interview the clinical educators who took part in this study consisted of three sections that include profile questions, and questions about their experience of providing clinical education to undergraduate physiotherapy students and the appropriateness of current clinical education model followed at the host institution. The interview guide for interviewing the undergraduate physiotherapy students contained only two sections in which the first section consisted of questions about students' clinical education experience and the second section questions were about their professional practice readiness. These set of questions were used as a guide while interviewing the clinical educators and undergraduate physiotherapy students. It was expected that every participant may respond in a different way to each question and the interviewer was ascertain about this fact and ensured that the interviewee responds as accurately as possible to the particular question asked by explaining the meaning of the question when the participants had different thoughts about the questions. The researcher was also the interviewer in this study and did not rely on the interview guide alone to interview the participants, instead the interviewer was carefully listening to the participants' response and

identified the need for follow-up questions. Using the participants' response as a probe, the interviewer asked follow-up questions as needed. Probes are believed to deepen the understanding and enhance the participants' response which will in turn enrich the quality of data gathered in the interview (Patton 2002). For the purpose of this research semi-structured interviews were conducted at the end of clinical placements with few willing undergraduate physiotherapy students' and the clinical educators working in the healthcare facilities that offer the clinical placements for the host institution. Participants were asked to reflect on their experience of the existing clinical education model and provide their valuable input for developing a new clinical education model that will ensure contemporary physiotherapy practice readiness among the graduating students by developing sound clinical reasoning skills. All the interviews were audio recorded with the consent of the participants. The qualitative data collected through the semi-structured interviews assisted the researcher to triangulate the findings of the survey.

3.2.3 Data Analysis

Researcher created an electronic database to store the results of the questionnaire and the semi-structured interviews. Multiple backup storage options were also created to ensure the data is not lost due to any damage and/or malfunctioning of the primary electronic storage device. The quantitative data collected from the undergraduate physiotherapy students at two stages that is before the start of clinical placements and after the completion of 12 weeks of clinical placements using the study questionnaire through an online survey was analyzed using the "Statistical Package for Social Sciences" (SPSS) version 23. It was necessary to use the statistical package to interpret the quantitative data collected using the questionnaire to answer the research question of this study. Does clinical education contribute to the development of clinical reasoning skills and professional practice readiness among physiotherapy students?

This was the primary research question that this study intends to answer. In order to provide an authentic answer to the main research question it was essential to find the answer for the following sub-questions which are,

1. What are the underlying factors for an effective clinical education?
2. What factors affect the development of clinical reasoning skills?
3. Does clinical education adequately prepare the undergraduate physiotherapy students for professional practice?
4. What is, if any, is the appropriate clinical education model that facilitates clinical reasoning skills and professional practice readiness for the UAE context?

Does clinical education contribute to the development of clinical reasoning skills of physiotherapy student? To answer this part of the main research question, it is essential to use the descriptive and inferential statistics for SACRR tool included in the second section of the questionnaire. For this researcher used the mean and Wilcoxon signed rank test to report the differences in students' clinical reasoning skills before start of clinical placements and after the completion of 12 weeks of clinical placements. The first and third section of the questionnaire which included the participant demographic information and their perception about clinical education experience respectively was used to answer the first two sub-questions of this study. Descriptive statistical analysis was conducted separately for the first and third section of the questionnaire. The percentage frequencies of the first section helped the researcher to classify the participants' according to their year level and the campus or the location of their clinical placements and the specializations they have covered during their placement rotations. Similarly, the frequencies and its percentage for students' perspectives about clinical education

helped the researcher to understand the effectiveness of clinical education and this assisted the researcher in the preparation of interview guide.

The qualitative data gathered from the interviews with the physiotherapy students and their clinical educators were verbatim transcribed. Qualitative data analysis was performed using the NVivo 12 software to identify the codes from the interview transcripts. Then a thematic analysis of the codes developed from the interview findings was performed and the themes emerged in this process are used to answer all the sub-questions of this study in order to answer the main research question which wanted to find the contribution of clinical education in developing the clinical reasoning skills and professional practice readiness of physiotherapy students. Analysis and findings of this mixed method study is presented and discussed later in the chapters four and five. The aims that the quantitative and qualitative research methodologies wanted to achieve might differ, but both these methods seem to complement each other and effectively combining the findings of these methods will help the researchers seeking answers for their research problem (Patton 2002).

Thematic analysis was performed for the qualitative part of the study using the model of Braun and Clarke (2006). During the process of qualitative data analysis, a constant comparison method was used as recommended by Creswell (1998) to compare the responses of different participants to identify statements that are having similar meaning and the common ideas or concepts between different participants. All statements that had similar meaning and concepts were coded under the same “umbrella term” and this was guided by the research questions of this study.

According to Tesch (1990), coding of qualitative data involves several steps which are as follows,

1. Researcher must carefully read the entire transcripts and make notes of ideas arising in their mind based on data in the interview transcript.
2. Analyze each transcript to find the concepts and their meaning and keep recording their findings.
3. Skim through multiple transcript files to bring together the common ideas as clusters.
4. Assigning codes using short phrases for the similar concepts or ideas that are clustered in the third step.
5. Finalize and organize the codes as needed for the research purpose or alphabetically.
6. Conduct a preliminary analysis of the data
7. Recode the data if need.

Qualitative data analysis for the purpose of this study was performed by combining the recommendations of both Tesch (1990) and Braun and Clarke (2006). The researcher first verbatim transcribed the interviews by carefully listening to the audio files. Then all the transcripts were imported to the NVivo 12 plus software for analysis. Researcher was carefully reading and re-reading electronic copies of each interview transcript files in order to get the sense of the information that the participants provided during the interviews. Statements and the phrases that were significant for answering the research questions were highlighted in files stored in NVivo 12 and sticky notes were inserted into the electronic transcripts as needed for cross referencing at a later stage. Finally, comparisons were made between the transcripts and during this process several themes emerged, and these are presented and discussed in the subsequent chapters.

Table 2 Summary of Study Phases Aligned with Main Research Question

Phase	Main Research Question	Participants	Data collection method	Data collection instruments	Data collected	Techniques used for data analysis
I & II	Does clinical education contribute to the development of clinical reasoning skills and professional practice readiness among physiotherapy students in the UAE?	Physiotherapy students (Year 4 & Year 5)	Quantitative	Questionnaire	Demographic data	Descriptive statistics (Frequency)
					Self-assessment of clinical reflection and reasoning	Descriptive statistics (Mean) and Wilcoxon Signed Rank Test
					Students perspectives about clinical education	Descriptive statistics (Frequency)
		Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview	Students' and clinical educators' views about their clinical education experience	Coding and Thematic analysis

Table 3 Summary of Study Phases Aligned with Sub-questions of the Research

Phase	Sub Questions of the Research	Participants	Data collection method	Data collection instruments
I & II	What are the underlying factors for an effective clinical education?	Physiotherapy students (Year 4 & Year 5)	Quantitative	Questionnaire
		Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview
I & II	What factors affect the development of clinical reasoning skills?	Physiotherapy students (Year 4 & Year 5)	Quantitative	Questionnaire
		Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview
II	Does clinical education adequately prepare the undergraduate physiotherapy students for professional practice?	Physiotherapy students (Year 4 & Year 5)	Quantitative	Questionnaire
		Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview
II	What is, if any, the appropriate clinical education model that facilitates clinical reasoning skills and professional practice readiness for the UAE context?	Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview

3.3 Ethical Considerations

Globally and locally, the federal regulations mandate the researchers to obtain consent from the participants for the study (Johnson & Christensen 2012). Hence the purpose of the study was

explained to all the potential participants for them to decide if they would like to participate in the research or not. All willing participants were asked to sign the informed consent document (appendix E). In line with the ethical standards highlighted by AERA, all participants will have the freedom to withdraw from this study at any point of time. Confidentiality, anonymity and privacy were assured to all participants and to the data they provided.

Before the commencement of the study a formal ethical approval was first sought from the Ethical Committee of the British University in Dubai which is parent institution for the researcher where this study was registered for doctoral research. The host institution for this study was a Health Sciences in the UAE and the student participants belonged to this institution where the researcher was a fulltime employee working as a lecture in physiotherapy and teaching the undergraduate physiotherapy students. In order to approach the physiotherapy students' studying at this institution to participate in this research it was necessary to get the permission of their Research and Ethics Committee (REC). The researcher submitted the application to this committee for ethical clearance and obtained formal written permission before reaching out to the students for the purpose of this study. Though the researcher had a direct access to the students' on a daily basis during the development stages of this study, the researcher did not discuss anything to the students' about the planning of this study and the possibility of the, participating in this research until the ethical approval was received. Once the final written approval was granted to conduct this research at the college of health sciences, the researcher approached the physiotherapy students' studying in year levels 4 and 5 of the programs and requested them to participate in this study. The researcher also explained the purpose of this study to the student population and answered their questions. Researcher stressed on the fact that the students' participation on this study is voluntary and assured them confidentiality and anonymity of their data that will be collected for the purpose of this study

using the questionnaire and interviews. Next it was necessary for the researcher to get the ethical approval from several institutions where the clinical educators were employed because the host institution physiotherapy students were attending their clinical placements in those institutions. Among the five government hospitals where the students were posted for clinical placements four hospitals were managed by SEHA which a public joint stock company. In order to approach the clinical educators working in the four business entities of SEHA the researcher first approached the Corporate SEHA Research and Ethics Committee seeking permission to conduct this study at their subsidiaries and upon getting their preliminary approval the researcher then contacted the local Research and Ethics Committees in each of the four hospitals to get the final approval to conduct the study in their hospital. The other government entity and the semi-government and private hospitals in which the students were attending the clinical placements had a memorandum of understanding with the host institution which covered the permission for education and research purpose. Therefore, it was not necessary for the researcher to separately seek permissions in each institution if there is permission from the host institution to conduct the study which the researcher already obtained. However, the researcher contacted the managers and/or the team leads of the physiotherapy departments in each of those hospitals to crosscheck this requirement and shared the research proposal and data collection instruments to keep them informed of this study before approaching the clinical educators working in their facilities.

Researcher received necessary ethical approvals and/or the permission to conduct this study in the above-mentioned institutions. The study acknowledges that there was a power relationship in this study between the participants and the researcher. The potential participants were the students and professional colleagues of the researcher hence there is a position of authority which could influence the participants. However the researcher made every single step as

explained above to ensure that such power dynamics will not happen at any stage of the research process and also the researcher respected the rights of all individuals who refused to participate in this study and/or to withdraw from the study at any stage without any explanation. It is almost impossible to be bias-free especially when you include a qualitative methodology especially when the researcher has professional interest on the research problem and involved as a stakeholder within the research context. However, the researcher encouraged the participants to answer the questionnaire as well as the interview questions as authentic/honest/open they can. The researcher was self-critical throughout the process of conducting this research and ensured that his own bias did not influence the results/interpretation of the findings. Researcher showed reflexivity (Finlay 2002) while interpreting the findings of the study and discussing the implications of the same to construct knowledge by making some assumptions. This is believed to have minimized the bias. In addition, the research was self-critical and has taken a neutral stand which helped him to accurately interpret the findings and minimized the bias in this research and ensured the validity of the data was maintained. Researcher showed respect and empathy for all participants and ensured a comfort zone during the data collection process.

All the data collected for the purpose of this research was stored electronically in the researcher's laptop and additionally on external hard drives. All these devices are password protected which the researcher is only aware of and the confidentiality and anonymity of these data were strictly maintained. During the interview process, the researcher made some handwritten notes in a diary for all the participants and this diary is stored in researcher's personal briefcase which is digitally locked with a passcode and cannot be opened by anyone other than the researcher.

3.4 Researcher Role

The researcher is the sole investigator in this study for the entire duration. However, the researcher received inputs from the Director of Studies at several stages throughout this study. The researcher was working at the primary study institution that is the College of Health Sciences as Lecturer in Physiotherapy and was involved in coordination of clinical placements. In this additional role as clinical coordinator, the researcher did not engage in direct teaching of students who were the participants of this study. The researcher was part of many stakeholder's forum and witnessed growing concerns from placement providers who are potential employers of the graduates from the study institution. The major concern raised during those forums was issues around students' clinical reasoning skills and readiness for professional practice. This had created the interest for the researcher to research on this problem and to identify possible solutions to address the everlasting concerns in the physiotherapy profession about the lack of clinical reasoning skills of new graduates.

According to Glesne (2011), researchers play dual roles during the study that include the "researcher role" and a "learner role". In the first role, the researcher is involved in data collection through designing and administering questionnaires, conducting interviews, observing performances, reading documents and analyzing the data gathered. Whereas in the second role as a learner, the researcher becomes a student who is very keen on learning from the research participant and, recognizes and acknowledges the self-bias in the research process. In this study, the researcher has performed the twin roles as a researcher and a learner by developing study instruments, collecting and open-mindedly analyzing data, and the researcher had acknowledged his self-bias and ways he overcame the ethical dilemmas at various stages of conducting this study. Especially, during the second phase qualitative study, the researcher was interviewing various types of participants including students of different year levels and

clinical educators who have had enormous differences in their background. At this stage of the study, the researcher was acting as “a good listener” and learning from the research participants.

3.5 Validity of the Study

While addressing the validity concerns it is essential to acknowledge the expertise of the researcher in the subject matter and his or her subjective relationship with the research problem (Glesne 2011). Eliminating the researcher bias is nearly an impossible task in any research process as the research problem is conceptualized in the researcher’s mind based on their own understanding of the phenomenon being studied (Wittgenstein 1953 in Devadas 2015).

Number of strategies were used to strengthen the validity and reliability of this study. At different stages of this study, peer reviews and supervisor feedback on the questionnaire and the interview guide developed for this study was carried out to enhance the reliability and validity of the information gathered from the participants. Then the researcher was keen on not depending on one type of data instead used both qualitative and quantitative data and also triangulation of the findings of one form with another means all attempts were made to ensure the validity of the findings of this study. In addition, the themes that emerged from the semi-structured interviews were cross-checked with few selected participants to verify the credibility of the information interpreted. The researcher signed on a “conflict of interest declaration form” with the College of Health Sciences that is the host institution and with the other entities as needed in order to get the access to the physiotherapy students and clinical educators. Findings of the qualitative study includes narrative descriptions which provides an in-depth information about the research problem that is the clinical reasoning skills and professional practice readiness of undergraduate physiotherapy students. From the time of conception of this study until its completion, the researcher was in close association with his Director of Studies who

mentored and guided him throughout this journey. The researcher believes that the feedbacks received from multiple sources enhances the validity of this research.

3.6 Chapter Summary

In the chapter three, the research approach and methodology used for this study has been discussed first along with the rationale that directed the researcher for selecting the mixed methods research design. Then the sampling methods used, the data collection and analysis techniques incorporated in this study were presented. Finally, part of this chapter discussed the role of researcher in the study, his ethical dilemmas and how the validity and reliability issues were managed.

CHAPTER 4: ANALYSIS AND FINDINGS

4.1. Introduction

As stated in the chapter three, both quantitative and qualitative findings will be integrated to provide the solution for the research problem studied. The study stemmed in the researcher's mind with question that was, "Does clinical education contribute to the development of clinical reasoning skills and professional practice readiness among undergraduate physiotherapy students in the UAE?"

Review of literature apart from the researcher's professional experience as a senior physiotherapist and physiotherapy educator for closer to two decades helped him to understand that this complex cognitive phenomenon is usually influenced by versatile intrinsic and extrinsic factors. Several authors have stated numerous factors influencing the clinical reasoning skills and decision-making process which in turn affected the autonomy in professional practice. Combination of the clinical reasoning and learning theories attributed to the theoretical framework for this study which mainly included the dual-process theory and the transformative learning theory. The combined theoretical framework considered for the purpose of this study enlightened the researcher's knowledge about the research problem in particularly the factors influencing the clinical reasoning process. However, from the extensive review of literature conducted for the purpose of this study, the researcher developed an insight that these factors depend upon the context and the people involved in it. It resulted in the development four sub-questions of this research which are listed below and the researcher expected to answer the main research question by addressing these sub-questions using the findings of the mixed methods study.

1. What are the underlying factors for an effective clinical education?
2. What factors affect the development of clinical reasoning skills?
3. Does clinical education adequately prepare the undergraduate physiotherapy students for professional practice?
4. What is, if any, the appropriate clinical education model that facilitates clinical reasoning skills and professional practice readiness for the UAE context?

The researcher was keen on investigating this problem in the context of a higher education institution that is offering health sciences education to adult student population in the emirate of Abu Dhabi within the United Arab Emirates. For this purpose, the researcher choose mixed-methods approach that used sequential explanatory research design and applied methodological triangulation to analyze, interpret and report the findings of the study.

In this chapter, the data collected from both quantitative and qualitative methods that followed the mixed-methods approach with a sequential explanatory research design is presented. As discussed in the previous chapter, this research was completed in two phases. The first phase used quantitative methods to collect the data from the undergraduate physiotherapy students and the second phase used qualitative methods that included both physiotherapy students and their clinical educators for gathering the information required for the purpose of this study. In phase 1 the researcher collected the data through a questionnaire that was administered twice online, that is for the first time just before the students started their clinical placements and the second time was when they have completed the 12 weeks of clinical placements covering the core placement rotations in physiotherapy. During the second phase of the study the researcher conducted semi-structured interviews with the clinical educators and few selected

physiotherapy students in order to understand the contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students and also to explore the factors that affected the development of clinical reasoning skills. During the planning stage of this study the researcher assumed that the first phase quantitative findings would inform the qualitative study because of the nature of the phenomenon that the researcher intended to investigate. The researcher was interested in exploring the development of clinical reasoning which is a cognitive skill. In order to get a deeper and richer understanding of the research problem it was essential to explore the experiences of people involved. The parties concerned in the context of this study were the undergraduate physiotherapy students who was on clinical placements for completing their clinical education modules and the recognized clinical educators who were teaching and assessing those students during their placement period. Therefore, it was vital to explore the views of both parties to provide an answer to the research questions of this study.

Findings of the quantitative methods study conducted in phase 1 are presented in the first section and the second section included the findings of the qualitative study conducted in phase 2. The demographic data collected in the questionnaire (section 1) will provide an insight into participant categories and the areas or specialties of clinical rotations that the students have completed within their 12 weeks placement period. The Self-Assessment of Clinical Reflection and Reasoning (SACRR) instrument which was included in the section 2 of the questionnaire was expected to provide students' self-evaluation of their clinical reasoning level before the start and after the completion of 12 weeks of fulltime clinical placements. The findings of the SACRR in the pre-clinical placement and post-clinical placement surveys is expected to enhance the researcher's understanding about the contribution of clinical education towards the development of clinical reasoning skills of undergraduate physiotherapy students who have

completed the clinical placement modules as a part of their academic requirement. Students' perspectives about clinical education was collected in the third section of the questionnaire in the post-clinical placement survey and it is expected to provide an overall understanding of the effectiveness of clinical education. In order to get a deeper and richer understanding of the research problem, the researcher choose the mixed-methods approach. The findings of the quantitative study informed the qualitative study conducted in the second phase, which is presented as "themes" in the second section of this chapter. The data presented in this section include the narrative descriptions from the participant interviews which is quoted as an evidence to support the researcher's interpretation of the findings of the qualitative study. The participants' (that is the undergraduate physiotherapy students and clinical educators') lived experience in clinical education is expected to provide an in-depth understanding of the research phenomenon under study that are the factors underlying effective clinical education and the factors affecting the development of clinical reasoning skills which would be visible from these findings and provide an answer to the first and second sub-questions of this research that are,

1. What are the underlying factors for an effective clinical education?
2. What factors affect the development of clinical reasoning skills?

Clinical reasoning skills is an essential competence for professional practice and the readiness for professional practice which in this case is the undergraduate physiotherapy students' readiness to be an independent physiotherapist depends on this cognitive skills. Combining the findings of both quantitative and qualitative studies will provide the answer for the first two sub-questions of the research that will lead to the answer for the third sub-question which is,

3. Does clinical education adequately prepare the undergraduate physiotherapy students for professional practice?

Clinical reasoning is vital for professional practice and the clinical education plays a crucial role in developing this skills. However there are several factors that affects the effectiveness of clinical education thus affecting the development of clinical reasoning skills. In essence those factors will affect the readiness for professional practice. Therefore the combined findings of both quantitative and qualitative study was used to answer the third sub-question stated above. Finally, the integrated findings of both quantitative and qualitative study is presented in the third section of this chapter to show how these findings and the answer it provided to the first three sub-questions of this study helped the researcher to answer the main research question, that is, “does clinical education contribute to the development of clinical reasoning skills and professional practice readiness among undergraduate physiotherapy students?”.

Apart from answering the main research question, the researcher was keen to make recommendations to improve the clinical education standards in physiotherapy education mainly in the United Arab Emirates (UAE). For this purpose, during the semi-structured interviews conducted in phase 2 of this study, the researcher asked the people involved in clinical education that is both clinical educators’ and the physiotherapy students to share their views about an appropriate model for clinical education based on their experience. The qualitative data gathered from this component of the interview was used in conjunction with the evidences from the literatures to recommend an appropriate clinical education model that would facilitate the clinical reasoning skill development and professional practice readiness in the context of the UAE.

The table below will provide an overview of the research phases, instruments used for data collection, type of data collected and the data analysis methods that will be used to answer the research questions of this study.

Table 4 Summary of Data Collected and Data Analysis Techniques used

Phase	Sub Questions of the Research	Participants	Data collection method	Data collection instruments	Data collected	Techniques used for data analysis
I & II	What are the underlying factors for an effective clinical education?	Physiotherapy students (Year 4 & Year 5)	Quantitative	Questionnaire	Demographic data	Descriptive statistics (Frequency)
					Students perspectives about clinical education	Descriptive statistics (Frequency)
		Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview	Students' and clinical educators' views about their clinical education experience	Coding and Thematic analysis
I & II	What factors affect the development of clinical reasoning skills?	Physiotherapy students (Year 4 & Year 5)	Quantitative	Questionnaire	Demographic data	Descriptive statistics (Frequency)
					Self-assessment of clinical reflection and reasoning	Descriptive statistics (Mean) and Wilcoxon Rank Test
		Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview	Students' and clinical educators' views about their clinical education experience	Coding and Thematic analysis
II	Does clinical education adequately prepare the undergraduate physiotherapy students for professional practice?	Physiotherapy students (Year 4 & Year 5)	Quantitative	Questionnaire	Self-assessment of clinical reflection and reasoning	Descriptive statistics (Mean) and Wilcoxon Rank Test
		Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview	Students' and clinical educators' views about their clinical education experience	Coding and Thematic analysis
II	What is, if any, the appropriate clinical education model that facilitates clinical reasoning skills and professional practice readiness for the UAE context?	Physiotherapy students (Year 4 & Year 5) and Physiotherapy Clinical Educators	Qualitative	Semi-structured interview	Students' and clinical educators' views about their clinical education experience	Coding and Thematic analysis

4.2 Phase 1: Quantitative Study

The quantitative study was conducted from November 2017 to May 2018 and it included two surveys that were administered online using “google forms” as a platform. The aim of the survey was to measure the undergraduate physiotherapy students’ clinical reasoning skills using a self-assessment tool and also to find out the effectiveness of clinical education by exploring the students’ perspectives about their clinical education experience. The first survey was sent out to the undergraduate physiotherapy students before the start of their clinical placements. The second survey was sent out after the students have completed 12 weeks of fulltime clinical placement rotations. Student category participants represented two different year levels in physiotherapy program which include the year 4 junior cohort and the year 5 senior cohort. The terms junior cohort or year 4 and senior cohort or year 5 will be used interchangeably in this report. Both cohorts did not start the clinical placements at the same time. The senior cohort students started their placements ahead of the junior cohort of the students and the placement expectations between these cohorts were also different as understood from the physiotherapy curriculum. The main aim of the study was to find out the contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students. The demographic data collected along with students’ the self-assessment of clinical reasoning and reflection, and also their perspectives about the clinical education helped the researcher to understand the role of clinical education in developing the clinical reasoning skills. The year 4 students attended basic level core clinical placements and the year 5 students attended advanced clinical placements. All willing participants have to sign the mandatory consent by clicking “yes” to the consent question that appeared at the first page of the online survey in order to access and complete the survey. In addition, the participants were also asked to provide a valid email address which was used as their identifier and the purpose of asking the participants to

provide their “email id” was for the researcher to contact only the respondents of the first survey to complete the second survey after the completion of their 12 weeks placement. The researcher was wary of the fact that the sample size available for the study was small with only 53 students from both year levels 4 and 5 of the physiotherapy program. The researcher was keen on understanding the differences in students’ clinical reasoning after completion of 12 weeks of clinical placements when compared to their level before the start of the clinical placements. So, it was necessary for the researcher to compare the findings of the first survey with the findings of the second survey in order to get an understanding of contribution of clinical education in developing the clinical reasoning skills of physiotherapy undergraduate students. Therefore, the second survey was only sent to the ones who have completed the first survey. The responses from the participants who have completed both surveys were only included for the analysis.

4.2.1 Summaries of participants, their campuses and response rates across the research stages:

Findings from the first survey (pre-placement survey):

Before the commencement of clinical placements, the researcher met the student cohorts in their classroom and explained the purpose of the study and invited them to take part in the study. The participants from senior cohort of physiotherapy were about to attend their advanced clinical placement modules from November 2017 to February 2018 and during this period they have attended 12 weeks of clinical placements covering three different specialty of rotations. At first the online survey link was sent to all the senior cohort students who were enrolled in advanced clinical placement modules. This questionnaire consisted two section in which the first section collected demographic data such as the students’ year level in the program and the geographical location where they have completed their placements. The second section included the “26 items” self-assessment of clinical reflection and reasoning questionnaire. This pre-placement survey to the senior cohort students returned with 17 responses from an overall 23 potential

participants that were available as the target population for this study. The response rate was 73.91%.

The junior cohort of physiotherapy students attended their clinical placement from January 2018 to April 2018. They were enrolled in three basic level core clinical placement courses and needed to complete three rotations in core areas of physiotherapy practice within the 12 weeks period of their clinical education. The researcher emailed the survey link that was sent to the senior group of students to the junior cohort students before the commencement of the first core placement. The pre-placement survey to the junior cohort returned with 22 responses out of the overall 30 students in the year 4 level of physiotherapy program and the response rate was 73.33%. In total 39 students from the overall 53 completed the first survey and the cumulative response rate for the questionnaire was 73.58%. Below tables provide the summary of responses from the first survey conducted before the students commenced their clinical placements.

Table 5 Summary table of participants (by stage and year group) in two Campuses

Stage	Year groups	Total number of students	Number of Responses	Percentage
Phase 1	BPT Year 5	23	17	73.91%
Phase 1	BPT Year 4	30	22	73.33%
Total	Year 4 & Year 5	53	39	73.58%

Table 6 Summary table of participants (by stage and year group) in Abu Dhabi Campus

Stage	Year groups	Total number of students	Number of Responses	Percentage
Phase 1	BPT Year 5	8	5	62.5%
Phase 1	BPT Year 4	20	12	60%

Table 7 Summary table of participants (by stage and year group) in Al Ain Campus

Stage	Year groups	Total number of students	Number of Responses	Percentage
Phase 1	BPT Year 5	15	12	80%
Phase 1	BPT Year 4	10	10	100%

Findings from the second survey (post-placement survey):

Only the participants of the first survey were invited to take part in the second survey. An online survey link was sent through emails to the ones who completed the first survey using the “email id” that the participants provided in the first survey. The second survey consisted of 3 sections. Participants were asked to complete the demographic details and a self-assessment of their clinical reflection and reasoning using the similar tool that they completed in the first survey. In addition, they were also requested to complete the additional questionnaire on the third section on their perspectives about the clinical education experience.

At first, an email with survey link and invitation to take part in the second survey was sent out to all the 17 first survey respondents from the senior cohort when they have completed their 12 weeks of clinical placement. 16 of them responded and the response rate was 94.11%. The dropout rate was just 5.89% with the senior cohort sample. Then the junior cohort students who took part in the first survey were asked to complete the second survey when they have completed their 12 weeks of clinical placements. 18 out the 22 first survey respondents from the junior cohort have completed the post placement survey. The response rate was 81.82% and 18.18% dropout were seen in the junior cohort involved in this study. The below tables provide an overview of the responses and dropout rates of the post placement survey.

Table 8 Summary of Dropout rates of the post placement survey

Year groups	Number of Survey 1 respondents	Number of survey 2 Responses	Response percentage	Dropout in survey 2	Drop out Percentage
BPT Year 5	17	16	94.11%	1	5.89%
BPT Year 4	22	18	81.82%	4	18.18%
Year 4 & Year 5	39	34	87.18%	5	12.82%

Table 9 Summary of Dropout rates of the post placement survey in Abu Dhabi Campus

Stage	Year groups	Total number of students	Number of Responses	Percentage	Drop out	Drop out percentage
Phase 2	BPT Year 5	5	4	80%	1	20%
Phase 2	BPT Year 4	12	8	66.66%	4	33.34%

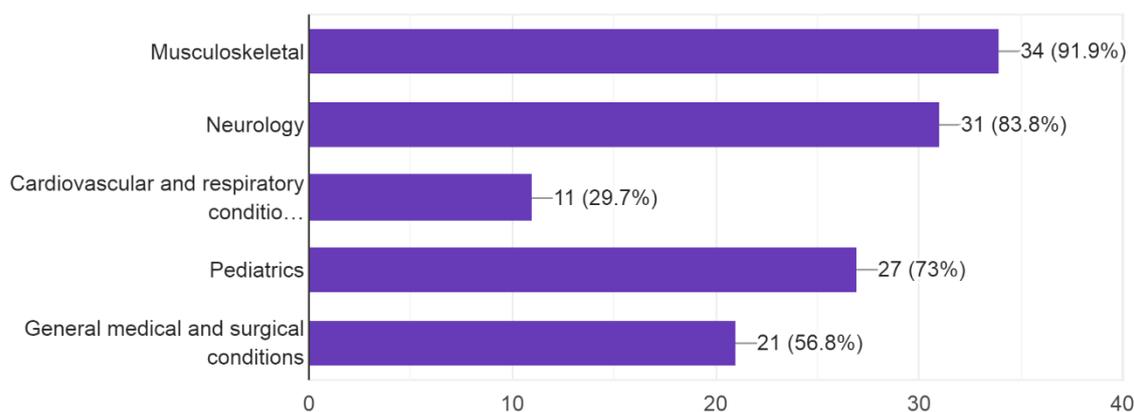
Table 10 Summary of Dropout rates of the post placement survey in Al Ain Campus

Stage	Year groups	Total number of students	Number of Responses	Percentage	Drop out	Drop out percentage
Phase 2	BPT Year 5	12	12	100%	0	--
Phase 2	BPT Year 4	10	10	100%	0	--

Figure 3 Placement specialties covered in 12 weeks

Please select all the areas that you covered during the last 3 rotation.

37 responses



4.2.2 Initial analysis, data conversion and dealing with missing values of the survey:

From the total of 39 first survey respondents, one student from the senior cohort and 4 students from the junior cohort did not complete the second survey. Considering the smaller sample size, it was necessary to exclude these 5 participants from the analysis to avoid any misleading

findings. Since the questionnaire had the identifier it was possible to match the first and second survey responses and eliminate the first survey responses from those 5 participants who did not complete the post placement survey.

The questionnaire used for self-assessment of clinical reasoning and reflection had the participants to respond with Likert Scale options which had numerical and text data. In order to conduct a statistical analysis of the data using SPSS, it was necessary to convert the combined “numerical-text data” to pure numerical data and this process was completed using Microsoft excel operations. Then the data were grouped into two categories in which the first group of data corresponds to the senior cohort students’ responses and the second group of data corresponds to the junior cohort students’ responses. Both types of data were separately analyzed using the SPSS version 23 in which the descriptive statistical analysis and the nonparametric Wilcoxon Signed Rank tests were performed for both groups independently. The SACRR questionnaire had 26 items and the pre-placement and post-placement survey responses for each of the 26 items were compared.

Initial analysis of the data showed 1 missing value in the first survey that was conducted before the start of the placement and 6 missing values were noted in the second survey conducted after the completion of 12 weeks of clinical education. The item 18 was missing in the first survey and the items 7, 10, 11, 12, 21 and 22 were missing in second survey from one participant. However these were not missing from the same participant as all of these items were randomly missing from different participants, except the items 21 and 22 which were missing from the same participant. There are few recommendations on how to deal with the missing value or a data and the most common ones are excluding those responses from analysis or replacing the missing value through appropriate method. Since the sample size for this study was very small,

leaving out any responses may lead to a bias in the data analysis and interpretation. Therefore, the researcher chose the latter approach to replace the missing values using imputation technique that is a little MCAR test in the SPSS. After replacing the missing values for the items 18 in survey 1 and items 7, 10, 11, 12, 21 and 22, the data was considered complete for the statistical analysis.

4.2.3 Selection of statistical technique for the data analysis:

While considering the statistical analysis method, there are various approaches available to use from parametric and non-parametric tests. To determine the most appropriate statistical test, it was necessary to look at the normal distribution of the data. SPSS was used to analyze the normality of the pretest and posttest data. The findings confirmed that both the pretest and the posttest data for all the 26 items were not normally distributed. Since the questionnaire used the Likert Scale responses, the data gathered is ordinal and in order to use a parametric test it is highly recommended that the data should be continuous. Both these factors rule out the possibilities of using the parametric tests. Therefore, the non-parametric tests were considered as appropriate method to analyze the quantitative data collected from the self-assessment of clinical reflection and reasoning questionnaire. Wilcoxon signed rank test was found to be the appropriate technique to analyze the data collected from the SACRR questionnaire. The reason to employ Wilcoxon signed rank test was mainly because of the repeated measures design used for the collecting the data from the same sample. Therefore, the non-parametric Wilcoxon signed rank test was considered to be the most appropriate test for this study. Data collected from the senior and junior cohort of students using the SACRR instrument was first analyzed independently for both groups, then the data from both group participants were combined and analyzed using the Wilcoxon signed rank test. Findings of the research are presented in the following section.

4.3 The Research Findings from Quantitative Data

As outlined in the first section of this chapter, the findings from both quantitative and qualitative data were used to answer the sub-questions of the research which in turn will bring the answer to the main research question. The aim of this section is to present the findings of the quantitative study.

4.3.1 Contribution of clinical education to the development of clinical reasoning skills:

Clinical reasoning is an essential skill for competent, safe and independent physiotherapy practice. Clinical education plays a major role in developing clinical reasoning skills. Thus it is vital to compare the students' clinical reasoning skills before the start of clinical placements and after the completion of 12 week of clinical placements. Clinical reasoning levels were assessed by the students using the self-assessment of clinical reflection and reasoning (SACRR) instrument which is a 26-item questionnaire rating with Likert scale response. The Wilcoxon Signed Rank Test was used to compare the results of pre-clinical and post-clinical SCARR. First, the Wilcoxon test was conducted to analyze the pre and post-clinical SCARR responses from all the participants who have completed both surveys. Then the year 4 and year 5 student groups were independently compared for their pre and post-clinical SCARR scores. The main aim of this analysis was to find if there was any difference in students clinical reasoning levels after attending 12 weeks of clinical placements compared to their clinical reasoning level prior to the start of clinical placements. Also, the researcher was keen on finding the differences in clinical reasoning levels of these two groups of students. These findings helped the researcher to answer the first component of the main research question, that is, 'does clinical education contribute to the clinical reasoning skills of physiotherapy students'. The findings are presented in below tables that is adapted from the Self-Assessment of Clinical Reasoning and Reflection (Royeen et al. 2001) instrument,

Table 11 SACRR Wilcoxon Signed Rank Test Results for both BPT4 & BPT5

#	Self-Assessment of Clinical Reflection and Reasoning	Pretest	Posttest	P value
1	I question how, what, and why I do things in practice.	4.29	4.21	0.47
2	I ask myself and others questions as a way of learning.	4.53	4.50	0.81
3	I don't make judgments until I have sufficient data.	3.94	4.21	0.05
4	Prior to acting, I seek various solutions.	4.00	4.12	0.32
5	Regarding the outcome of proposed interventions, I try to keep an open mind.	4.12	4.26	0.13
6	I think in terms of comparing and contrasting information about a client's problems and propose solutions to them.	4.00	4.18	0.20
7	I look to theory for understanding a client's problems and propose solutions to them.	4.09	4.21	0.40
8	I look to frames of reference for planning my intervention strategy.	3.82	4.00	0.18
9	I use theory to understand treatment techniques.	4.35	4.29	0.66
10	I try to understand clinical problems by using a variety of frames of reference.	3.97	4.09	0.24
11	When there is conflicting information about a clinical problem, I identify assumptions underlying the differing views.	3.94	3.88	0.54
12	When planning intervention strategies, I ask, "what if?" for a variety of options.	3.91	3.94	0.87
13	I ask for colleagues' ideas and viewpoints.	4.24	4.29	0.59
14	I ask for the viewpoints of clients' family members.	3.74	3.76	0.81
15	I cope well with change.	4.09	4.35	0.16
16	I can function with uncertainty.	3.21	3.53	0.11
17	I regularly hypothesize about the reasons for my client's problems.	3.91	4.15	0.09
18	I must validate clinical hypotheses through my own experience.	3.94	3.97	0.56
19	I clearly identify the clinical problems prior to planning intervention.	4.09	4.21	0.32
20	I anticipate the sequence of events likely to result from planned interventions.	3.85	4.15	0.04
21	Regarding a proposed intervention strategy, I think, "What makes it work?"	3.97	4.09	0.31
22	Regarding a particular intervention, I ask, "In what context would it work?"	3.76	3.91	0.35
23	Regarding a particular intervention with a particular client, I determine whether it worked.	3.94	4.24	0.01
24	I use clinical protocols for most of my treatment.	3.79	3.94	0.36
25	I make decisions about practice based on my experience.	3.82	4.09	0.13
26	I use theory to understand intervention strategies	4.06	4.32	0.02

Table 12 SACRR Wilcoxon Signed Rank Test Results for BPT5 Cohort Participants.

#	Self-Assessment of Clinical Reflection and Reasoning	Pretest	Posttest	P value
1	I question how, what, and why I do things in practice.	4.31	4.19	0.53
2	I ask myself and others questions as a way of learning.	4.50	4.44	0.71
3	I don't make judgments until I have sufficient data.	3.81	4.31	0.02
4	Prior to acting, I seek various solutions.	3.94	4.31	0.03
5	Regarding the outcome of proposed interventions, I try to keep an open mind.	4.25	4.19	0.66
6	I think in terms of comparing and contrasting information about a client's problems and propose solutions to them.	4.00	4.25	0.27
7	I look to theory for understanding a client's problems and propose solutions to them.	4.13	4.20	0.76
8	I look to frames of reference for planning my intervention strategy.	3.75	4.00	0.16
9	I use theory to understand treatment techniques.	4.19	4.13	0.79
10	I try to understand clinical problems by using a variety of frames of reference.	3.94	4.07	0.38
11	When there is conflicting information about a clinical problem, I identify assumptions underlying the differing views.	3.81	3.93	0.68
12	When planning intervention strategies, I ask, "what if?" for a variety of options.	3.81	3.93	0.62
13	I ask for colleagues' ideas and viewpoints.	4.31	4.19	0.41
14	I ask for the viewpoints of clients' family members.	3.81	3.63	0.45
15	I cope well with change.	4.19	4.44	0.21
16	I can function with uncertainty.	3.56	3.56	0.94
17	I regularly hypothesize about the reasons for my client's problems.	4.00	4.13	0.48
18	I must validate clinical hypotheses through my own experience.	3.88	4.06	0.18
19	I clearly identify the clinical problems prior to planning intervention.	4.25	4.13	0.32
20	I anticipate the sequence of events likely to result from planned interventions.	4.00	4.25	0.21
21	Regarding a proposed intervention strategy, I think, "What makes it work?"	3.81	4.01	0.29
22	Regarding a particular intervention, I ask, "In what context would it work?"	3.75	3.81	1.00
23	Regarding a particular intervention with a particular client, I determine whether it worked.	4.00	4.25	0.16
24	I use clinical protocols for most of my treatment.	3.56	3.63	0.77
25	I make decisions about practice based on my experience.	3.69	4.19	0.05
26	I use theory to understand intervention strategies	4.00	4.38	0.03

Table 13 SACRR Wilcoxon Signed Rank Test Results for BPT4 Cohort Participants

#	Self-Assessment of Clinical Reflection and Reasoning	Pretest	Posttest	P value
1	I question how, what, and why I do things in practice.	4.28	4.22	0.71
2	I ask myself and others questions as a way of learning.	4.56	4.56	1.00
3	I don't make judgments until I have sufficient data.	4.06	4.11	0.74
4	Prior to acting, I seek various solutions.	4.06	3.94	0.48
5	Regarding the outcome of proposed interventions, I try to keep an open mind.	4.00	4.33	0.01
6	I think in terms of comparing and contrasting information about a client's problems and propose solutions to them.	4.00	4.11	0.53
7	I look to theory for understanding a client's problems and propose solutions to them.	4.06	4.22	0.43
8	I look to frames of reference for planning my intervention strategy.	3.89	4.00	0.56
9	I use theory to understand treatment techniques.	4.50	4.44	0.71
10	I try to understand clinical problems by using a variety of frames of reference.	4.00	4.11	0.48
11	When there is conflicting information about a clinical problem, I identify assumptions underlying the differing views.	4.06	3.83	0.21
12	When planning intervention strategies, I ask, "what if?" for a variety of options.	4.00	3.94	0.87
13	I ask for colleagues' ideas and viewpoints.	4.17	4.39	0.16
14	I ask for the viewpoints of clients' family members.	3.67	3.89	0.31
15	I cope well with change.	4.00	4.28	0.37
16	I can function with uncertainty.	2.89	3.50	0.04
17	I regularly hypothesize about the reasons for my client's problems.	3.83	4.17	0.11
18	I must validate clinical hypotheses through my own experience.	4.00	3.89	0.58
19	I clearly identify the clinical problems prior to planning intervention.	3.94	4.28	0.08
20	I anticipate the sequence of events likely to result from planned interventions.	3.72	4.06	0.11
21	Regarding a proposed intervention strategy, I think, "What makes it work?"	4.11	4.17	0.71
22	Regarding a particular intervention, I ask, "In what context would it work?"	3.78	4.00	0.10
23	Regarding a particular intervention with a particular client, I determine whether it worked.	3.89	4.22	0.01
24	I use clinical protocols for most of my treatment.	4.00	4.22	0.29
25	I make decisions about practice based on my experience.	3.94	4.00	0.79
26	I use theory to understand intervention strategies	4.11	4.28	0.26

Findings from the Students' Self-Assessment of Clinical Reflection and Reasoning (SACRR):

1. Combined analysis of the data from both the cohorts showed significant difference between the pre-placement and post-placement SACRR scores for the items 3 (P value 0.05), 20 (P value 0.04), 23 (P value 0.008) and 26 (0.02). However there was no significant difference between the pre and post-placement scores of all the other items in SCARR instrument
2. For the senior cohort students (year 5) there was significant difference between the pre-placement and post-placement SACRR scores for the items 3 (P value 0.21), 4 (P value 0.034), 25 (P value 0.46) and 26 (P value 0.034). However there was no significant difference between the pre and post placement scores of all the other items in SCARR instrument
3. For the junior cohort students (year 4) there was significant difference between the pre-placement and post-placement SACRR scores for the items 5 (P value 0.014), 16 (P value 0.042) and 23 (P value 0.014). However, there was no significant difference between the pre and post placement scores of all the other items in SCARR instrument.

From the above findings it can be concluded that the clinical education had some role in developing the clinical reasoning skills as the mean scores for most of the items in the post-test SACRR were higher than the pre-test. However, the differences in SCARR item scores were not statistically significant. To explain this, it was necessary to explore the possible causes for this non-significance in students' clinical reasoning skills after completion of 12 weeks of clinical placements. This is suggesting that the clinical education and development of clinical reasoning skills may be influenced and/or affected by some factors. In order to explore the underlying factors that for effective clinical education and clinical reasoning development,

further investigation was required which brought up the sub-questions of this research that are stated in first section of this chapter.

4.3.2 Effectiveness of clinical education:

To explore the effectiveness clinical education, it was essential to consider the students views about their clinical education experience. The post-placement survey included an additional section of questionnaire to collect the students' perspectives about clinical education. Participants were asked to complete their responses using the Liker scale response for statements about learning objectives, instructor, how to deal with students in clinical placements, clinical environment and, evaluation and supervision during their clinical placement. The findings of this component of the survey had shed the light on the effectiveness of clinical education.

Table 14 Students perspectives about clinical education

Questions	Total	5 - Strongly Agree	4 - Agree	3 - Undecided	2 - Disagree	1 - Strongly Disagree	Total
Q1	34	35%	56%	3%	6%	0%	100%
Q2	34	35%	47%	9%	6%	3%	100%
Q3	34	32%	62%	3%	3%	0%	100%
Q4	34	26%	53%	15%	0%	6%	100%
Q5	34	26%	53%	12%	6%	3%	100%
Q6	34	23%	56%	15%	3%	3%	100%
Q7	34	23%	47%	18%	12%	0%	100%
Q8	34	21%	71%	6%	3%	0%	100%
Q9	34	29%	59%	9%	3%	0%	100%
Q10	34	26%	62%	6%	3%	3%	100%
Q11	34	21%	65%	12%	3%	0%	100%
Q12	34	24%	62%	12%	3%	0%	100%
Q13	34	21%	68%	12%	0%	0%	100%

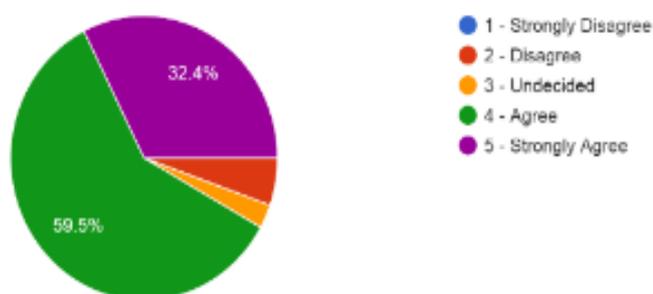
From the above table it is visible that vast majority of the students felt that their clinical education was effective in terms of fulfilling their learning needs, support of instructors and their ability to deal with students, learning environment, and supervision available to them as well as the evaluation of their performance. However, there were few participants who were undecided on their responses about some of the aspects of clinical education. Their response rate is presented below for each questionnaire to provide a clear picture of students' perspective about clinical education.

Learning objectives of the clinical education:

1. An aggregate of 91% of students either agreed or strongly agreed that they have been provided with the learning objectives of the clinical placement on the first day whereas 3% of student were undecided and the remaining 6% disagreed to it.

Figure 4 Placement Objectives Provided

1. Provided with the objectives of the clinical placement on the first day
37 responses

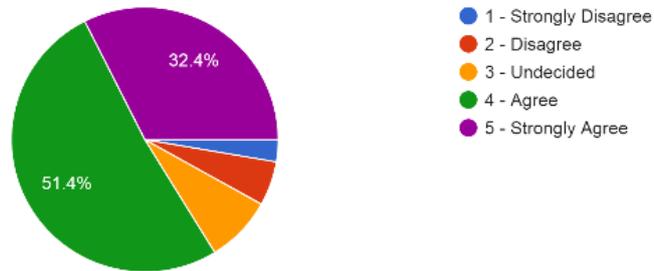


2. An aggregate of 82% of students agreed or strongly agreed that their clinical education was in alignment with the objectives of the placement whereas 9% of students were undecided and the remaining 9% either disagreed or strongly disagreed to it.

Figure 5 Placement Objectives Aligned

2. Clinical education is in alignment with the objectives of the placement

37 responses

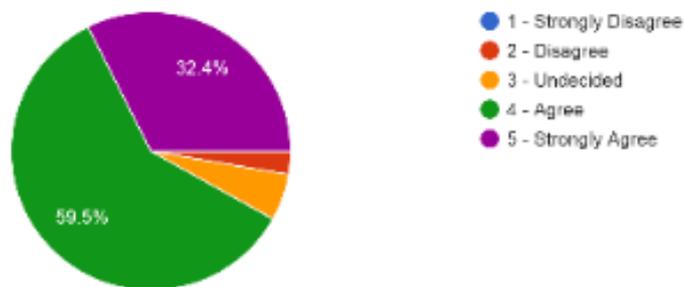


3. An aggregate of 94% of students either agreed or strongly agreed that there was a link between educational objectives and expectations of the clinical educators from students whereas 3% of students were undecided and the remaining 3% either disagreed or strongly disagreed to it.

Figure 6 connection between placement objectives and expectations

3. There is a link between educational objectives and expectations of the clinical educators from students

37 responses

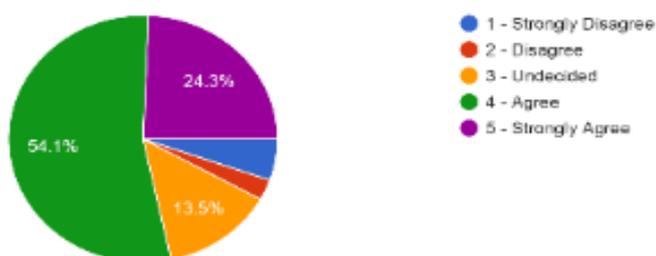


- An aggregate of 79% of students either agreed or strongly agreed that there was compatibility between theoretical curriculum and clinical activities, whereas 15% of students were undecided and the remaining 6% strongly disagreed to it.

Figure 7 Compatibility of the curriculum

4. There is compatibility between theoretical curriculum and clinical activities.

37 responses



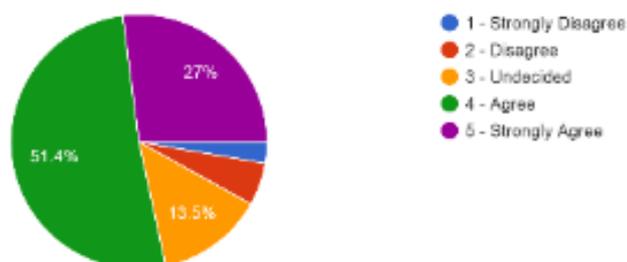
Instructor:

- An aggregate of 79% of students either agreed or strongly agreed that their clinical educators provided full support to them, whereas 12% of students were undecided and the remaining 9% strongly disagreed to it.

Figure 8 Support for students

1. Clinical educator provides full support to the students

37 responses

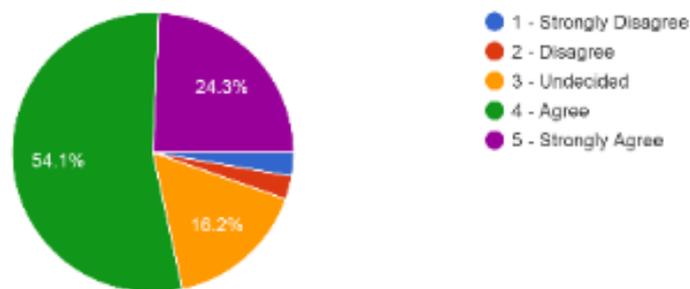


2. An aggregate of 79% of students either agreed or strongly agreed that their clinical educator deal with them effectively, whereas 15% of students were undecided and the remaining 6% strongly disagreed to it.

Figure 9 Dealing with students

2. Clinical educator deal with student effectively

37 responses

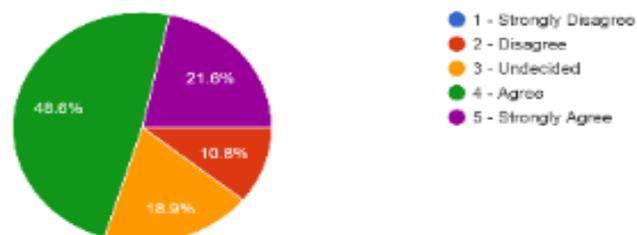


3. An aggregate of 70% of students either agreed or strongly agreed that the clinical educator has a good understanding of the physiotherapy curriculum that the students' studied at their University/College, whereas 18% of students were undecided and the remaining 12% strongly disagreed to it.

Figure 10 Curriculum awareness

3. Clinical educator has a good understanding of the physiotherapy curriculum that the students' studied at their University/College.

37 responses

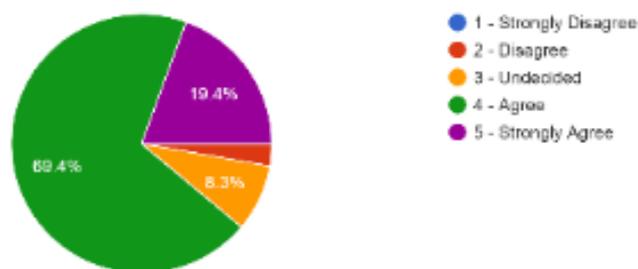


How to deal with students in clinical settings:

1. An aggregate of 91% of students either agreed or strongly agreed that their clinical educators have necessary cooperation with them, whereas 6% students of were undecided and remaining 3% strongly disagreed to it.

Figure 11 Cooperation between clinical educators and students

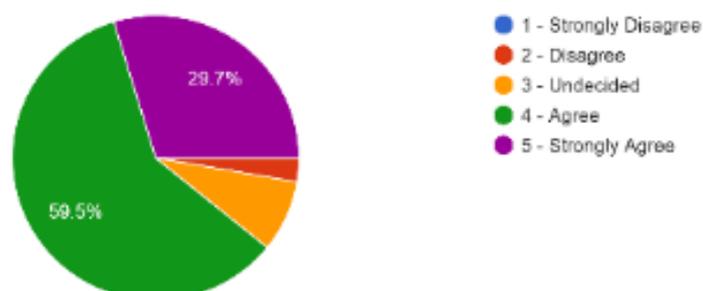
1. Clinical educators have necessary cooperation with students.
36 responses



2. An aggregate of 88% of students either agreed or strongly agreed that the clinical educators allowed them to make decisions in patient care planning, whereas 9% of students were undecided and the remaining 3% strongly disagreed to it.

Figure 12 Opportunity to the students for decision making

2. Clinical educators allow the students to make decisions in patient care planning
37 responses



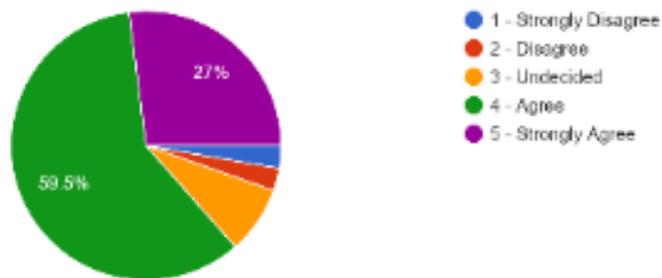
Clinical environment:

1. An aggregate of 88% of students agreed or strongly agreed that there were enough patients for learning, whereas 6% of students were undecided and the remaining 6% strongly disagreed to it.

Figure 13 Caseload for the students

1. There are sufficient number of patients for learning

37 responses

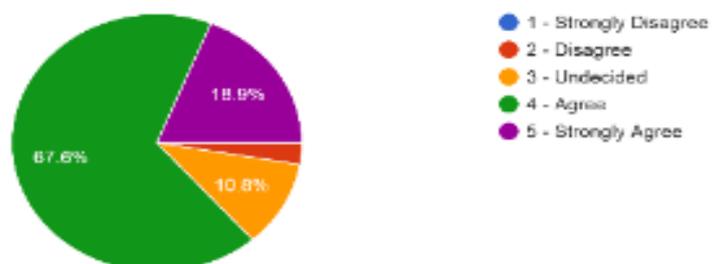


2. An aggregate of 85% of students either agreed or strongly agreed that there were enough facilities within the department as well as in the hospital, whereas 12% of students were undecided and the remaining 3% strongly disagreed to it.

Figure 14 Facilities available to the students

2. There are enough facilities within the department as well as in the hospital.

37 responses



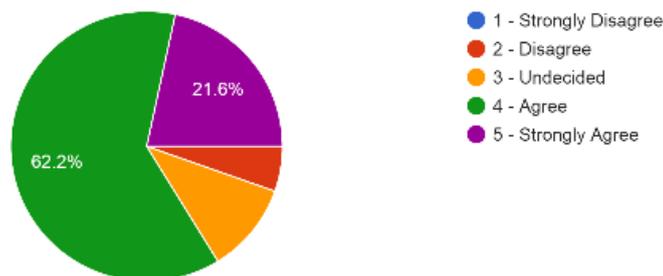
Evaluation and supervision:

1. An aggregate of 85% of students either agreed or strongly agreed that there was always a supervision during the clinical training, whereas 12% of students were undecided and the remaining 3% strongly disagreed to it.

Figure 15 Supervision

1. There is always a supervision during the clinical training.

37 responses

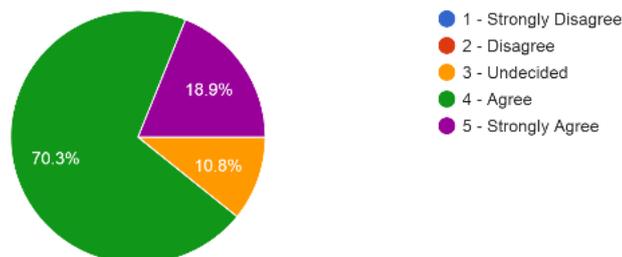


2. An aggregate of 88% of students either agree or strongly agree that one to one performance evaluation of the clinical placement was provided to them and the remaining 12% were undecided.

Figure 16 Performance evaluation

2. One to one performance evaluation of the clinical placement is provided

37 responses



Findings from quantitative data concluded that there was no significant difference in students' clinical reasoning levels after the completion of 12 weeks of clinical education when compared to their baseline level at the start of the clinical placements. But high level of satisfaction was noticed among the undergraduate physiotherapy students' which was evident in results of students' perspectives about clinical education. However there seems to be gaps in the physiotherapy curriculum, clinical educators' understanding of the curriculum, and the clinical education activities including the environment as few students were unsatisfied with their clinical education experience and expressed disagreement to the statements about their perspectives of clinical education. Considering the small size of sample that was available for this study, the researcher assumed that there was a gap in the effectiveness of clinical education as there was dissatisfaction from fewer students which may be one of the reasons that the change in students' clinical reasoning skills were not significant. To further explore these factors associated with effective clinical education and also the factor affecting the development of clinical reasoning, a qualitative study with semi-structured interviews was conducted with the clinical educators and also with few selected students from those who participated in the phase 1 quantitative study. The researcher believed that this type of a study would help him in exploring the multifactorial research problem of this study. Findings of qualitative study is presented in the following section.

4. 4 Phase 2: Qualitative Study

This second phase of study started was conducted from March 2018 to July 2018 and included both the undergraduate physiotherapy students and their clinical educators. Semi-structured interviews were conducted with willing clinical educators who were working at different facilities that provided clinical placements for the students of the host institution. In order to get a deeper understanding of the factors underlying effective clinical education and the factors that

affect the development of clinical reasoning skills in turn the professional practice readiness, the researcher wanted to interview the undergraduate physiotherapy students as well. Few randomly selected students who have completed in the phase 1 quantitative study were also recruited for this second phase.

4.4.1 The process of conducting the Qualitative Study

During the above said period when the qualitative study was conducted, the undergraduate physiotherapy students were attending clinical placements at 10 hospitals within the Emirate of Abu Dhabi. So, this study targeted clinical educators who were working in those hospitals. The researcher approached the clinical educators through proper communication channels and invited them to participate in this study. Purposive sampling method was used to recruit the clinical educators as participants in this study. To teach and assess the physiotherapy students during the clinical placements, the physiotherapists working in the affiliated sites must attend a clinical educator workshop conducted by the physiotherapy department of the college of health sciences. Participants needed to meet these criteria and, they should have involved in the clinical education during the time this study was conducted. The researcher contacted the participants through the lead clinical educator(s) and/or the head(s) of the department of each facility that was included in this study. The need to follow the channel of communication demanded the researcher to take this approach to reach the potential participants. Upon receiving the willing participants and their contact details from primary communication point the researcher directly approached those clinical educators who were willing to contribute to this study via email and phone to confirm their availability for this study. Then the research sent out a formal customized email to clinical educators to explain the purpose of the study and asked them to confirm their available time for the one to one interview.

4.4.2 Collection of Qualitative Data

The researcher received confirmation from the participants with varied time and date of their availability and accordingly the researcher set up the interview. In almost all cases, the researcher visited the participants' workplace to conduct the face-to-face interview. Privacy was ensured to the participants during the interview by arranging a quiet place for private conversation. At the start of each interview, the researcher explained the purpose of the study again to individual participants' and reconfirmed their willingness to participate in the study. The researcher also obtained the participants' consent to audio record the interview. The researcher thought that it was necessary to audio record the interviews, because the conversation will not be tuned out by a recording device and it will not alter the information said by the participant as a result of interpretation and it records the words as spoken and in the same pace. According to Fraenkel, Wallen and Hyun (2015), "No matter what kind of interview one conducts, and no matter how carefully one prepares the interview questions, all will be to no avail if the interviewer does not capture what the interviewee actually says. While the interview is going on, therefore, it is essential to record as faithfully as possible what the participant has to say. Some method for recording an interviewee's word exactly is required". In addition to the audio recording, the research also made handwritten notes of the key points discussed by the participants during the interview. Researcher respected the participants consent for audio recording and if they were unwilling as it was the case with very few participants where the researcher made in-depth handwritten notes of what the participants said during the interview. The researcher conducted the interview with clinical educators and students using the semi-structured interview guides (appendix C and D). Interviews with the clinical educators lasted for 30 to 45 minutes and the student ones lasted about 20 to 30 minutes.

Findings from Student Interviews:

5 students were randomly selected from each the junior cohort and the senior cohort who took part in the phase 1 quantitative study. The researcher wanted to have representation from both group of students as their characteristics differed because they belonged to different year levels in physiotherapy program. Researcher sent out customized emails to each of the randomly selected 10 students and invited them to take part in the interview. Nine students expressed their interest to participate in the interviews and all of them were interviewed. Among these five students belonged to year level 5 and the remaining four belonged to year level 4. Out of the nine student, two requested that their interviews not to be audio-recorded but they were happy for the researcher to make the handwritten notes of what they are speaking during the interview.

All the students who took part in this study were young females who were in the age group of 22 to 25. This is a vital factor when it comes to close contact with patients especially young males as the female students might be sensitive towards this aspect of physiotherapy practice which is inevitable for safe manual handling.

Findings from Clinical Educator Interviews:

Twenty-six clinical educators were willing to participate in this study. Ten of them were males and the remaining sixteen females. Ten were working in government hospitals, three in the semi government and the remaining thirteen in private hospitals that are located in the Emirate of Abu Dhabi. All the clinical educators who took part in this study were physiotherapist except one who was an occupational therapist and all of them were licensed by the Department of Health for healthcare practice within the Abu Dhabi emirate as well as in the United Arab Emirates. Clinical educators' experience in clinical practice ranged between 5 to 32 years and their average clinical practice experience was 11.54 years. They all have had clinical education

experience previously which ranged between 1 to 12 years with an average of 3.54 years of clinical educator experience. Below table provides information about the clinical educator profile.

Table 15 Clinical Educator Profile

Participant characteristics and profile		Number
Males		10
Females		16
Place of work	Government	10
	Semi-government	03
	Private	13
Years of Experience in Clinical Practice	Minimum	05
	Maximum	32
Years of Experience in Clinical Education	Minimal	01
	Maximum	12

4.4.3 Analysis of Qualitative Data

Qualitative data analysis was conducted by carefully listening to the audiotapes and the researcher first verbatim transcribed all the interview recordings. Then the transcripts were sent back to the participants for cross-checking the accuracy of its contents. Several steps were involved in conducting the qualitative data analysis for which NVivo a qualitative data analysis software was used. To gain an understanding of this software, the researcher attended a hands-on workshop about the NVivo tool at his parent institution where this study was registered. After becoming familiar with the software, the researcher imported the files that contained the interview transcripts into the NVivo 12 Plus software that was licensed for use in the researcher's computer.

According to Thabet (2018), NVivo is useful for researchers to organize, store and make a sense of information that are not structured as in cases such as data gathered from the qualitative

interviews. However, NVivo is not an intellectual thinker for the researcher, instead it just provides them with space to work and the tools in NVivo enables the researcher to analyze the data with ease. Even though there is an auto analysis option available in the NVivo the researcher chose the manual analysis in order to get an in-depth understanding of the qualitative data. NVivo was chosen over the manual because it allows easy data management without the need to print and store the hard copies of several interview transcripts and it enhances detailed analysis across the data points.

Researcher read each participants transcript individually and highlighted the key points. Comparison of the key ideas between transcripts was done to check if there were any similar ideas noted across the different transcripts. All ideas that were closely associated and have had the same concept were coded together under a common heading. Transcripts were read, re-read and reviewed number of times by the researcher to ensure that the information interpreted was accurate. Numerous codes were identified through this process and some of them are area of interest, assessment skills, attitude, cultural issues, environment, gap in curriculum, peer learning, reflective practice and willingness to learn etc. Finally the researcher compared the several codes identified across all the transcripts and during this process various themes emerged which helped the researcher in addressing the purpose of the research that is the contribution of clinical education in developing the clinical reasoning skills and professional practice readiness among the undergraduate physiotherapy students.

Holloway and Todres (2003) stated that “qualitative approaches are incredibly diverse, complex and nuanced”. Thematic analysis is a widely used method for analyzing the qualitative data. According to Braun and Clarke (2006) “Thematic analysis is a method for identifying, analyzing and reporting patterns (themes) within data”. Though it is primarily used in the field

of psychology, the scope of analyzing themes in qualitative research is not limited to this field alone and it is widely considered by other discipline researchers (Boyatziz, 1998; Roulston, 2001 in Braun & Clarke, 2006). Braun and Clarke (2006) argues in favor of thematic analysis and believes that this should be foundational method to analyze any qualitative data. The flexibility it offers to the researcher is the greater strength and a major benefit of conducting thematic analysis. Rubin and Rubin (1995 in Braun & Clarke, 2006) claimed that analysis of qualitative data is always moving because “you discover themes and concepts embedded throughout your interviews”.

Thematic analysis is more suitable for the researchers who are new to qualitative research such as in this case because it does not demand the in-depth theoretical knowledge and technological awareness when compared to the grounded theory and decomposition analysis. Braun and Clarke (2006) highlighted the potential pitfalls that a researcher should avoid while conducting thematic analysis and presented “a 6-phase guide to performing thematic analysis”. When compared to narrative analysis, grounded theory or the interpretive phenomenology approach, this approach of qualitative data analysis mostly not linked to already existing theoretical frameworks. Thus it gives the flexibility to the researcher to use thematic analysis within the different theoretical frameworks such as in this study where the theoretical framework was drawn by combining multiple theories. According to Braun and Clarke (2006) “Thematic analysis can be an essentialist or realist method, which reports experiences, meanings and the reality of participants, or it can be a constructionist method, which examines the ways in which events, realities, meanings, experiences and so on are the effects of a range of discourses operating within society”. Therefore, this study included thematic analysis to report the experiences of undergraduate physiotherapy students and their clinical educators in clinical

placements while exploring the role of clinical education in developing the clinical reasoning skills and professional practice readiness among the students.

4.5 The Research Findings from Qualitative Data

Qualitative data gathered for this study include participants' experience in clinical education. The information collected through the semi-structured interviews in phase 2 of the research was converted from a spoken audiotaped data into a transcribed text data for analysis. The aim of this section is to present the interpretations of qualitative study.

4.5.1 Underlying factors for an effective clinical education

Clinical education is an important element of physiotherapy education and in the context of this study the last 18 months of physiotherapy education was filled with clinical placements. It is vital to understand the effectiveness of clinical education that occupied the larger part of physiotherapy curriculum in order to understand the contribution it makes towards the development of clinical reasoning skills among undergraduate physiotherapy students. The findings from the quantitative data showed high satisfaction levels in clinical education experience among the physiotherapy students. But there were some factors identified in the quantitative findings as potential hindrances for the effectiveness of clinical education. The aim of the qualitative study was to explore the factors underlying effective clinical education. For this purpose the qualitative data collected about the clinical placement experiences of the undergraduate physiotherapy students' and their clinical educators' was considered as an evidence make a conclusion on the underlying factors for effective clinical education.

In-depth analysis of the participants' interviews identified several underlying factors for an effective clinical education. Some of these factors were pertinent to the students' populace and others were related to clinical educators and the physiotherapy curriculum studied at the host

institution. So, the three main themes that emerged from the qualitative data analysis were the student attributes, clinical educator attributes and the barriers in physiotherapy curriculum. These 3 were the main themes and several sub-themes also emerged under each category which are presented in the following sections to illustrate the underlying factors for an effective clinical education.

Theme 1: Student Attributes

Student related factors were mainly their area of interest, learning style, personality, cultural issues and their ability to cope up with challenges arising during the clinical placements. Each of these factors are presented below as sub-themes and few relevant examples of the excerpts from the participants' interviews are used in each sub-theme as quotes to explain how these factors determined the effectiveness of clinical education.

Area of interest:

Clinical placements for physiotherapy students at this institution were focused on the areas of musculoskeletal, neurology and pediatrics, general medical and surgical conditions. Students attended their clinical placements on a rotation basis covering all the specialty areas mentioned above and the placement duration in each of these areas was for a period of 4 weeks. So within the 12 weeks period they were expected to complete all the core specialties mentioned above. Placement rotations were planned at the faculty level by taking into account the curriculum needs and the capacity framework for student placements at the partnering institutions of the host institution. Findings of the interviews showed that the placement focus should be in line with the students' area of interest to enhance their learning experiences. Each student's interest seemed to vary but the practice placements were aligned to meet the learning objectives of the physiotherapy curriculum.

Some of the clinical educators felt that the students' interest should be taken into account before placing them in a particular specialty for clinical placement rotations. Clinical educators thought that the placement focus should be aligned with students' interest so that it would motivate their willingness to learn and enrich the learning experience. This was evident in the clinical educators' interviews and the following are examples of clinical educator interview excerpts from where it can be concluded that the area of interest was one of the factors that determined the effectiveness of physiotherapy clinical education.

One of the clinical educators said during the interview that the students were motivated to learn when they liked that area of specialization.

Some really like this specialty and I think it motivates their learning. (CE 10)

Another clinical educator have had a similar view and said that the students' interest had an influence in their learning in clinical setting.

This depends upon the student's interest. We have here outpatient and inpatient departments. For the outpatient department the focus is on musculoskeletal conditions and the inpatient focus is on neurological rehabilitation. So, I found some students are really interested in and willing to be in the outpatient than the inpatient. (CE 11)

A student also expressed similar view which was evident in the finding of student interview.

In the last rotation I was in stroke unit. I don't like neuro, so it was bit difficult. If you compare the neuro patients to musculoskeletal patients, they are much more difficulty to do the assessment, position and explain. (ST 5)

One more clinical educator reported that the student he had was not interested in dealing with children so he thought it would be good to align the practice placement to match students' interest.

We should ask the student first, what do you want to gain from this clinical placement? Because I found, one student that was with me for pediatrics clinical placement and she was not interested in pediatric rehabilitation. (CE 12)

There is a close association between the students' interest and their knowledge level. The type of cases and the complexity involved handling those cases determined interest of students as stated by a final year student,

Even now I am struggling to handle pediatric cases. I think I have knowledge gap and also, I don't like it much. (ST 3)

Learning styles:

The findings of the interviews with physiotherapy students showed differences in students' learning styles. Some students seemed to be highly enthusiastic and motivated to learn while the others were not. Two clinical educators have confirmed that there was a difference among the students' in the way they learn during placements.

I can see the difference between the students. I have noticed few students were more enthusiastic and majority of the students are enthusiastic but not consistent. (CE 1)

I think it also depends upon the students' group. I felt some were lot more eager in that perspective and quickly ask us if there are some literature on earth on this topic. (CE 4)

This could be because of the individual student's characteristics or their knowledge level and ability to communicate. One of the clinical educators stated that some students learn faster than the others.

Some learn quicker than the others and some could do it towards the end and some even toward the end they were not able to do it. (CE 21)

Two other clinical educators reported that the students' abilities were not the same and some outperformed the others.

It depends on the students. Some students are always stronger than the others and they are obviously going to get up. (CE 9)

Every group of students is different. In each group there is someone who is highly skilled or someone who is moderately skilled or someone who doesn't care. (CE 26)

Another clinical educator stated that the students' confidence level influenced their learning in clinical setting.

Not all are at same level. Some are not proactive. They are anxious and there is a fear. They are not confident, and they have a feeling that they may harm the patient. So they are apprehensive. (CE 24)

Personality of the student:

Inquiry based learning is what expected from an experiential learning. Since clinical education is all about learning from experience, students were expected to learn through questioning approach. It was found that the inquiry based learning ability depends upon the personality of the individual student and their confidence level and also the ability to interact with others in

the clinical placement site. Clinical educators have stated during the interview that the personality of the student determined their ability to learn through a questioning approach.

It is personality, are they really eager to learn? Some really wanted to learn nothing but some understood this profession. There are some students that you can see are really proactive and be comfortable in asking us. But some needs to be guided and need some encouragement to involve themselves in the patient care and any activities. (CE 10)

It depends on the personality of the student. If the student has good self-confidence, she can interact with the patient, interact with the clinical educator and other therapists within the team. (CE 12)

Some educators said that they have to often facilitate the questioning approach to learning.

Some of them are really good. I can't paint them all with the same brush! My last student was excellent but the one before that was not really very good. We have had to encourage them to ask more questions and the more confident student will ask us questions but the shy, less confident student tend to still retrieve back and not forthcoming with information. (CE 7)

Students vary. Some students ask more questions than the others. But I find lot of the time they need quite a bit of prompting. (CE 16)

Self-directed Learning:

It was found that self-directed learning is another vital element for successful clinical education. This largely depends of the students' willingness to learn on their own using a reflective approach. Self-directed learning was hindered by lack of imitiveness and self-reflection. The below interview quotes from clinical educators confirms supports this finding.

Some of the students will seemingly self-reflect themselves or go and do some self-study but in terms of collaboratively discussing cases between themselves and with me, it's only typically when I encourage them to do that. (CE 23)

You find students who are very proactive, do lot of questioning and they are very inquisitive. On the other hand there might be a passive student who would need a lot of prompts. (CE 25)

Cultural issues:

Culture played an important role in providing an effective clinical education to the physiotherapy students while they were on placements. All the physiotherapy students were females and the clinical educators' felt that the local culture influenced the students' learning experiences. Findings showed that the students were not comfortable in handling the opposite sex patients and, they faced difficulties to mingle with male clinical educators. The following excerpts from the clinical educator interviews suggested that the culture had an influence on learning in the clinical settings.

Two of the clinical educators said that the students were hesitant to treat male patients.

Challenge sometime is more culturally, example when I use to take our female students to see a male patient, I have seen many of the students initially expressed the concerns to see the male patient. (CE 1)

Interaction with the others is restricted by the cultural background. Only some of them are social with the males and the reason for this is culture more than anything else. Even while dealing with male patients you need to tell them to come closer and speak to the patient. Sometimes they don't feel very comfortable. (CE 2)

One clinical educator said that it took a sometime for the student to adjust with a male educator.

Most of them, because of the social culture here, if I am man and she is a female student for example, then she takes more time to be familiar with me and also if the patient is male or a pediatric patient is for example is 14 or 15 years old in the adolescent period, then there is some shyness between the student and the therapist or the patient. (CE 12)

During the clinical placements, students are expected to develop their hands-on skills. It was reported by the clinical educators that the students were hesitant to do physical contacts with their patients which is essentially a part of the patient assessment.

They should getting (sic) used to touching men and understanding that is part of your profession. You are doing it because this is how you are going to assess what is going over this patient? (CE 17)

When we ask them to practice on us, they were very shy and nervous to do that. So that does come across with patients, so if you are not confident with your skills and not confident with what you are feeling, and the patients going to feel that and know that may be you are not so certain about what is going on. (CE 17)

They are all females so there is sometimes like a shyness or cultural, may be lack of confidence when they are asking patients to appropriately undress and hand-hand contact, palpation, facilitation. (CE 23)

Some of the students also reported that they become introvert when they are supposed to deal with local patients highlighting their cultural sensitivity.

How to deal with patients without any fear of touching the patient especially the males.

In my first placement I didn't see any male patients. (ST 1)

I am a little bit shy in dealing with patients especially if they are locals. (ST 5)

Coping with challenges:

In the context of this study, the clinical education environments were usually acute care hospital settings that are dynamic in nature and the learners' need to deal with people from diverse background during their clinical placements. Findings of the interviews concluded that, in a day to day business within the hospital settings the students may experience some or many challenging situations and their ability to handle those challenges played an important role in their learning experience. The ability to cope with challenges was depending on the students' characteristics and some were stronger than the others as reported by the clinical educators.

Some students we would find them raising to the challenge and although they would be uncertain they would really try and get in there and help and try to find ways. For some students they would find it too overwhelming and they would sort of shrink back. So it really depends on the character of the student. (CE 3)

We have had 4 different students. They have all reacted differently. It is their personality, some are more confident and they will tackle it on and would ask guidance from us, they are not scared to ask upfront, while the others I found would shy away from it and avoid situations like that and they would not want to address it. (CE 4)

In challenging situations the students were seeking help as reported by the clinical educators. This approach of students was appreciated by the clinical educators as they thought that it was

normal for any student to not know what to do while facing a challenge in real-life situation and seeking help in those circumstances was wiser than shying away.

Sometimes they have challenging patients who are refusing to treatment or family members requesting more therapy when not indicated and issues around discharge planning. They are quite good at communicating with the patient and their family members in a very calm way. They know when to seek assistance and refer back to clinical educator for further guidance. (CE 16)

Abrupt reaction to the situation and some may cry. They cannot control their emotions. Some of them will say that I will not go to that patient. In ICU's they will generally cry. Some are asking our guidance and support. (CE 24)

The personality of the student played role in overcoming the challenges during practice placements as reported by one of the clinical educator,

In one of the session we have had two students and myself. Patient was really challenging, lot of ways not onboard with what the plan of treatment was, and in an agitated state, and was not agreeing with the plan of care. One student was leading the session at that time, she got really nervous and almost gave up, and wouldn't want to talk to the patient at all. I think, she was just taken back by the whole situation and couldn't cope up with it. On the other hand, the second student did take over and she was able to really communicate with that patient in a way that the patient actually left the session agreeing to plan of care. So we had two personalities there. (CE 25)

It was also reported that the ability to manage challenges will develop through experience and support.

Challenging situations...I wouldn't expect the student to be able to manage it perfectly.

I think that is something that will come with practice and experience. (CE 7)

A clinical educator felt that it was necessary to give these experiences in which they are challenged in real-life situations so that they can develop these skills through experience.

There was a scenario where I purposely put the student with a post coronary bypass graft on day 1 after the surgery and the student was little bit fumbling with the lines and the patient picked up that non-verbal cues and became little bit aggressive and I still let the student be in charge of the situation and try to manage that in good sense. (CE 15)

Students also felt that the experiential learning challenges during clinical education has made them to realize her strengths and weaknesses.

It was nice and very good experience. I understand my strengths and weakness. I took the challenges and learned from my experience. (ST 2)

I was very nervous in the beginning. I wanted everything to be perfect and I wanted to prove myself in the clinical placement and to have a nice reputation but then I learnt that it all comes with experience. I calmed myself down. (ST 8)

Some of the students felt that their challenges during clinical placements were more of emotional and they would need to develop their ability to cope with those challenges.

Sometimes we face patients with amputation who has psychological issues. Sometimes I feel like crying so that aspect I need to improve. (ST 1)

I cried twice when I was seeing dying patients. I was feeling emotional and even the educator was telling me to control my emotions. I still feel the same and sometimes I drain. (ST 5)

Few students also reported that their workload including hours of practice and the number of patients that they were supposed to handle in a day was a challenge as their expectations about the placements were different.

At the beginning, I thought I will only observe but when I went I saw 5 to 6 patients on my own which was difficult in the beginning and now I am okay. (ST 1)

Timing was not easy and it was too long without break. Handling patients was a big challenge. Setting goals and seeing progress was the main challenge. (ST 6)

Few other students thought that it was difficult for them to adjust to their educators' expectations and teaching strategies their educators used influenced their ability to cope with the challenges during the placement. The following excerpts from the students' interview supports this argument.

I had my expectation for the rotations and I want to learn how to assess the patient and how to treat. But in the hospital they will not tell which patient I will take to assess and treat. For example they will suddenly choose a patient that just came and ask me to assess. It is better they tell me before so that I have my plan. (ST 7)

On my very first placement, I had to treat an elderly patient. She was not happy for the treatment ending soon and she started shouting at me. My educator came and solved this for me and supported me. She stayed calm and taught me how to deal in such situations. (ST 9)

Theme 2: Clinical educator attributes:

Data analysis also revealed some of the factors influencing the clinical education corresponds to the clinical educator characteristics. These include the workload of clinical educators, their knowledge of the physiotherapy curriculum that the students studied in their college and the instructional strategies they imply to teach students on placement. These factors are presented as sub-themes in this section along with few participants' interview excerpts as quotes to explain how the clinical educator attributes influence the effectiveness of clinical education.

Clinical educator workload:

Clinical educators reported that their workload is a major factor that determined if they were able to support the students during their placements. One of the clinical educators felt that teaching and assessing students needed lot of time but their priority on a day to day business was to provide safe and effective patient care.

Time and workload is an issue because the expectation on this curriculum they do depend on more of clinical evaluation as well as training. So as a clinician I need more time to concentrate on this aspect (CE 1).

It was evident that the clinical educators are primarily physiotherapists responsible for providing patient care and teaching the students on top of their main clinical role was a huge ask for them. There was no support offered to the clinical educators in terms of their workload as they were expected to be as productive as their colleagues who were not involved in clinical education. Another clinical educator said that,

Teaching students is a bit challenging for us here especially with our workload. The support and the time is a bit challenge for us (CE 10).

Few educators thought that they were unable to extend their full support to the students on placement though they were keen to do it. Performing the dual role of clinician and clinical educators was a burden for them and they reported that at times it compromised the quality of clinical education experience that they wanted to provide for the students.

The problem I have as clinical educator full time is that when the clinical case load is so busy, the time you have for students is often prioritized off because you would start doing evaluation for patients ready for discharge. Sometimes you are trying to teach the students at a particular time, you might want to sit down and specifically go through their notes but you might be pulled in several directions to attend MDT meeting and/or other things. (CE 16)

I think it's hard for us to have the main responsibility during that time both in fairness to the students and in fairness to the practitioner in order to continue the same amount of work and the same quality of work with the added load doing education to the students. Because it take (sic) a lot time. The more time you take they more they benefit. There is a potential compromise either to patient care or to the student education. (CE 21)

Some students also reported that their clinical educators were mostly busy with patient care and they haven't had enough time to teach the students on placement.

When we go to private hospitals, there are not much patients at times and in this time we sit together and discuss, but not all the sites. Because in some of the hospitals they are busy with the patients. (ST 1)

They were welcoming, but educating the students was not that much, they don't concentrate on that. They concentrate more on the patients. (ST 7)

Knowledge about students' curriculum:

Some of the educators said that they were not having adequate knowledge of the physiotherapy curriculum that the students studied in the college and this had an impact on the clinical education.

I am not 100% aware of what is taught in your curriculum. I use to refer to the materials given from the college, but I cannot take 100% of the information given to me. (CE 1)

Actually we don't know what they have learnt. I as a clinician doesn't have enough knowledge and background of the curriculum and relying on the student information about their background knowledge. There is a gap here. (CE 13)

Though they would be aware of the physiotherapy curriculum in general from their own background it is vital to know the learning objectives of the curriculum that the students are studying. Two of the clinical educators have stated in their interview that there were gaps in their understanding of the curriculum studied at the college.

I don't know what the background is for them. I know the general physical therapy structure. (CE 18)

We didn't particularly have much information about what they have studied and what they have learnt (CE 23).

In contrary a student said that she expected the clinical educators to teach what she has not studied in the college, but the clinical educators reported that they are not aware of the whole curriculum.

Educators needs to explain to us. They have to explain about pediatrics and electrotherapy which we didn't learn much in the college. They need to give feedback to know my weakness and strength to improve myself. (ST 7)

Teaching strategies:

It was evident from the clinical educators' interview findings that they have had different approaches to teach students in placement. Empowering students to make their own decisions was helping them with their clinical reasoning skills as reported by two clinical educators,

We are not giving spoon feed. We are trying to analyze what are the things they can do as a physiotherapy students? We are giving the diagnosis but allowing them to make their own judgement about what approach they are planning to use for that patient. (CE 5)

I don't allow them to go blind. The only reason is that I am trying to empower them and give them prior information. (CE 15)

Making the students to reflect on their knowledge helped them to develop their reasoning skills.

One of the educators stated that,

We make them do the presentation to the team, they sit and reflect on their theory to that individual case and present it to the team. I think it really helps. Often, we sit with them and ask them to reflect why they made that decision and what their clinical reasoning

is and also we ask them to do a presentation on a particular case. I think that helps them to think about clinical reasoning, why they are doing what they are doing. (CE 9)

Bedside teaching was reported to be an effective way of teaching students during their placements.

Where it is an appropriate patient, I like to discuss the case in front of the patient. Sometimes the best time to discuss the cases is when the case is there rather than like the next day, because you can't just tell, how do I hold it and do that test? And what would I expect to feel? (CE 23)

Providing prior information of the cases helped the students to learn effectively and overcome the gaps in knowledge during the placements which is highlighted in the following clinical educator interview quote.

They might have theoretical gaps; you can direct the student to go and read about it. The other ways are for the students to prepare in advance about the patient. So, they have an access to what patients come in the next day. That gives them some work to do at home. The more prepared they are the more they are able to apply their knowledge with their patients (CE 25).

Students have reported that their clinical educators teaching strategies played a crucial role in their clinical education experience. Findings showed that the educators have had different approaches to teach students which influenced their learning experience. Understanding the students' learning needs was vital to provide effective clinical education. A student reported that,

Sometimes it was not safe for me because they use to send me alone to see the patients. But I am scared and nervous thinking that if something goes wrong with the patients. I understand that they want us to be confident but we do not have much experience, so I am worried. Sometimes they didn't even ask what my learning need was, but if we tell them they help us. (ST 2)

Allocating time for teaching, welcoming and involving students in patient care and, flexibility in teaching approach were reported as factors that were positively influencing the clinical education

Some of the educators were friendly and they know the how to teach students and they were flexible. They were welcoming us. One therapist really supported me in being independent but not all of them are same. (ST 3)

She gave enough time for me to accommodate and then asked me to deal with the patients. First two weeks were only observation and it was in the third and fourth week I started to assess and treat patients. (ST 4)

Educator was kind and he made me to open up. He helped me to mingle with the team. I am very shy person, but he helped me. He will drag me and ask me questions always that's how I opened up. In my last rotation, neuro, since it was not my area of interest and I didn't know much, the educator took lot of time every day to explain me the conditions and how we will treat it etc. (ST 5)

In contrast to the above, directing the inappropriate cases to the students and lack of supervision were the factors that were reported to be negatively affecting students' experience in clinical placements. The following excerpts from students' interview confirmed these findings.

Sometimes I felt that they just wanted to finish their work. Sometimes they just gave the passive cases to students which I felt affected the students learning. (ST 3)

I wasn't supervised. I go to the patient by myself from the beginning. They ask me to go to the patient and you have to do these like range of motion and strength. But there is some special tests that I need to be supervised. I want to make sure if I am doing that proper or not. (ST 7)

Theme 3: Curriculum Barriers

Physiotherapy faculty members' support in the clinical education, placement expectations and duration, preparation for placement and, peer learning opportunities were among the curriculum related factors that determined the effectiveness of clinical education. These are presented as sub-themes below along with few quotes from participant interviews as examples.

Faculty involvement in clinical education:

Many clinical educators said that they would need the support of faculty members in clinical education and they felt that involvement of faculty members in clinical education would benefit the students learning and will help to bridge any gaps. Findings showed that the faculty members who have taught the students in the college are involved to some extent in the clinical education, but it was more of discussing the student progress. They have not been involved in direct supervision, teaching and assessment of students. This would also make the students' clinical performance evaluation as a reliable measure when it was done by both the clinical educators and the faculty member involved in clinical supervision.

I feel there is gap, between us as the clinical educators here and the university. We do meet with the clinical supervisors once a week, but I do feel it needs to be more of a practical session than just us sitting with the supervisor and discussing something.

Maybe we can do an assessment session together with the student in the first two weeks then in the last two weeks we can do a treatment with the students, so we can correct them. It would make the marking also a little better way. (CE 4)

We would like to have more help from your side. The communication between us and the clinical supervisor and the students' the link is missing. What happens is like we are dealing with the students, the supervisor is dealing with the students, but connection is nowhere. Academic supporting the actual clinical education is needed. (CE 14)

Some clinical educators thought that the academics should have more time to support the students learning in clinical site.

If you can increase the number of visits from the college to be twice per week, it will be better. You can give them tasks or objectives to discuss. (CE 11)

The clinical supervisors from the college can join with the students' especially in follow-up cases and help the students (CE 13).

It would be better if somebody allocated to students to dedicate more time. Clinical tutor would go through specific topics and in-services, things like documentation, and would also see patients with students within her protected time. (CE 16)

One of the clinical educators working in a private hospital felt that the faculty members must get involved in clinical education to enhance students learning and also to reduce the clinical educators' workload.

More faculty involvement is needed to focus on the student and to take the little bit of burden out the clinician. Perhaps they can observe the patient care and go and discuss

about it later. To have once a week session, where you either have patient session or patient demonstration or sit and discuss case studies. (CE 21)

Another clinical educator felt that it was necessary for the academic members to get involved in clinical education to bridge the theory practice gap.

Academic is different than practice so need the supervisor support. Theory-practice gap to be addressed by the faculty supervisor (CE 22).

However, one of the educators working in a private sector had a contrasting view as she felt that the involvement of faculty members in clinical education may take away the clinical educators' freedom and this may confuse the students.

Every week one came in and that is good. If there is too much involvement the students get confused. Minimal faculty involvement I think is good. If you have to come here every day then it will take away the clinical experience from them. They need to feel as a part of the team here. When someone from outside is coming, they will stuck (sic) between the two. They are not really getting the experience. (CE 6)

Placement expectations:

From the findings it was noted that some of the clinical educators were not fully aware of the placement expectations. They were keen to know about the student levels, what is the academic background for the students and the placement objectives. They thought that these would help them to educate the students effectively during their clinical placements. The below interview quotes from two clinical educators confirms these findings.

There is an expectation for the clinical placement. I try to fit our department into that expectations. We are not able to meet all the 100% of what is expected. Anywhere

around 50 to 70% depending upon the availability of the conditions. For example, in musculoskeletal, there is a clinical “Pilates” as one of expectation, but we don’t do that one here. So, there are some exceptions. (CE 1)

It would be good if you could let us know your expectations and on what to mentor the students. It will good for us the educators to understand what the college wants from us? (CE 10)

There seems to be some mismatch in the expectations between the curriculum demands and clinical educators’ expectations.

We were asked to consider them when as in the fourth year they were like a physiotherapist. So that level was not there. The expectation given to us was higher. (CE 14)

Placement focus seems to be missing in some of the placements due some reasons and this might affect the students’ learning experience.

They are coming here for neurology postings. But unfortunately, we do not have a separate neurology clinic here. They cannot see what they are posted for. It is big gap. Make sure if they are going to neurological placements, they must see at least 50% of cases should be neurology. The supervisor should identify this gap and sort it out. (CE 13)

Similar view was reported by a final year student,

The placement focus was not maintained. (ST 3)

Clinical educators have said that it would be a good idea for the students to know the expectations of the placement sites and prepare themselves accordingly so that they can get an enriching learning experience during their practice placements.

If we could have an understanding initially about what we expect from the students, so when they come they already have some idea of what kind of conditions they are going to see, what type of a setting it is, so that is not a so much of a shock and also what's our expectations for them would be, for example, with not all of the students, with some we found punctuality was a problem or they didn't really know what was expected, so somewhat of a shock. (CE 3)

Few clinical educators were also expecting the students to have pre-reading and/or placement focused course works prior to the placements and demonstrate what they have learnt in the college so that they can assist their learning.

Whenever they are out on a clinical placement, if they have a pre-reading or course work prior to that based on the similar postings it would be good. (CE 20)

If they have done like a musculoskeletal module and they had some basic training on questioning of a patient, history taking, objective assessment, red and yellow flags, progression of exercises, if they have had these and when they come, we should expect to see that. But if they haven't because if that placement is happening afterwards or, then I think it will help our expectations. (CE 23)

Some of the students have reported gaps in expectations of their placements. Findings showed that their placement expectations were not fulfilled in some sites.

In some facilities, we felt there is nothing more to learn. In the last placement where I went, I thought I learnt new things and I saw new cases. (ST 1)

Students' also felt that the clinical educator expectations were unrealistic at times and the feedback they provided were not meeting the students' expectations which indicates a clear mismatch of expectations between the parties.

Some educators, even if the student did very well, they will still put low marks without much reasons. If we ask, they would just say that it is midway so it is okay, and you will improve in the final evaluation. But I want to know the reasons for low scoring so that I can work on those areas. Expectation from the educators were too much. (ST 5)

Students also reported gaps in clinical education strategies apart from the mismatch of expectations between the clinical educators and themselves.

I wanted to see different cases and I want someone to explain to me, but this didn't happen. They have to reduce their expectation and should not expect everything from student. (ST6)

Educators must have a plan for us. They have to have a plan for us for every week. (ST 7)

Couple of students also reported issues with their clinical educators' attitude towards them and they felt some of the educators were disrespectful towards the students.

They were aggressive. Some are welcoming and some were not. They just ask us to take lots of cases. I expect to be with educators who are updated. Try to support the students in their learning. (ST 5)

We are not supposed to do cleaning job for them. I am there for learning from seeing patients. (ST 6)

Variety of placements also seems to affect the clinical education experience as shown in the following excerpt. One of the clinical educators reported that the clinical placements provide excellent opportunities to the students to understand the different settings of practice.

They are getting to see lot of variety with different placements. Public sector and the private sector and how the functioning is? What kind of approach is done with each patient in each setting and how it is different between settings from public to private? In this country you see a wide variety of physios coming from different backgrounds and experiences. (CE 20)

Placement duration:

The duration of placement seems to play an important role in providing an effective clinical education experience. Both the clinical educators and the physiotherapy students have reported that the length of the placement was short to meet the learning objectives of the clinical education and they were expecting and recommending to have a longer duration placements in order enhance the learning experience. Few clinical educators have said that the students' usually takes some time settle in a placement and with shorter duration placements there is a drawback that the students might look unsettled in all of their placements as they will have to move to a new placement site by the time they get settle at one site. This seemed to affect the clinical education experience.

We found is that the placements are very short. You are trying to get the student fully oriented to the clinic. We really feel that in this region that 6 weeks placement or 8

weeks placement, probably 6 weeks is ideal for placement. 4 weeks is definitely too short. (CE 15)

Placement for 4 weeks are quite shorter. Students take some time to get oriented to the hospital and we have electronic records and to be familiar with. So perhaps longer placements for minimum 6 to 8 weeks may be the student would be more benefited. (CE 16)

Duration of the placement should be longer. I think it should be at least 8 weeks. Because by the time one month is completed that's when the student is actually getting comfortable. Getting used to the flow of things and that gives the students more time to get used to documentation and getting adjusted to all the other clinicians, comfortable asking questions. Getting used to patients and been able to develop a case load. (CE 17)

Students also had similar views that the time allocated to their clinical placement rotations were not sufficient for them to get accommodated and learn.

Maybe we need more time. One month is not enough to achieve all the learning objectives. (ST 7)

It was a good experience. I always felt it was short in some placements. Especially in neurology cases. (ST 9)

It was also reported that continuous placements blocks seem to be affecting the placement experience. One of the clinical educator reported that the students' become tired because they are doing fulltime placements of blocked nature at the end of their program and he thought that it would be good if the students do a placement and go back to college for some academic course and then return to placement for another rotation to ease of their physical burden.

I think having back to back placements seen students' tiring mentally and physically.

(CE 23)

Preparation for clinical placements:

Students have reported gaps in preparation for their placements and suggested that early learning experience in clinical settings may enhance the clinical education.

We must be prepared in different ways. How to deal with patient should be taught early.

We know nothing about pediatrics and there is a huge gap. Infection control, consent taking, and manual therapy skills are lacking. (ST 4)

When I went to clinical, I thought I had all the knowledge. But in reality, I felt that I have to read more and update myself to cope with placement, especially the assessment and treatment. (ST 5)

Opposing to the above quoted views, another student thought that she was well prepared for the clinical education and she felt it during her clinical placements.

When we use to get short deadlines, lots of feedback, maybe we took it as this professor doesn't really like me. This was all in our own benefit because when you are out in the real world, you know that, yes, I was actually well prepared. The staff in the college was 100% supportive and this is something that only a student would understand after the clinical placement. (ST 8)

Peer learning:

Some of the clinical educators have thought that the opportunity for peer learning is another factor that determined the effectiveness of clinical education. It was reported that the collaborative learning was beneficial in many ways for the students.

One of the clinical educators said that the peer learning experience depends on the relationship between the students.

Knowingly or unknowingly the colleagues are friends, so they develop good rapport. If they are not close to each other, they work more independently. If they are close to each other then they talk about the cases and their peer learning experience will be better.

(CE 1)

Two other educators felt that the peer learning opportunities provided during the clinical placements helped them to overcome any emotional hurdles by supporting each other during their practice placements.

The pairing helps because there are two of them, so they do not feel too overwhelmed and they always consult each other. They feel that they have a friend and the ones that come they already have a close bonding, so it makes it more calming for them. (CE 3)

In preparation for their presentation, we give them some self-directed learning time. We can very much see them bouncing off each other in terms of the design of their presentation and the structure of it. They collaborate with one another to emotionally support each other very voluntarily. (CE 15)

Apart from developing the rapport and offering emotional support, peer learning also provides the opportunity for self-directed learning as reported by two of the clinical educators in the interview.

I had the chance to observe the students in the inpatient side discussing and talking together about the cases or how their day went. There is definitely some self-directed learning when they are together and discussing cases. (CE 17)

Students are in group of two which is good. They can learn together and grow. (CE 6)

Clinical education is the cornerstone of physiotherapy education and it plays a pivotal role in developing the clinical reasoning skills. Providing an effective clinical education is vital to facilitate the clinical reasoning development. The factors presented this section were drawn from the experience of people who have had clinical education experience as learners and instructors, therefore it is important to consider these factors to provide an effective clinical education that promotes the development of clinical reasoning skills among the physiotherapy students.

4.5.2 Factors affecting the development of clinical reasoning skills

Findings of the phase 1 quantitative study showed that there was a difference in the pre-placement and postplacement mean scores of majorities of SACRR items but these differences were not statistically significant which was evident in the results of Wilcoxon rank sum test. It was assumed that there may be some factors that might influence the development of physiotherapy students' clinical reasoning skills. The qualitative study in phase 2 helped the researcher to explore the possible factors that were affecting the clinical reasoning skills development. Findings from the qualitative data showed that the physiotherapy students' skills, knowledge and experience were the main factors that determined the development of their

clinical reasoning skills. These factors are presented in the following section as themes and sub-themes to explain how each of these factors affected the development of clinical reasoning skills among the undergraduate physiotherapy students.

Theme4: Skills:

Sound clinical reasoning depends on clinician's ability to make a thorough assessment of the client, ability to explain the reasons behind their judgements and arriving at a diagnosis, and the ability to link and apply their knowledge in a given clinical scenario and also their experience in clinical settings or real-life situations. Analysis of the qualitative data showed that the students' skills in performing the patient assessment, problem solving, reasoning and decision making were some of the factors among the many that influenced their clinical reasoning abilities. In the following sub-sections excerpts of clinical educator and student interviews are presented to explain how each of these factors were influencing the development of clinical reasoning skills among the undergraduate physiotherapy students.

Assessment Skills:

According to the clinical educators' lack of skills among the physiotherapy students in performing clinical assessment of the patients accounted for their poor clinical reasoning skills.

Their difficulty is assessing and finding the problem, but if you tell them, for example if you say that this patient has gluteus muscle weakness and ask what exercise can you do strengthen that, they would say straightaway, you could do bridging. They know but the difficulty is finding that weakness. (CE 7)

The lack in their assessment skills leads to problem in arriving at a hypothesis. For example, during gait evaluation, the student was saying that the patient was not walking straight and leaning towards one side. But as a clinician you should be able to elaborate

on what aspect of the gait was missing. They were unable to differentiate the stance phase and swing phase. (CE 8)

It was reported by a clinical educator that the students were lacking the practical knowledge and hands-on skills for making an appropriate assessment of their patients. This seems to be compromising the clinical reasoning behind their judgements.

One thing that was most difficult and challenging to the students is when it comes to actually being hands-on with the patient, not just assisting with functional mobility, bed mobility transfers and walking. But in the musculoskeletal arena palpating landmarks, joint mobilizations, stretches, teaching exercises and really understanding the purpose of the exercises, for example, I am doing this exercise for strengthening this muscle, what muscle does that and knowing all of these things and applying it. That area was really difficult for the students. (CE 17)

Some of the clinical educators have thought that the students were good in communicating with their patients, but the issues were in their ability to perform the physical examination of their clients. They thought that this might also contribute to the poor clinical reasoning.

They are okay with subjective assessment but not with the objective assessment. They are unable to relate the findings in a patient, for example, why flexing the trunk is aggravating the pain in the morning? (CE 22)

Typically, when they are assessing, they generally want to go straight to what the problem is as opposed to how the problem came about. Present condition questioning is normally pretty good, but there is less emphasis and interest in history of the present

condition or contributing factors or the reason for recurrence or progression of symptoms over the last months. (CE 23)

Problem solving skills:

Clinical educators have identified gaps in students' problem-solving skills. It was reported by the clinical educators during the interview that the physiotherapy students who they have supervised during the clinical placements were having difficulty in finding the complete list of problems associated with their patients. According to the clinical educators this gap in students' ability to identify the holistic problems of the patients affected their ability to solve their clients' problems.

They have difficulty in generating the patient problem. They are very much generic and not specific. So, when they were not specific in identifying the problem, they have difficulty in addressing it. (CE 1)

Once they have the problems, they are very good at setting the treatment plans and progressing that plan. But the assessment and coming to summary of what the problem is the area that need more work. (CE 7)

They are able to assess and diagnose but they cannot pick up all the problems. They are picking the main problems, but most of the other problems they cannot pickup. (CE 11)

Goal setting is an important element of physiotherapy practice and the clinical educators have observed during the practice placements that the physiotherapy students have had difficulties in setting appropriate goals for their clients. Clinical educators have stated that if the student is unable to set proper goals it may not be possible for them to address their client needs accurately.

Most of them cannot put SMART goals, for example, they are missing the time frame or if they get the time frame right, they are missing to set a measurable goal. (CE 11)

They were able to identify the major issues and set up their goals and plans. They were lacking only with the long-term goal and discharge planning. (CE 13)

They put a very vague goal, and sometimes it is not even relevant. It is not realistic. Sometimes there is chronic bedbound patient and they put goal to improve the strength which doesn't go together. (CE 14)

Some clinical educators have said that they need to often facilitate the students' in their problem solving especially with the complex patients.

When they make their treatment selection, let's go with balance for example, they can accurately pick up the problem, but they have to be prompted to think about the variable with which they are going to continuously monitor in order to detect change. (CE 15)

For more complex patients they need a lit bit of more support but for the basic patients they do have the clinical reasoning skills to carry out the basic assessment. (CE 16)

Some clinical educators have noticed that the physiotherapy students had the skill sets to address their client needs but they were unaware of the reasons behind why they are doing what they are doing. An educator said,

I found it was very difficult for the students to actually put it together and say this is what I am finding, this is why you are presenting this way, and explain it to the patient what is going on. (CE 17)

According to the clinical educators, the physiotherapy students were able to provide the necessary treatments for their patients, but they didn't had the ability to look at the bigger picture that is the functional aspect of their clients which is the central aim of rehabilitation.

If they haven't identified the patient's main problem, they are still able to help the patient but it's not in a very coherent planned way. For knee pain for example, they might be able to help with that pain through a modality or stretching or an exercise recommendation but that won't automatically transfer to functional goal or functional improvement in an outcome measure. (CE 23)

Reasoning, judgement, and diagnostic skills:

Many clinical educators have reported gaps in students' abilities to reason, judge and diagnose the case. Findings showed that the students' often needed prompts and support with their clinical reasoning. They seem to be doing the clinical tasks without an understanding of why they are doing what they are doing. Their clinical judgement was mainly based on their past experiences to similar cases rather than analyzing and making customized decisions. The following excerpts from the clinical educators' interviews highlights the gaps in students reasoning, judgement and diagnostic skills.

One of the educators said that the students were trying to mimic their approach to similar conditions rather than analyzing what best suits a particular patient.

When I ask the students how you came to that judgement, they are not able to give proper reasoning. They create it like a tick play and not customizing it to next patient. Instead they take it in a similar formula, for example, patient A and patient B with the same

condition, then this is what we have to do! But the two patients do differ, and they have to build that skill to differentiate. (CE 1)

Another educator criticized the students lateral thinking abilities as he felt that the students were unable to think outside of the box during the patient encounter.

If there is a consistency of the case, they are very comfortable but if they are put in any change then they let go and the critical/lateral thinking is missing. (CE 14)

Clinical educators who were working in an acute care setting reported that the students often needed some facilitation to change their treatment plan when the patient condition improves which indicated the gap in students' clinical reasoning skills.

They need a bit of prompt to progress their treatment choices. For example, how your patient tolerated the treatment session and if they tolerate it well what it means for you for tomorrow and often, they can pick up that you are suggesting progress. The treatment technique within the acute hospital is not as sophisticated as in an MSK outpatient unit but the reasoning analysis that goes into why you select that is really the tough bit for the students. (CE 15)

Their clinical reasoning needs to be worked on and I find it in their assessment chart in the clinical reasoning section and this is where they require lot of support. They tend to write down exactly what they did within that session. They don't really clinical reason why are they doing something. Lots of time their clinical reasoning needs to be supported by the clinical educator and sometimes they tend to compartmentalize the diagnosis and they may not consider other comorbidities like Dementia, osteoarthritis so they need a bit of support there with their clinical reasoning. (CE 16)

One of the clinical educators in a private hospital also shared similar views that the students often need some prompts to understand the reasons behind their own clinical judgments.

Most of the time they need a little bit of guidance with their clinical reasoning. They are able to perform the test but when you ask what their conclusion is, they needed a little bit more direction to get know why they are saying what they are saying. (CE 21)

Another educator felt that the students were not knowing benefits of interventions and did not had proper rationale for selecting a particular approach over the other. This showed gap in students clinical reasoning skills.

They are stuck with progressive exercises and unable to change their treatment plans. Proper selection of plan is a question mark, that is, if this exercise is good or bad, they don't know! You need to question them to clarify why they choose one over other. They are doing something without knowing what happens to the patient. (CE 22)

One of the clinical educators said that the students were trying to treat the patients' conditions instead of their problems which he felt was inappropriate and linked it to the student's narrow thought process.

They are undergraduate students so that their thinking process is quite narrow. Largely they look at the diagnosis that is being written and they will try to link that diagnosis to what they know about it. For example, OA of knee then they will try to link what do I know about OA of knee. Generally, they are looking condition specific not functional. They are much more focused on what the diagnosis is then thinking how they are going to manage it as opposed to what the patient problem is and how they are going to manage it. (CE23)

Some of the students also acknowledged their problems with clinical reasoning and judgement. One of the students said during the interviews that she was expecting the support of her clinical educators to arrive at a diagnosis and also to confirm if she was accurately performing the assessments and treatments.

I just want to know in detail about goal setting and progression of goals. If my patient is not improving, I get confused why there is no progress, whether it is the treatment or the patient circumstances resulting in this. (ST 2)

Another student reported that she was afraid and lacked the confidence that affected her clinical reasoning. The below quotes from student interviews supported this finding.

I still don't feel confident to deal with the patients. I didn't feel that I am supervised and corrected to ensure that I am doing things correctly. So, I have a fear and not confident. The patients also not feel comfortable. (ST 7)

Theme5: Knowledge:

Theoretical knowledge plays a crucial role in the clinical reasoning process and the university education prepares the students with adequate knowledge required for clinical practice. Clinical educators were expecting the students to possess in-depth knowledge about physiotherapy practice. But the findings from the qualitative data collected during the clinical educator and student interview showed that there were gaps in students' knowledge, mainly the students were unable to connect the theory and practice, and also the knowledge base of students was associated with the type of patients that they are presented with during day to day clinical practice.

Theory-Practice Gap:

Many educators have reported that they have identified theory-practice gap with their students who were on placements. It was evident from the findings of the clinical educators' interview that the physiotherapy students' have had difficulties in connecting their theory knowledge into actual clinical practice which seems to affect the development of clinical reasoning skills in the students.

They have knowledge, but the problem is retrieving those information in which they have a difficulty. (CE 1)

It's really hard for them to link the theoretical knowledge into practice. It's very rare for to me see a student at the first few weeks who can link the theoretical practice into bedside treatment for patients. (CE 5)

The judgment is always depending on, how much theory they know. If they don't know much of the theory in the first place, then their judgement is not good enough. (CE 25)

One of educator said that the long wait for the students to get into placements seem to affect the ability to link theory with practice.

I think because they don't do placement for that long, by the time they go out on placement, they have almost forgotten what they have learnt at the beginning. (CE 7)

Another educator believed that the good theory knowledge is vital for sound clinical judgments.

Their theoretical knowledge plays a very important role to apply in practice. Clinical judgement, it all depend (sic) upon the knowledge they have. (CE 8)

Apart from the theory knowledge the practical hands-on skills that the students had also affected their clinical reasoning abilities. Some of the educators felt that the students lacked the practical skills, so even though they might have possessed adequate or good level of theory knowledge, their weaknesses in hands-on skills were the main factors that affected their clinical reasoning.

They have a good and solid theory. But it's on the clinical/practical skills they are lacking. Some will follow just theories but not the individual patient peculiarities. In the manual skills, as any new practitioner they are still hesitant. (CE 10)

The only thing what we struggled here is that the students have been little bit uncomfortable in hands-on and close body contact with the patients. (CE 15)

You can definitely tell that they know what is said in the book. Hands-on was the one of the most challenging aspect, especially in the medical-spine unit. Joint mobilization, they seemed very uncomfortable with it. Now knowing exactly what group to use and what position to use, where the landmarks are. (CE 17)

One of the clinical educators felt that the students were expecting the real patient problems to be typically like a textbook described conditions and it was challenging for the students to make the differential diagnosis by applying their theory knowledge into real time situations.

They have the knowledge. It is just connecting the bridge between the theory and practical. They think when they are here, that the clinical picture would be exactly the same as what they read in the book and it cannot deviate. When you make them see a deviation, they get confused? It is that confusion that stops them from bringing out the diagnosis. (CE 20)

Some clinical educators have reported that there was always a gap in students' abilities to apply their theory knowledge into practical scenarios.

Most students think like in textbook and it is only with experience they get out of it. They are very confident with the electrotherapy and exercise therapy even though they are not at the reasoning behind. But manual therapy none of them were confident and comfortable. They could talk about it, but they couldn't perform the skill. (CE 21)

There is always disconnect between what one learns in university in a largely hypothetical context to what actually is the reality in clinical practice. Lot of the times people have coexisting problems, so they might have a meniscal injury, but they may have had it for 20 years and they may also have some degenerative cartilage changes and they may also have some recent knee strain. So, they have had all these problems for years but they only had pain for a month. They are testing them and then why it's not a fully positive test but they still have these problems. Most of them you could see that trying to work out what's going on because it is not simple as what the book says one should do for degenerative meniscal injury. (CE 23)

One of the clinical educators working in a pediatric set-up criticized the students' knowledge in pediatrics and attributed this knowledge gap to students' poor clinical reasoning with pediatric cases.

They do not have good clinical background in pediatrics. They are stuck with the theory and practice gap. They think that we have studied like this in theory and in real life it is completely different. (CE 26)

One of the students also acknowledged that she had good theoretical background but when she stepped into the real world for clinical practice, she actually experienced the difference. She noticed significant differences in what she learnt in theory to what she actually saw in real time.

It was good foundation of information. The college is more theoretical but when I go to clinical placements, I am seeing different kind of cases. (ST 9)

Type of patients:

It was found that the students were able to clinical reason the cases that were simple and straightforward whereas in complex cases they seem to be struggling with their clinical reasoning and judgement.

Not in all cases but in some cases they would be able to hypothesize, for example they would see a patient with the diagnosis of diabetes, and then they would be able to discuss before even seeing the patient that this is the kind of things I am likely to see in problems. (CE 3)

One of the clinical educators thought that there were patient safety related concerns to allow the students to autonomously assess and treat the clients and she was not confident with the students' reasoning abilities in case of complex patients. So, she felt there was a need for supervision to ensure accurate clinical reasoning and to guide the treatment for their patients.

I don't think they have that level of skills where we can say that is this is the patient, go and do an initial assessment, treatment and hypothesis. They do need that level supervision and guidance, particularly if the patient presents little bit differently unless you are seeing standard patient. Your typical standard patient you might see after the back surgery and you know they expect to progress in certain way. But in complex cases

they might feel lit bit challenged and I feel there is safety concerns, so I feel that level of supervision is required. (CE 16)

Few clinical educators have stated that the students' clinical reasoning abilities vary depending on the complexity of the patients that they are presented with, where in simple cases the students were able to make accurate clinical reasoning but in complex cases they could not conclude.

Again, it varies from condition to condition. Like I see a large number of pregnant ladies, women's' health related problem, then I don't expect them to know, and they would learn as they go along. But majority of the joint issues or the back issues they were able to identify appropriate treatment modalities to address the patient problems. (CE 21)

For common cases maybe they can develop a hypothesis. For example, knee pain or OA, this just an OA because there is crepitation. But in complex cases they cannot conclude. They cannot reach to the point why this is that particular case. They are more focused to that area only not holistic. (CE 22)

If it a simple straight forward patient, most of the students are able to do it, but if it is a complex patient with several comorbidities and health issues, they might struggle. For example, knee pain with predominantly an osteoarthritis presentation may be something quite straight forward. Arriving at a diagnosis or a hypothesis for a patient with choric low ache, who has had several treatments and the back pain had been there for 10 years, has had a surgery could be quite challenging. (CE 25)

One of the students reported that her placements was not focused on a particular specialty and she was seeing mixed cases every day. This seemed to affect the development of her clinical

reasoning skills as she had to switch her through processes between different specialties and learn during the placement which was difficult for her.

Seeing different cases in one day was big challenge. I covered outpatients and inpatients like surgical, stroke and ICU in the same day. I was treating different cases in different areas like neuro, musculoskeletal and pediatrics, and it was not focused. So, my mind was not focused in one specific area. I find difficulties every day, like how to plan and how to do the assessments. (ST 7)

Another student felt that her clinical reasoning was good in some aspects of physiotherapy practice.

Some of my placements were in musculoskeletal cases, and some in pediatric cases. I was able to achieve the learning objectives in musculoskeletal placement but in pediatric I was not able to achieve it. (ST 9)

These findings suggested that the clinical reasoning skills develops with experience of handling complex patients and the students clinical reasoning may not form a full circle within their clinical placement experience.

Theme 6: Experience:

Experience seems to play an important role in development of the clinical reasoning skills. Clinical educators were able to see the difference in the clinical reasoning skills of students from different year groups and also they were able to witness change in students' reasoning abilities with time. It was reported by a clinical educator that the senior students have demonstrated better reasoning skills than the students of junior cohort.

Fourth year students are much better in planning when compared to the third-year students. Third year students are more structural, for example if there is limited range of motion then they will go for passive exercises or active exercises, they don't think beyond that one plan, and that makes the difference with the final year students. (CE 1)

As the placement progresses over a period of 4 weeks, students were showing improved clinical reasoning in the later stages of placements when compared to their level at the start of the placements. Few clinical educators have reported that the students were demonstrating better reasoning abilities with time and experience.

With the time I found they get more confidence and interact and speak and even they are more active. At that point their reasoning makes sense and I don't need to correct it often. The advanced levels of clinical reasoning needs (sic) more practice and they lack it which is normal. It takes them time which is natural way. (CE 2)

I have noticed that they are not really competent at the first few days. But after the second week they are gaining more knowledge to handle neurological cases and they are becoming more competent to see different neurological cases here. (CE 5)

Sometimes towards the end of the placements their clinical reasoning skills, you can see improvements and they would know how to progress exercises and where to add on a weight but often I find it's a bit, that can be poor because their assessment isn't the strongest. (CE 7)

Previous experience apart from the time spent on the current placement also played a vital role in students' clinical reasoning abilities. One of the educators stated that,

Initially when they start the placement, they don't do that and as they get some clinical experience it does to start make more sense. Particularly if the students were on placement earlier, they are better with this than if they are just starting off their first placement. At the start of their placement they need lot of support and facilitation and as the placement progresses their clinical reasoning does improve as well. (CE 16)

Apart from previous experience, the time spent on the current placement and the students' year level in the program, their family background also played role in determining the students' clinical reasoning skills. A clinical educator said that,

The students come with limited set of skills. They would need a lot of guidance. It improves as they progress through the placement. It also depends on whether it is a third year or fourth year student or they have been out on placements before. Some students with some family background of medical people in their family and then generally they tend to be a bit better in their judgement and approach for some reasons, either they have some kind of environment at home, or they have seen patients before. To some extent, there will be some difference in whether it's in week 1 or week 6, depending on the length of the placement. They come strong, if they have already been out on a placement before. (CE 25)

Some students have reported that they were unable to fulfil their learning needs within the short time of their clinical rotations and said that they need additional experience to achieve it.

It was hard to achieve the manual therapy skills. We need more experience and maybe we need to attend courses. (ST 2)

Some electrotherapy modalities like ultrasound I didn't try it, may be once or two. So, I find it difficult to use that to different cases. (ST 7)

One of the students reported similar view to what the educators' have stated that she was efficient in performing the patient evaluation toward the end of her placements.

First rotation was the hardest one. I did not have any idea and my initial assessment took one and half hours. By the end of the rotation it took only 20 minutes. (ST 6)

From the findings of the qualitative data and the themes presented in this section it was evident that the clinical education contributes to the development of clinical reasoning skills in physiotherapy students, but there are variety of factors presented above seems to be affecting the process of clinical reasoning development. Therefore it is essential for the clinical educators and curriculum developers in physiotherapy education to consider those factors affecting the development of clinical reasoning skills along with the factors underlying effective clinical education that were presented in the previous section in order to devise instructional strategies that can promote the development of physiotherapy students' clinical reasoning skills.

4.5.3 Role of clinical education in preparation of the students for professional practice:

Another aim of this research was to understand the contribution of clinical education towards preparing the undergraduate physiotherapy students for their future professional role as physiotherapist. As discussed in the literature review chapter clinical reasoning skills are essential competence for contemporary physiotherapy practice and the findings from both quantitative and qualitative data confirmed that the clinical education contributes to the development of clinical reasoning skills and therefore it helps in preparing the students' for their future role as physiotherapist. However, this is not the only skill that would determine the job readiness of a new graduate and there are several other competence and skills required for

safe practice as discussed in the literature review section. Findings of this mixed methods study showed that there were numerous opportunities for the students to develop these additional set of skills and competence during their practice placement.

Theme 7: Preparing competent graduates

Preparing work ready graduates is the main aim of clinical education and the opportunities for real world experience, multidisciplinary experience, reflective and evidence-based practice, introducing to the autonomy of the professional role and developing the openness for feedback were the main contribution of clinical education in preparing the students to meet the core competencies required for the day 1 new graduate role. The sub-themes identified in the qualitative data gathered from the clinical educator and student interviews are presented in the following section to explain the role of clinical education in preparing the students for professional practice.

Real world experience:

Several clinical educators have felt that the clinical placements were providing enormous opportunities for real world experience to the undergraduate physiotherapy students. They have said that the clinical education played major role in facilitating the development of problem-solving skills and reflective practice among the physiotherapy students. They have considered these skills as vital competencies required for contemporary physiotherapy practice. The following are examples of excerpts from clinical educator interviews that supports these findings.

Students have a very good opportunity to interact with the patients during their education itself. Mostly it is reflective, and they have more opportunity to think about the patient condition. It is like a problem-solving approach. (CE 1)

Another educator felt that it was not only the clinical skills and competencies that were developing through clinical education as she was able to see a bigger picture in where the students face challenging situations and learn how to overcome it from their own experience.

When you move out of your comfort zone and dealing with other you get different views on how they deal with the patients. When you come to clinical placements it's not only about treating the patient, it's about dealing with the patient, and how you tackle the situation and everything. It's not only what you read and just practice. It's a mixture of many things. So definitely, it helps a lot for future professional practice. (CE 14)

Students have had a mixed feeling about the role of clinical education towards their professional practice readiness. Most of the senior cohort students have reported that the clinical placements helped them to be job ready. The following excerpts from the student interviews supports this claim.

It gave me a picture of my job in future. Now I know what I will do, and I understand my responsibilities. It prepared me for the job. (ST 1)

It was really good. Good chance to understand that I have chosen right major for me and provided real world experience. (ST 9)

However some of the students from both the senior and junior cohort reported gaps in certain areas of their professional practice so they felt unprepared for their role as physiotherapist. This feeling was more among the junior cohort compared to the senior cohort. The following student interview quotes highlights the same.

It helped but there is a gap. Lack of experience in women's health and pediatrics. Tapping, manual therapy and aquatic therapy skills are still lacking as there is not much

experience in these aspects. I still have lack in neuro assessment and dealing with neurological cases. Still I felt there is lack of exposure for me in early interventions and complex cases which needs to be improved. (ST 4)

It helped me to know what are my strengths and weakness. It helped me to see real patients. I cannot say I am 100% confident but I have a kind of semi-confidence to deal with patients. (ST 5)

From this it can be concluded that there was a linear development noticed in physiotherapy students' clinical skills through progressive experience as the students sail through various clinical placements at different year levels. This linear growth of competencies also contributed to their confidence that is vital for the independent clinical practice required from the day 1 new graduate.

Interpersonal skills and multidisciplinary experience:

Clinical educators have thought that the clinical education is providing opportunities for students to develop their interpersonal communication skills and relationships. Professional practice involves working within the multidisciplinary team and it is essential for the practitioners to possess good interpersonal relationships to manage conflicts. Clinical placements provided the opportunities for physiotherapy students to experience those challenges as early as in their student life and promoted the development of interpersonal skills that are considered vital for professional practice. The following interview excerpts highlights the ways through which the students develop their interpersonal skills.

In their first week we usually let them shadow all the therapists so they could build relationship. (CE 3)

Student does develop a good rapport with the educator, because they are there the whole day with them. (CE 25)

Apart from developing relationship with healthcare professionals the students also had opportunities to build rapport with patients and their families during the clinical placements.

We try and let the students go off independently to the client and try build their own relationship with the clients and introduce themselves. (CE 15)

Physiotherapy students reported that they have had different strategies to establish their interpersonal relationship with the patients and also with the clinical educators. The followings are some of the excerpts from students' interviews to confirm that the clinical education provided the opportunities and contributed to the development of physiotherapy students' interpersonal skills.

By talking to the patient and their family we developed good rapport. I go with a smiling attitude/approach. (ST 1)

It was difficult to be friendly with them. By asking questions and getting involved in discussions I started to develop a good relationship with them. I explain everything to family including what I am going to do, why I am doing that and how I will do it. Just good communication helped to build a rapport with them. (ST 2)

I sometimes act as a translator to the patients and their families and they really appreciated it and that helped me to develop a good rapport with them. (ST 9)

Modern day healthcare practice requires the clinicians to work within a dynamic clinical environment in which the patient care is managed by team of professionals. It is an essential

competency that the newly qualified physiotherapist possesses the team working skills in order to function effectively within the multidisciplinary team that has patient-centric goals. Below quotes from clinical educator interviews confirms that clinical education supported the students in getting multidisciplinary team working experience which is vital for their readiness to practice.

They have multidisciplinary team experience, so they will start to know the roles, tasks and the communication between the departments and how to get patient-centric goals. (CE 11)

We get the students to attend multidisciplinary team meetings, so they understand the role of each member in the multidisciplinary team. We get them do some joint sessions with speech and language therapist and occupational therapist and we encourage them to constantly liaise with the nurse before and after the treatment and also with the case manager especially after the first week when they become familiar with the roles of each member of the MDT. (CE 16)

A student also shared similar view that the clinical placements helped her to get oriented to the multidisciplinary team.

I was introduced to many people in health professional care, not only to physiotherapists, also to nurses, doctors and in various other professionals. I learned to become more confident and how to speak with people in professional way. How to deal with people with different moods and behaviors. (ST 8)

Reflective practice:

Reflective practice seems to be an important element of day to day clinical practice of

physiotherapists' life like any other healthcare professional. It was evident from the interview findings that the clinical education laid out the platform for reflective practice and the clinical educators were stressing the significance of reflective practice and facilitating the process of reflection in their students. The following excerpts from clinical educator interviews demonstrated that there was consistent scope for reflective practice during clinical placements and the reflective practice skills may vary depending on the student characteristics.

They tend to look back and see how they have grown and see where maybe they are lacking, and where they want to strengthen. Most of the students, we have found are quite consistent with their reflective practice. (CE3)

Few clinical educators have reported that during the clinical placements they were able to observe the changes in students' practice because of their improved ability to reflect based on their previous experiences.

At the end of each day we would try and meet to discuss how the day went. They can say they had difficulties, may be some clashes with either a member of staff or a patient and then talk about it and say did they managed it or I would say tomorrow if this comes up what would you do. They were very good at reflecting and changing their practice approach as necessary. (CE 7)

The part of learning from experience is learning from your mistakes. So, I try and make them reflect why they made that decision and it actually worked quite nicely. (CE 9)

Some of them really reflect on dealing with the patients, especially we have some cognitive patients and few patients who are deaf and mute. So, the student was reflecting on her previous experience and try to apply in these cases. (CE 10)

Some clinical educators have said that the reflective practice is not something that is innate on the students and often they need to facilitate the reflective process. They have had different strategies for to promote the reflective practice among the students.

We have introduced them to reflective practice, going through the Gibb's cycle. When you make the same reflection using the same scenario 2 to 3 times that is when they pick up some useful learning. The proactive initiation to search for the literature and get answers, and I think in order to do that they have to hone their reflection skills. (CE 15)

Their reflection needs to be facilitated. We get them to write the impairments, functional limitations and goals and I try to make them reflect on their goals to know whether your treatment has been effective or not. (CE 16)

Though the students were able to reflect on their own or through some form of facilitation, some educators felt that the students struggled in lateral thinking that hindered their reflective practice.

When we give a new scenario or slightly different, they are not able to reflect on their experience. They have to modify based on their experience and that modification part is missing. (CE 1)

Sometimes any new cases if it comes, and if it is little bit different then they get panicked. (CE 14)

The following interview quotes from student interviews showed that physiotherapy students were reflecting on their practice experience and aware of the reflective practice concept. The students were able to vocalize their strengths and the areas that needed improvement in their clinical practice which is a clear sign of reflection. Therefore, it is obvious from the findings

presented above that the clinical education helped the physiotherapy students to develop their reflective skills which is vital for them to be ready for their role as physiotherapist.

But I need to be stronger in some aspects like manual therapy and tapping skills. (ST 3)

Pediatrics is the area that I need to improve and also in stroke and neurology. (ST 6)

How to master my skills in doing the initial assessment and treatment planning in new patients. I want to improve on these aspects. (ST 9)

From the above findings it can be argued that there were some gaps in students' reflective practice abilities. However, the clinical education attempted to inculcate the reflective practice habits among undergraduate physiotherapy students' whilst they were on clinical placement and thus contributed in preparing them for their future professional practice.

Evidence-based practice:

Quality of healthcare is determined by the availability best possible treatment for the clients' problem. All practitioners including the newly qualified are expected to incorporate the best possible assessment and treatment methods to their patients for which the clinician should be able to find and apply the recent evidences that are available for their patients' problem. Some clinical educators reported that the students were lacking skills to link the research findings into their clinical practice and often needed facilitation.

I have seen some students using guidelines for stroke, but they do not understand the significance of it. Probably they need an answer to why it should be followed. (CE 15)

They tend to use their clinical guidelines as scientific evidence at the end of placement when they are doing the presentation. But they definitely need lot of encouragement

while on placement as well as to put that clinical guidelines and research evidence into practice. I think they consider it as two separate entities and they find it hard to link them together. They understand the importance of CPG's but they find it difficult to apply it in practice by linking the research and guidelines to what they should be doing.
(CE 16)

Clinical educators have said that the interest for evidence-based practice is not something that is within the students. They often need to push the students to follow evidence-based practice which again created the opportunity for the students to incorporate evidence in their clinical practice.

When we question them, why we did this, they don't have an answer. So, we ask them to go back, read about it and get some evidence. (CE 20)

The evidence-based practice is more coming from my prompting than them volunteering. I think it is difficult for them to get the two things together. (CE 21)

They have a strong tendency to use the methods that they see other therapist like the previous clinical educators using which could be evidence based or it could not be evidence based. But it seems they put a higher weighting on what they saw someone do previously as opposed to thinking what the evidence to this? (CE 23)

One of the students also reported that during the clinical practicum she had the opportunity to practice using evidence.

Every week I use to discuss with my clinical educator about the clinical guidelines and the research about various treatments for various conditions either musculoskeletal or stroke or other conditions. (ST 8)

From the findings of the clinical educator and student interviews it can be concluded that the clinical education set the stage for the students to indulge in evidence-based physiotherapy practice. Students have made efforts to follow clinical practice guidelines and other forms of evidences during their clinical placements which was mostly evident during their case presentations. However, the clinical educators have noticed several gaps in the students understanding of evidence-based practice and the main limitation for students was in applying that evidences in real practice.

Autonomy:

Standards of physiotherapy practice expects the day 1 new graduate to work independently. From the findings of this study it can be concluded that clinical education played a major role in developing the autonomy in the students. Findings of this study shows that the students' ability to practice independently is evolving through clinical practice in real settings. Several physiotherapy students have reported that during the clinical placement they have had the opportunities for autonomous practice and build their confidence in handling the patients alone. However, the findings suggested that the junior cohort students were not in the same line as the senior cohort students and also the complexity of the case determined if they are able to manage it on their own or not.

A senior cohort student said,

Yes, because they let me to deal with the patient individually. It was a challenge for me. They told me to do initial assessment for a patient and that patient will be mine until I finish my rotation. So like this I had many patients for whom I do the initial assessment and treatment. I can also progress the treatment for them. (ST 1)

Another student from the year level 5 said,

I think I will be fine but if there are anything complex, I will ask my colleagues. For example, how to deal with ICU/LTC patients who are ventilated. I was nervous and cannot do without instructions. (ST 2)

Couple of the junior cohort students reported that they need more experience to be able to function independently especially when the cases referred were complex.

It facilitated me to know my job more. But still I don't feel confident to deal with patients fully independent. Maybe I need some help or clarifications while handling the cases. I think I still need more experience. (ST 3)

In some cases, like stroke I am confident to manage independently but for the other cases not so much confident. Some musculoskeletal cases too I can handle alone, but I would also need the supervision in complex cases. (ST 8)

One of the senior cohort students felt that she was ready for her role and appreciated the clinical educators for providing her with opportunities for independent practice.

After one and half years of practicing, I think I am able to practice on my own. Because in my placement they will treat me like a real physiotherapist. I have my own case load. I do my documentation. We share the work. So, it seems like I am already working. (ST 9)

From the above findings it can be understood that the students have had the opportunities for working on their own during the clinical placements and as a student practitioner they were asked to make their own decisions for the patients assigned to them. Clinical educators have

played a pivotal role in facilitating the ability for autonomous practice among the undergraduate physiotherapy students. Therefore, it can be concluded that the clinical education promoted autonomous practice among the physiotherapy students and contributed towards preparing for their future professional role as physiotherapist. However, the findings also highlighted that the students were not fully independent, and they often needed guidance in their clinical practice especially when the scenarios were complex in nature whereas in straightforward situations, they were able to manage it on their own. Progressive independence is what expected from a student practitioner and learning in clinical settings promoted this and helped in preparing work ready graduates.

Openness to feedback:

While working within a team in the clinical settings, it is imperative that the practitioner considers the opinions of others. Though it can be argued that taking the views of the others might be an innate character of an individual, the findings of the study showed that the physiotherapy students demonstrated changes in their practice upon receiving the feedback from their clinical educators and other members of the multidisciplinary team including the patients.

One of the clinical educators said that the students were good in putting themselves on the patients' shoes and considering their voices in decision making.

They definitely take into consideration the opinions of the patient. I have seen them negotiate with the patient, change or ask the patient what they wanted to do next and take the patient's opinion on board. They do take the views of family members. They are quite empathetic, and they are good listeners. (CE 7)

Another educator felt that the clinical educator's feedback helped the students to improve their practice and the changes in students' performances were noticeable during the clinical placements.

Most of the students were good in listening to advice and taking feedback of how to improve themselves. Because they understand that this is the learning experience for them, and they have been very good at taking the feedback. Actually, when you give feedback during the placement you see changes in their performance related to that.
(CE 9)

Couple of clinical educators have reported that the students were keen on getting the views of the interdisciplinary team members to improve their clinical performance.

They are very well eyeing on the views of the team members. They do involve the patients and their family members in making decision. (CE 15)

They do take the views of other members while planning the care particularly the case manager and the occupational therapist. (CE 16)

One of the clinical educators said that the students' attitude towards feedback was positive and they understand the value of feedback that is provided to them during the clinical placements.

Generally, their attitude to feedback has been very good. Most of the time they take it very positively. They understand that they are not good at something and this is for their own good, and they will grow into better practitioner with feedback. (CE 25)

The findings from the student interviews showed that the students were open for any feedback provided to them and they understood that the aim of feedback was to improve their

performance. However, some students have criticized the way the feedback was provided to them. Students did not like the feedback when it was in front of their patients. One of the students reported that,

In some rotations I got the feedback in front of the patient and I didn't like that. After I told my educator that I accept her feedback but not in front of the patient. She can tell me the feedback even if it is bad, it is okay with me because I am there to learn. (ST 1)

Few students stated that the feedback was not in a timely manner, so it didn't help their learning.

Of course, the feedback will help us always. But we didn't receive feedback after seeing each patient, it is only during the midway and final APP session they give feedback. But sometimes I go to see a new patient and I want to know if I did good or not. They didn't give any feedback. (ST 2)

I respect any feedback even though I don't like it. But there was no regular feedback. Only during the midway and final APP they gave the feedback. (ST 3)

Students were appreciating the educators who provided regular and ongoing feedback throughout their placement period. Two of the students have said that,

In one place I got feedback after every session. Usually in the midway feedback I get to know the areas that I need to improve on. (ST 4)

He will always tell me what wrong I did and how I have to do. Usually on a daily basis he provides feedback which helped me a lot. (ST 5)

Some students have stated that the feedback was mostly constructive which enhanced their learning experience whilst on the placement.

On the second week and on the fourth week we use to have a meeting and they use to always give me the feedback. The feedback was always constructive. It helped me to improve my physiotherapy practice. (ST 8)

I receive the feedback always at the midway and end of each placements. It helps in my learning. It shows my strengths and weaknesses. (ST 9)

Rehabilitation of patients involves teamwork where professionals from different disciplines have to work towards achieving patient-centered goals. So, the newly qualified physiotherapists are expected to have an open mind for receiving the input of other interdisciplinary team members about the care plan for their patients and accordingly change their treatment plans. From the findings of this study it can be concluded that clinical education helped physiotherapy students to develop an open mindedness that is required to work as a part of an integrated team in the future.

4.5.4 Clinical education model for the UAE context

Physiotherapy education at the College of Health Sciences offered a transnational curriculum that was taken from a University in Australia. Clinical education for the physiotherapy program was organized and conducted in a way that it would happen in an Australian context. According to this curriculum the clinical placements are situated in the later stages of the program and the students spend their earlier years within the university campus studying the theoretical and practical aspects of core physiotherapy curriculum. Students spend three and half years in studying academic courses in the college and in the last 18 months they move out of the campus to the real world for clinical education. They spend the last one and half years of their program

in hospital and/or healthcare settings outside of the university campus to complete their clinical placement rotations in the core areas of physiotherapy practice. This arrangement of blocked placements affected students learning experience. The findings of this study identified several gaps in physiotherapy curriculum apart from the absence of integrated clinical placement opportunities which were the main areas that needed to be considered in order to develop an appropriate model of clinical education for the UAE context.

Theme 8: Gaps in physiotherapy curriculum:

Several educators have criticized the current model of clinical education because they thought that the delay in exposing the physiotherapy students to clinical education affected students' learning experience. Clinical educators argued in favor of an integrated model of clinical placements in which the students attend clinical training parallel to their academic activities. Clinical educators have said that the integrated clinical placements would benefit the students more and facilitate the application of theory into practice because the students learn the academic modules in the university and simultaneously do clinical placements on those subjects which makes it easier for them to link theory to practice. Some clinical educators have recommended that the students must be exposed to real world situations as early as possible in order to enhance their application of knowledge gained from university education.

Earlier placements at least for observation, just for the students to get a feel and use the knowledge in real world. (CE 7)

If the course work, they do prior to the placement is based on the placement, it will be fresh on their mind rather than what they study two years ago and when they come to clinical placement they almost lacks it. So that would help them try and link the theory

and practical. If they have clinical exposure right from the beginning and not just the end of the fourth year. (CE 20)

More than the clinical education model, some of the clinical educators have stressed on the need for context specific curricular contents. The present curriculum had limitations on several areas as it did not cover certain topics in physiotherapy which were the main focus of clinical practice locally.

Not reading the modalities in the curriculum as it is a curriculum adopted from Australia, but the context and community is different. Curriculum is not contextualized. Some patients are not ideal for manual therapy, so they need to know the modalities. This gap should be addressed. (CE 24)

Some students have reported gaps in the physiotherapy curriculum that they studied at the college. They felt a huge difference between what they have learnt in the university setting and what they have seen in real clinical settings when they stepped out for their practice placements.

In practical labs we need more of real-world kind of experience. They teach everything but when I go to clinical placements, I see everything is different there. (ST 2)

I learnt to use electrotherapy modalities such as Ultrasound, TENS and traction unit which I didn't learn much in the college. Manual handling, position and respiratory therapy all I have learnt from clinical placements. (ST 4)

Few students have asked for changes in teaching strategies at the college so that it would prepare themselves to future clinical practice, especially they have highlighted the lack of their hands-on skills as a hurdle for their learning in clinical settings.

Everything we have studied was useful, but I was lacking on handling and evidence-based practice. (ST 6)

Lectures and materials were good, but we need to go deeper in learning. We learn how to assess and how to treat in our practical classes but when we go to the clinical placements in the hospital, they are using different approach. (ST 7)

Theme 9: Integrated Placements:

Several clinical educators have voiced against the current model of blocked clinical placements and argued in favor of integrated clinical placements. Many clinical educators have said that they have noticed gaps in physiotherapy students' theoretical knowledge, and they have claimed the long wait for clinical education as a reason for this knowledge gap. They thought that the integrated clinical placements would enhance students learning by providing opportunities to link theory to practice in real-world settings from the early stages of student life and they expected it to help the students in retaining the knowledge gained in classrooms. The following quotes from clinical educator interviews highlights the need for integrated clinical placements in physiotherapy education.

They do the studies by part by part the body. For example, the lower limb conditions, pathophysiology, management, pharmacology, physiotherapy intervention all in one semester and move to the upper limb in the second term. So, what happens by the time they come out for placements after 3 years or so, they forget what has happened in the first year. Clinical placements should coincide with ongoing educational subjects. (CE 8)

Every time they go through a subject coursework, immediately if they go through the clinical exposure to similar background of what they have read, it will settle better in their mind. The bridging of theory and practical will be quite good. (CE 20)

I think there is a big gap that you can see. You can lose the continuum between what they taught in theory and what they do in practice. (CE 21)

Some of the students felt that their clinical education should have happened along with the academic courses so it would have been easy for them to relate their theory knowledge to practice.

We go to placements for one and half years continuously. But if we go to placements for example after taking cardio courses, if we go to placements for cardio only maybe it will be more helpful. But we mix all together such as neuro, cardio and musculoskeletal which is difficulty for us. (ST 2)

Few students have said that the delayed exposure to clinical education has made it difficult for them to learn in clinical settings. They felt the hand-in-hand placements along with theory courses will help them to retain their knowledge.

It is better to go to placements along with the courses. This will help us to link theory to practice. The knowledge that we get will be stored within us for long term. (ST 3)

I think that the clinical placements should go along with the courses so that the students can get real time experience and benefit from that. For example, if we learn about assessment of a condition then we should simultaneously apply in real patients. (ST 5)

From the findings of this study it can be concluded that the current model of clinical education followed at the College of Health Sciences has gaps that needs to be addressed. Though this is a proven as an effective clinical education model in the context of Australia, the nature of students and the clinical education settings between the United Arab Emirate (UAE) and Australia significantly varies. Therefore, following the carbon copy of the clinical education model adopted in Australian higher educational context may not be an appropriate in the UAE context. Thus, the physiotherapy educators and the education providers in the country must consider the gaps identified and problems reported in this study and develop an action plan for establishing a context specific clinical education model that promotes the clinical reasoning skills and professional practice readiness among the undergraduate physiotherapy students. Based on the findings of this study and the literatures available in this arena, the researcher aims to recommend an appropriate model of clinical education for the UAE context which will be discussed in the subsequent chapters of this thesis. The below table provides an overview of the themes and sub-themes presented in chapter 4.

Table 16 Summary of themes and sub-themes aligned with the research questions

#	Research Questions	Themes	Sub-themes
1	What are the factors underlying effective clinical education?	Student attributes	<ul style="list-style-type: none"> ➤ Area of interest ➤ Learning styles ➤ Cultural issues ➤ Coping with challenges
		Clinical educator attributes	<ul style="list-style-type: none"> ➤ Clinical educator workload ➤ Knowledge of curriculum ➤ Teaching strategies
		Curriculum barriers	<ul style="list-style-type: none"> ➤ Faculty involvement in clinical education ➤ Placements expectations, ➤ Placement duration ➤ Preparation for clinical placements ➤ Peer learning
2	What factors affect the development of clinical reasoning skills?	Skills	<ul style="list-style-type: none"> ➤ Assessment skills ➤ Problem solving skills ➤ Reasoning, judgement and diagnostic skills
		Knowledge	<ul style="list-style-type: none"> ➤ Theory-practice gap ➤ Type of patients
		Experience	
3	Does clinical education adequately prepares the undergraduate physiotherapy students for professional practice?	Preparing competent graduates	<ul style="list-style-type: none"> ➤ Real-word experience ➤ Interpersonal skills and multidisciplinary experience ➤ Reflective practice ➤ Evidence based practice ➤ Autonomy ➤ Openness for feedback
4	What is, if any, the appropriate clinical education model that facilitates clinical reasoning skills and professional practice readiness for the UAE context?	Gap in curriculum	
		Integrated placements	

4.6 Summary of the main findings

The main purpose of the research was to explore the contribution of clinical education towards the development of clinical reasoning skills of undergraduate physiotherapy students in preparation for their future professional practice for which this study took the mixed-methods approach. The findings from the quantitative data analysis showed that the clinical education had a role in developing the clinical reasoning skills of undergraduate physiotherapy students as there was difference in the mean scores of students' Self-Assessment of Clinical Reasoning and Reflection (SACRR) before and after the clinical placements. However, the findings of the Wilcoxon Signed Rank Test showed that the differences were not statistically significant. So, it was necessary to explore the factors affecting the development of clinical reasoning skills which was another aim of this study. The other aim of the research was to find out the underlying factors for an effective clinical education for which the post-placement survey collected the students' perspectives about their clinical education experience. The analysis of the quantitative data collected showed high level of student satisfaction on this aspect but there were some factors associated with clinical educators, curriculum, the environment and clinical education activities that were found to be affecting the quality of clinical education provided. To get a deeper understanding of the factors affecting clinical education and the development of clinical reasoning skills a qualitative study was considered. Thematic analysis of the qualitative data collected from the participants that included both the clinical educators and the undergraduate physiotherapy students identified several factors influencing the development of clinical reasoning skills that were mainly intrinsic to the students' such as the knowledge, skills and experience. It was obvious from the findings that clinical reasoning is a cognitive skill and therefore the factors affecting the development of clinical reasoning were mostly linked to the students. However, the quality of clinical education also plays a role in building this cognitive

competence and the study found that there were several underlying factors that were responsible for providing an effective clinical education to the students' during their clinical placements. These factors were mainly associated with the attributes of physiotherapy students and their clinical educators and also the curriculum that the physiotherapy program followed. By integrating the results of both quantitative and qualitative studies it can be concluded that the clinical education contributed to the development of clinical reasoning skills among the undergraduate physiotherapy students but there were several factors affecting it. It is a linear process through which the expertise in clinical reasoning will be achieved and therefore the clinical education sets foundation for preparing the students for contemporary physiotherapy practice in their future role as physiotherapist. Achieving mastery in this skill requires an inquisitive among the students and physiotherapy professionals for lifelong learning. In addition to these main purpose and aims, this research had an additional aim to recommend an appropriate context specific clinical education model that promotes the development of clinical reasoning skills and professional practice readiness. The findings from the qualitative data analysis identified that the blocked clinical placement model and the gaps in physiotherapy curriculum were the main hurdles for the education providers and the students in this context. Thus, the researcher recommended that both the curriculum developers and the stakeholders of clinical education should take these factors into out and establish an appropriate clinical education model that would better suit the context of the United Arab Emirates.

4.7 Conclusion

This chapter provides an overview of the research phases including the data collected and the analysis techniques used for each type of data, then the research findings of both quantitative and qualitative study were presented in alignment with the research aims and questions. Summary of the main findings were presented at the end of the chapter to draw inferences by combining results of both the quantitative qualitative methods in order to address the main research question and the research problem.

CHAPTER 5: DISCUSSION OF THE RESEARCH FINDINGS

5.1 Introduction

The purpose of chapter five is to discuss about the findings of this research. In the previous chapter the findings from the data gathered through the mixed-methods approach were presented. In this chapter the researcher aims to discuss about the findings presented the previous chapter by drawing inferences from the recent and relevant literatures. Following sections include a quick overview of the research, summary of findings of the study and a detailed discussion of those findings. Then the recommendations, conclusions and limitations of this study are presented in the later parts of this chapter. Finally, this chapters ends by highlighting the contribution of this study along with a final word from the researcher.

5.2 Overview of the research

This study was conducted at a higher education institution that located in the emirate of Abu Dhabi. This college is exclusively female students that offers health sciences education within the United Arab Emirates. The purpose of this research was to investigate the contribution of clinical education in developing the clinical reasoning skills and professional practice readiness among the undergraduate physiotherapy students in the UAE. The main research question for this study was “Does clinical education contribute to the development of clinical reasoning skills and professional practice readiness among undergraduate physiotherapy students in the UAE?”. The following four sub-questions of this research heled in answering the main research question.

1. What are the underlying factors for an effective clinical education?
2. What factors affect the development of clinical reasoning skills?

3. Does clinical education adequately prepare the undergraduate physiotherapy students for professional practice?
4. What is, if any, the appropriate clinical education model that facilitates clinical reasoning skills and professional practice readiness for the UAE context?

The conceptual framework for this study evolved from various clinical reasoning theories and adult learning theories. The dual-process theory of clinical reasoning and transformative learning theory together formed the theoretical framework for this research. This study took mixed-methods approach with a sequential explanatory research design and collected both quantitative and qualitative data from the undergraduate physiotherapy students and their clinical educators using the questionnaire and semi-structured interviews. The main challenges in this research process was getting the ethical approval from various sites where this study was conducted and recruiting the students to participate in this study. However, the researcher's perseverance in this entire process helped him overcome these challenges. The following section presents the summary of main findings discussed in the previous chapter.

5.3. Summary of Findings of the study

This study using the sequential explanatory mixed-methods research design was conducted in two phases. Findings of the quantitative study showed that there was no significant difference in undergraduate physiotherapy students' clinical reasoning skills after attending 12 weeks of clinical education. The self-assessment of clinical reasoning and reflection instrument that consisted of 26 items was administered to test the changes in students' clinical reasoning levels before and after the clinical placements but only few of those 26 items (items 3, 4, 25 and 26) showed significant differences in SACRR score ($P \leq 0.05$) for both senior and junior cohort students in physiotherapy program. However, the clinical education experience was rated high

by the physiotherapy students but some of the students expressed dissatisfaction about various aspects of clinical education including the curriculum, environment and the clinical educator and it was evident in findings of the post-placement survey. The phase 2 qualitative research findings identified 8 themes and several sub-themes that highlighted the contribution of clinical education in developing the clinical reasoning skills and professional practice readiness among the undergraduate physiotherapy students including the factors underlying effective clinical education and the various other factors that affected the development of clinical reasoning. The findings of the study also showed the gaps in undergraduate physiotherapy curriculum of the host institution and suggested the need for an integrated clinical placement model to promote the development of clinical reasoning skills.

5.4 Discussion of the findings

Measurement of physiological variables such as blood pressure is a straightforward quantitative measure but the challenges for the researchers in the educational contexts such as in this study is the variables for measurement are cognitive in nature. Measuring these non-physical characteristics is a big challenge for the educational researchers (Harpe, 2015). Clinical reasoning skills and readiness for professional practice are both observable as well as hidden phenomenon in an individual and it is vital to explore these variables from the perspectives of the person expected to possess these skills and also from the observer point of view. In this study, the physiotherapy students are expected to demonstrate clinical reasoning skills and practice readiness, and the clinical educators are the ones supervising the students' practice and expected to observe these phenomena while they supervise the students during the placement. It is believed that clinical education plays an important role in developing clinical reasoning skills and promotes professional practice readiness. Therefore, it was essential to explore the views of both the undergraduate physiotherapy students and the clinical educators about their

own lived experience in clinical education in order to understand its contribution towards the development of clinical reasoning skills and professional practice readiness among the students. There is an internal mechanism behind the clinical reasoning process which makes it difficult to observe this phenomenon, so it was necessary to assess the clinical reasoning skills of physiotherapy students by means of a self-evaluation that can be reported in the form of quantitative and/or qualitative data. Simultaneously the preceptors can also provide the students' performance feedback that includes elements of clinical reasoning through a qualitative report. Therefore, this study utilized the mixed methods research with a sequential explanatory research design to find out the contribution of clinical education in developing the clinical reasoning skills and professional practice readiness among the undergraduate physiotherapy students. Self-Assessment of Clinical Reasoning and Reflection questionnaire is a valid instrument to assess the students' perception of their clinical reasoning and reflection abilities. This 26 items Likert scale instrument was administered twice to find out if there are any changes in physiotherapy students' clinical reasoning and reflection skills after 12 weeks of clinical education compared to their base line score measure prior to the start of clinical placements. Though the mean scores of each of the 26 items showed some positive changes in the post-placement survey findings compared to the baseline measure, the results of the Wilcoxon Signed Rank Test were not statistically significant. These findings warranted the researcher to explore the factors underlying effective clinical education and the factors affecting clinical reasoning skills development and the readiness for professional practice. At this point it was necessary to include the qualitative methods in order to understand the lived experience of the participants. Therefore, the mixed methods research was considered to be the most appropriate research approach for this study. Quantitative data collected for this study was analyzed using the non-parametric Wilcoxon signed-rank test as the data were not normally

distributed (Harpe, 2015). According to Harpe (2015) “Qualitative methods are extremely important and can provide a depth of information that quantitative measurement cannot begin to approach. Information gathered from qualitative methods can inform quantitative methods, and vice versa. Furthermore, both methods can be successfully used together as seen in mixed-methods studies”.

Clinical reasoning in physiotherapy practice is more of an analytical process and less focus or no emphasize is given to the associative emotions. Students who took part in this study have said that the main challenge for them during their clinical education was coping-up with their own emotions during the clinical encounters. They have also reported nervousness which is a physical response that accompanies the emotional imbalance. According to Langridge, Roberts and Pope (2016), “clinicians are expected to clinically reason based on the person-centered data, when sometimes these decisions provoke fear, concern and a feeling that something is not correct within the clinicians themselves”. But several studies on the decision-making stresses the importance of the physical and emotional responses that underpins the clinician’s ability to consciously analyze (Croskerry, 2009; Ellamil et al. 2012; Smith, Thurkettle & Cruz, 2004 and Strick and Dijkstrerhuis, 2011). Therefore, it is essential for the physiotherapists to find out their own emotional concerns and fears during the process of clinical reasoning and decision making. In the context of this study, both clinical educators and faculty members have a huge responsibility of addressing the emotional imbalance that the physiotherapy students suffer during their clinical placements. Langridge, Roberts and Pope (2016) believed that using a reflective practice approach clinician will be able to identify the impact of their emotions in the process of clinical reasoning and decision making. Hence the clinical education should promote reflective practice to develop the physiotherapy students’ as reflective practitioners who can

overcome their emotional imbalance and rely on their intuitions to make sound clinical reasoning and good decision making.

Clinical practice in physiotherapy demands the students to integrate their physiotherapeutic theoretical knowledge and practical skills. Findings of this study highlighted the theory-practice gap among the physiotherapy students who have been attending clinical placements in their fourth and fifth year of the program. It is important that the preclinical training at the university level should be aimed at preparing the students for the challenges of real-life experiences in clinical education and the complexities associated with it (Wijbenga, Bovend'Eerd & Driessen 2018). Theory-practice gap was reported to be prominent barrier for learning in clinical settings and several students and their clinical educators have acknowledged that the clinical reasoning was impaired because of the gaps in students' knowledge and skills. Almost all the clinical educators were expecting the students to demonstrate a holistic approach to patient care and good problem-solving skills. In contrast the physiotherapy students on placement were expecting their clinical educators to teach them the fundamental knowledge and skills of physical therapy. There were several factors that affected the students' clinical reasoning abilities during clinical placements which included the barriers that were associated with student attributes, clinical educator attributes and the physiotherapy curriculum. Time constraints of the clinical educators was one of the major factors that affected the physiotherapy students' learning experience in clinical settings. Several educators have acknowledged that they do not have a dedicated time for teaching the students on placement as their primary role is always the patient care. There seems to be a gap here in the understanding of clinical education by the higher education institution that offers the physiotherapy education and its stakeholders who are providing the clinical placements to fulfil the curricular needs of the program. The clinical educators working in the hospitals are not part of the educational institution and they are the

fulltime employee of the hospital which has the tie-up with the health sciences educational institution that conducts the physiotherapy education. The primary role of clinical educators who participated in this study is physiotherapist and almost all of them are expected to meet the day to day business needs of their employer which is mainly providing patient care. Teaching the physiotherapy students on placement is an added responsibility for them and they do not have a dedicated time allocated for this purpose. The gap here is that both the college of health sciences and their stakeholders providing clinical education do not have a clear strategy on their resource planning and therefore the time constraint of the clinical educators' impacts on the clinical education of the physiotherapy students. The onus is on the educational institution to create adequate resources to overcome the time constraints by working in partnership with their placement providers. When the clinical educators do not have adequate time, it has a direct impact on students' clinical exposure. Learning clinical reasoning skills largely relies on the patient exposure and also the variety of clinical cases that they assess and treat. Similar findings were reported by the physiotherapy students and clinical teachers in a qualitative study conducted by Wijbenga, Bovend'Eerd and Driessen (2018) at the European School of Physiotherapy in the Netherlands.

In this study, it was noted that the clinical education program was developed by the health sciences institution in line with the original Australian curriculum. The licensed physiotherapist working in the hospitals which provided clinical placements were responsible to teach and assess the physiotherapy students during their clinical placements. It was also reported that the physiotherapist needs to attend the clinical educators' workshop conducted at the college of health sciences in order to become the clinical educator. Some of the educators have felt that they are not fully aware of the curriculum that the students have studied in the college and they do not have adequate information about the individual students' academic background and/or

the other factors that can influence the students' learning. Hence, they were expecting a more collaborative approach to clinical education than the current model in which the faculty clinical supervisors from the college were visiting the clinical education sites for just discussing the students' learning needs and to check on the students' progress. But the clinical educators were expecting more involvement of the academic staff in clinical education activities to enhance the students learning. Jarecke, Taylor and Gusic, (2013) argued that the faculty members must reach out to the students on clinical placements in order to facilitate their learning in clinical environment by linking the present clinical experience with prior theoretical knowledge. However, in the context of current study there are legal restrictions within the country that limits patient care to only licensed healthcare professionals. The Department of Health (DoH) which regulates healthcare practice in the Emirate of Abu Dhabi is the licensing authority for health professionals that sets the standards for professional practice. All physiotherapists working in the hospitals are required to possess the DoH license to practice the protected title. But the academic staff members in the college do not have the license to practice as physiotherapist because the DoH does not regulate the health sciences educational programs within the emirate. As a result there is a gap between academic and clinical practice in physiotherapy in this context. But in countries like the UK, the Health and Care Professions Council (HCPC) that regulates 13 healthcare professions including physiotherapy expects both academic and clinical practitioners to possess the license to teach and practice their profession within the United Kingdom. In Wijbenga, Bovend'Eerd and Driessen (2018) study the physiotherapy students were supervised and assessed jointly by their academic staff members and also the clinical teachers to ensure reliability in assessing the students' performance but this reliability measure seems to be missing in the current study. However similar to the findings of Wijbenga, Bovend'Eerd and Driessen (2018) study, the participants of the current study also reported

positive experiences about their clinical education as they have had opportunities for peer learning and to work as a part of larger multidisciplinary teams during the clinical placements. According to Ladyshevsky (2002), the reciprocal peer coaching model is a valuable tool to support the clinical education as it provides the cognitive support to the novice clinicians during their patient encounter. The author argued in favor of the peer coaching model in clinical education of healthcare students because the peer learning promotes clinical performance and the clinical reasoning skills of the novice practitioners, therefore it enhances the clinical competence of the students.

Findings of the study showed that the physiotherapy students were considerate towards the views of other interdisciplinary team members especially in the care planning and the clinical education seems to have contributed to this openness for feedback among the students. Therefore, it can be concluded that the clinical education contributed to the development of clinical reasoning skills and professional practice readiness among the undergraduate physiotherapy students. Both physiotherapy students and the clinical educators reported that the clinical placements should be aligned to match the students' area of interest to generate the enthusiasm to learn. However the program learning outcomes of physiotherapy education in the college of health sciences and the international standards of physical therapy education expects that the physiotherapy students must go through the core-placements rotation to develop the competencies and skills required to deal with the versatile clinical conditions in their day to day practice. Clinical educators' have also stated that exposure to wide variety of complex cases in real-life scenario is vital for promoting the students' clinical reasoning skills. Wijbenga, Bovend'Eerd and Driessen (2018) concluded that "Students learnt most when they could test their own clinical reasoning approach on individual patients in real-life practice. Repetition, increased practical experience and exposure to a wide variety of complex patients helped

students develop and solidify their own approach, building towards pattern recognition”. In reality most of the patient problems are multifactorial and needs a holistic approach to care planning. Hence it is essential for the students to have range of experience in diverse practice settings to develop their clinical reasoning skills regardless of the complexity of the conditions that they are supposed to manage.

Some clinical educators have stated that the preclinical preparation should be focused on a particular specialty to enrich the students’ learning experience during the placements. They thought that the placement specific preparation will help the students to integrate their theory to practice in an efficient way and thus promote their clinical reasoning skills as well. According to Wijbenga, Bovend’Eerdt an Driessen (2018), employing a “contextualized pre-clinical training” helped the students to develop an individual approach for themselves prior to entering the clinical training.

Students learning styles is another factor that determined the effectiveness of clinical education in the context of this study. Clinical educators have reported significant differences in students learning styles which affected the way the students have learnt during their practice placements. Some students were active learners who were very enthusiastic to learn through self-directed ways using inquisitive approach whereas the others seemed to be passive learners who were not motivated enough to independently learn in clinical placements. Therefore, the university based education should aim to prepare the physiotherapy students for independent and active learning which is essential for succeeding in their clinical placements and also it should aim to foster students’ ability to integrate theory and practical knowledge. In Wijbenga, Bovend’Eerdt and Driessen (2018) study it was reported that the students and clinical teachers agreed that the focus of preclinical phase of education should be on developing the critical attitude among the

students' and this is mainly for supporting the active learning style and integration of evidence-based practice.

Ludin and Fathullah, (2016) believed that clinical teachers determine the quality of learning experience for healthcare students in the clinical settings. Edgecombe and Bowden (2009), and Kelly (2007) emphasized that “interpersonal skills, particularly the ability to communicate clearly and build respectful relationships with the students in the clinical setting, knowledge, competence, role modeling, and willingness and ability to provide constructive feedback as clinical teacher attributes that have a positive influence on students' clinical learning experiences”. Physiotherapy students appreciated the clinical educators who were friendly, kind and supportive in nature. They valued the feedback that the educators have provided them as they thought it helped to enhance their clinical reasoning and decision-making skills. Simultaneously, students have criticized the educators who did not supervise them for various reasons and reported gaps in their clinical reasoning because they weren't confident of the decision that they have made without the feedback of their clinical educators. Both the clinical educators and the academic faculty members should take these factors into account and devise strategies to support the students' during their clinical placements. Feedback is essential for the novice practitioner to fine tune their reasoning and decision-making skills and it is the responsibility of the educators to observe student practice and provide feedback on a regular basis. The significance of feedback to students' during their practice placements was reported by Wijbenga, Bovend'Eerd and Driessen (2018) in their study which concluded that “clinical teachers who adopted an open attitude towards the student, explicated their own thought processes and provided feedback regularly were appreciated most by students”. Delany and Golding (2014) suggested the use of “making thinking visible approach” as a pedagogical approach to develop the clinical reasoning. They believed that the clinical teachers using this

approach are forced to make their thinking visible so they start to reflect about their clinical reasoning teaching and it facilitates them to articulate their own reasoning process by scaffolding it to the students, who can access and use it in their practice.

Findings of this study showed that the students' personal rapport with their clinical educator affected their clinical education experience which in turn affected the clinical reasoning development. Both clinical educators and the students have reported that the relationship between them determined their interaction with each other. Good rapport was vital for the educators to share their feedback with the students' so that they can learn from their mistakes and develop their clinical reasoning and decision-making skills. Poor relationship affected the feedback process as there was no mutual trust and confidence between the students and their educators. This was affecting the development of physiotherapy students' clinical reasoning skills. Similar finding were reported by Wijbenga, Bovend'Eerd & Driessen (2018) and the students who participated in their study "believed it was their clinical teachers' job to help them organize and connect the elements of the reasoning process to improve its logic, whereas insufficient encouragement of the clinical teacher restricted their learning". Papp et al., (2002) argued that the clinical environment, teaching and learning activities, and the ability of the clinical teachers' plays a major role in creating a "positive learning environment through effective teaching processes such as offering support in negotiating the social world of the clinical setting, and constructive feedback and assessment". Edgecombe and Bowden, (2009) also found that the positive learning environment in clinical settings contributed to the student nurses learning and professional development. The behavior of clinical teacher in establishing a supportive teaching and learning relationship with student nurses in the clinical setting had a positive impact on the quality of nursing students' learning experiences in clinical placements (Stockhausen, 2005). Knowledge, communication skills and enthusiasm were the top three

qualities identified by Ludin and Fathullah (2016) as effective clinical teacher qualities. Similarly, the nursing students who participated in Valiee et al., (2015) study stated that “ ‘treating students, clients, and colleagues with respect’, ‘being eager to guide students and manage their problems’, and ‘establish effective communication with students’ as effective behaviors of clinical teachers that influence learning”. According to Heshmati-Nabavi and Vanak (2010), clinical instructors who show respect towards their students are found to be influential in motivating their learning and considered to be role model for the students. But findings of this study showed lack of consistency in relationship between the students and clinical educators as some students reported that they did not receive timely feedback and their educators were busy with their clinical routine and reported gaps in their clinical education experience. Similar experience was reported in the literature by nursing students (Najafi et al., 2011).

Teaching strategies used by the clinical educators helped the students to develop critical thinking and problem-solving skills that are vital for sound clinical reasoning and judgment. They have promoted inquiry based learning and reflective practice approach to facilitate the students’ learning clinical reasoning skills. When the clinical educators have identified theoretical gaps in the students’, they have directed them to read relevant sources to enhance the students’ ability to diagnose. Clinical educators stated that they have promoted autonomous practice during clinical education as they thought it was vital for students’ readiness to future professional practice. Holdar et al., (2013) concluded in their study that the physiotherapist clinical reasoning is a “multifaceted psychological process” and numerous internal mechanisms are associated with it. They argued that the physiotherapist’s power positioning, anxiety, pain and transference all determine their ability to effectively negotiate with the patients and making them do what they wanted them to do. Physiotherapists who participated in Holdar et al., (2013)

study confirmed that they have not learnt these skills during their physical therapy studies. Linking these findings of Holdar et al., study to the findings of the current research, it was evident that the clinical educators are attempting to promote students' clinical reasoning skills but there are several internal mechanisms that are associated with clinical reasoning process which is not visualized by the clinical educators. It can be argued that the development of clinical reasoning skills is an ongoing process in physiotherapists' professional life. Cutrer et al., (2013) stated that, "teaching clinical reasoning is difficult and requires a thoughtful approach from already busy clinicians who must balance their teaching responsibility with providing high-quality care to patients". According to Nendaz and Perrier (2012), developing the clinical reasoning skills in healthcare students is not a single-step process as it is an ongoing process that needs to be nurtured throughout the training period in student life and even beyond into the professional life. Inadequate knowledge, inappropriate data gathering and processing, and defective metacognition are the potential causes for cognitive errors that results in poor clinical reasoning (Graber, Gordon and Franklin, 2002). Addressing these elements is vital to improve the clinical reasoning and decision making and clinical teachers should consider these gaps and identify strategies for effective teaching of clinical reasoning. Cutrer et al., (2013) recommended that scaffolding and reflection are the two main strategies the clinical teachers can adapt to promote clinical reasoning skills development. Apart from these they also recommended the RIME (Reporter, Interpreter, Manager and Educator) framework and SNAPPS (Summarize, Narrow, Analyze, Probe, Plan and Select) as tools for teaching clinical reasoning.

Preclinical preparation, clinical placement expectations and duration are the main barriers reported by both the physiotherapy students and clinical educators. Students have reported mixed feelings about their preparation for clinical education. They thought the college-based

education adequately prepared them for the clinical placements but they felt there was a huge gap in their exposure to clinical environments as it happened in the very late stages that is in the fourth year of their study. Clinical Educators have said that they are not completely aware of the placement expectations and they relied mostly on student information to know the placement expectations. Both educators and students have reported that the clinical placement focus was not maintained in some placements due to lack of resources and unavailability of cases in the specialty where the student was placed. Students have criticized the clinical educators' evaluation of their performance and felt that the rationale for their low scoring was not appropriate. Both the students and educators felt that the placement duration was not adequate to provide an effective clinical education.

Lee et al., (2016) stated the clinical reasoning is a cyclic process and includes five phases. These involve assessment of physical functions, generating problems list through sound analysis, developing a hypothesis for each of those problems using the diagnostic skills, care planning through SMART goal setting and re-evaluation to monitor changes and modify the treatment choices. Lacunae in these skill sets may limit the clinical reasoning abilities as reported by Lee et al., (2016) for the participants in their study. Clinical reasoning in physical therapy is the justification behind every therapeutic decision of the physiotherapist. Therefore, it is of paramount importance that the physiotherapy students acquire the necessary fundamental knowledge and skills prior to making decisions about their physiotherapy practice. Students' need to recognize that individual patients may show variant signs and symptoms for the same condition, hence they must adapt a holistic approach to clinical reasoning rather than focusing on the specific area affected. If the students have gaps in their knowledge and skills it is common for them to struggle with their clinical reasoning and decision-making process. Clinical educators have reported knowledge gap is many students as they have observed the difficulties

for the students to retrieve the information and link to the real patients that they are handling during the clinical placements. On the contrary some of the clinical educators have stated that the physiotherapy students demonstrated sound knowledge but it is just the manual handling and the hands-on skills, that is, the practical skills were the ones that was lacking among the physiotherapy students who were on clinical placements. Cruz, Moore and Cross, (2012) concluded in their study conducted on Portuguese undergraduate physiotherapy students that the clinical reasoning is a knowledge dependent process. The final year physiotherapy students who took part in this mixed-methods research reported that sound clinical reasoning always depends on the deeper level of knowledge, cognitive skills and experience in clinical practice. The authors argued that the existing knowledge in students guided their clinical reasoning and the associated experience was useful in improving their clinical reasoning skills for future practice.

According to Ricros and Riviere (2018), “factors favoring students’ poor clinical reasoning skills were linked to a knowledge gap and a lack of interconnection of that knowledge, a lack of confidence, impaired reasoning tied to personal factors or an immature professional project. Authors questioned the learning approaches adapted by the students’ as they found that the students were relying on memorizing the information rather than understanding the concepts”. Clinical teachers who took part in this study highlighted the lack of time as a barrier for them to teach clinical reasoning to the students while they are in the clinical placements. Assessment skills and problem-solving skills seems to be closely related to each other. Identifying client problems is the first and foremost goal for any clinician and for this the physiotherapy students should be able to perform a thorough physical assessment of their patients in order to generate the problems list. But the clinical educators have identified gaps in their students’ assessment skills, and it had a direct influence on the students’ ability to generate the problem list for their

clients. Furthermore, they have reported gaps in students' ability to diagnose as they have noticed the students' arriving at a conclusion about the clinical scenario without analyzing the reasons behind their decision. It was reported that the physiotherapy students were unable to articulate why they have made that particular decision and how they have ruled out the other closely related possible differential diagnosis. Clinical educators have said that often they need to prompt the students to arrive at an appropriate decision by facilitating their reasoning process. Why you are doing what you are doing is the most common question that all clinical educators were asking their students to understand the rationale behind their decisions. On most occasions the students didn't had the answers to their clinical educators' questions and thus the clinical educators' have to unfold the hidden mystery in that clinical encounter by providing the justification for their treatment choices for the particular client. Students' clinical reasoning skills were also depending on the type of patients that they are handling and also if they have had any previous experience in clinical practice. Clinical reasoning of simple and noncomplex cases was easy for the physiotherapy students whereas the complex cases required lot of prompts for them to arrive at a conclusion. Physiotherapy students were able to develop the hypothesis, develop the problems list and set appropriate goals for almost all straightforward cases but the complex multifactorial conditions were difficult for them to handle. Students have reported that they faced difficulties when they have to switch between different areas of physiotherapy practice within the same day. Previous experience played a greater role in the students' clinical reasoning and decision-making process. Clinical educators have stated that if the students' have been on clinical placements before then their reasoning skills were better and also the final year students reasoning skills were superior to that of the fourth-year students. This indicated a linear development of clinical reasoning skills among the physiotherapy

students as they gain more and more experience in clinical practice and exposure to wide variety of cases their clinical reasoning skills also seems to develop.

Alfaro-LeFevre, (2013) presented 17 clinical reasoning skills that are as follows,

1. *Verifying the accuracy of data collected and its reliability*
2. *Customizing the interventions*
3. *Developing a care plan that is comprehensive and, re-evaluating and modifying it*
4. *Making conclusions*
5. *Finding the problems list*
6. *Establishing patient centered goals*
7. *Differentiating the related information from unrelated*
8. *Prioritizing problems*
9. *Finding the missing data*
10. *Ability to perform comprehensive and systematic assessments*
11. *Differentiating the normal findings from abnormal signs and symptoms*
12. *Self-reflection and monitoring*
13. *Making assumptions*
14. *Grouping relevant problems*

15. Acknowledging the inconsistency

16. Health promotion and prevention of illness

17. Pattern recognition

Findings of this study identified weaknesses and gaps in many of these skills for the physiotherapy students as reported by the participants in the face-to-face semi-structured interview. Developing a customized treatment plan and progressing the interventions was a challenge for physiotherapy students as highlighted in clinical educator interviews. Physiotherapy students in this study had difficulties in drawing conclusions and generating problems as reported by the clinical educators. Prioritizing the patient problems by distinguishing the relevant ones from the irrelevant was an issue for the physiotherapy students during clinical education as they had gaps in their assessment skills which limited the comprehensive evaluation of the condition. However, a linear development was noticed in these skills sets as the final year students showed better diagnostic and problem-solving skills. It can be argued that clinical reasoning skills are strongly associated with experience in clinical practice and the theoretical knowledge and practical skills have significant influence in the clinical reasoning and decision-making process.

Peer learning is another factor identified in this research as a determinant of effective clinical education. When two students are together, they seem to be supporting each other to overcome their challenges in clinical education and this enhances their overall learning experience. Clinical educators have said that they were able to witness discussions between students and questioning approach to learning when they were together. Peer learning is one of means to promote self-directed learning which is vital for the success of clinical education. However there seems to be barriers here as well especially if the two students placed together are not

friends as they may shy away from one another and do not engage in an interactive learning. Sevenhuysen et al., (2015) concluded in their qualitative study involving twenty-four physiotherapy students and twelve clinical educators that the peer-assisted learning reduces anxiety among the students and provides a feeling of safety within the learning environment when the students are together. They also argued that the peer learning reduces the clinical educators' burden and enhances collaborative working possibilities and develop their professional skills.

Culture plays a crucial role in deciding the effectiveness of clinical education. In the context of the current study, several clinical educators and the physiotherapy students reported culture as a key barrier for the success of clinical education and development of clinical reasoning skills. The local culture of the UAE has a strong influence on the clinical education and development of clinical reasoning skills for physiotherapy students. All students in this study were females and lot of them reported their cultural beliefs as a barrier for developing interpersonal relationship with opposite sex patients and clinical educators. Good interpersonal relationships are vital for effective communication and both these factors have an influence on the clinical reasoning and decision-making process. Therefore, the cultural restrictions among the female physiotherapy students of the host institution affected the development of their clinical reasoning skills. McBee et al., (2017) found in their study that the resident medical practitioners did not differ in their therapeutic and diagnostic reasoning when compared to the board certified physicians and the authors believed that the modern medical education prepared the residents with skills necessary to overcome the influence of contextual factors in clinical reasoning. The resident doctors who took part in McBee et al., (2017) study had early exposure to patient care and they had the competency to overcome the cultural barriers as their medical education utilized newer approaches to develop cultural competency in them and as a result they were in

par with board certified senior doctors. From this findings reported by McBee et al., it is understood that the culture is one of contextual factor that influences clinical reasoning and decision making and the physiotherapy educational programs should incorporate strategies that aims to address the cultural barriers among the physiotherapy students who are entering and/or on the clinical placement.

The findings of the study showed that the individual students' ability to cope up to the challenges arising in clinical placements is another factor that was affecting the overall effectiveness of clinical education and thus it affected the development of clinical reasoning skills. The students who raise up to the challenges of clinical placements and find their way out seems to have a good experience in clinical education and develops sound clinical reasoning skills whereas the ones who were unable to cope up to the demands of clinical environment often seems to dislike or have had an unpleasant experience in their clinical education. These students usually demonstrate weaker clinical reasoning skills. However few educators have thought that it was normal for the students to struggle in challenging circumstances and they didn't expect them to attain the mastery of overcoming these challenges of the clinical environment at this stage of their professional life and they believed that it is something that would develop over the years with experience.

According to Thompson et al., (2016), understanding the consequences of variations in clinical decisions among the clinicians was of paramount importance to improve the clinical judgements and decision making. Poor clinical judgement and decisions were the causes for potential harms associated with healthcare delivery (Reason, 2000). In the UK, 11% of patients receiving healthcare from the NHS were harmed by the poor clinical judgement and decisions of the healthcare team (Vincent, Neale & Woloshynowych, 2001) and Baker et al., (2004) reported

similar statistics in Canada. These adverse events costed an additional \$1.5 billion to the UK NHS towards its healthcare budget (Vincent, Neale & Woloshynowych, 2001). Some variations in healthcare practice is acceptable but the interventions available to improve pain and functional impairments are numerous in healthcare practice (Doran et al., 2006) and health professionals addressing these problems may differ in their clinical judgement and decision making (Ericsson, Whyte & Ward., 2007; Thompson & Yang, 2009; Thompson et al., 2013). Therefore, it becomes vital to address the sources of these variations in order to make good clinical judgements and decisions using relevant evidences into physiotherapy practice. Competency in clinical reasoning, decision making, and reflective practice should be achieved as early as student life. Thus, the clinical education and people involved in clinical education including the students, clinical educators, universities and placement providers all should aim to provide high quality and effective clinical education that prepares the physiotherapy students to meet the demands of contemporary physiotherapy practice.

Clinical education plays an important role in preparing the physiotherapy students for their future role as physiotherapist. Contemporary physiotherapy practice demands the day 1 new graduates to possess adequate skills for independent practice. In the context of UAE, physiotherapy practice is regulated by Department of Health (DoH), “Dubai Health Authority” (DHA) and the “Ministry of Health” (MOH). Within the emirate of Abu Dhabi where this study was conducted, the Department of Health is the regulator of healthcare practices. Professional qualification requirements for physiotherapist license has two different pathways for physiotherapy graduates from higher educational institutions within the UAE. One for the UAE nationals who are graduating with the physiotherapy degree are entitled for Physiotherapist license straightaway whereas the non-national graduates need to sit through a licensing exam and be successful in it in order to be eligible for licensing as physiotherapist. In the latter case,

non-national graduates are also expected to complete a 6 months compulsory rotational internship before applying for the licensing exam. In either of these cases, a physiotherapy graduate who obtains the license from the Department of Health can practice as a physiotherapist without any restrictions from the day of issue of the license. Therefore, the day 1 new graduate should be able to demonstrate the competencies and skills required for autonomous practice. Both the higher educational institutions and their placement providing stakeholders have a shared responsibility of producing practice ready graduates. The clinical educators have said that the students have enormous opportunity for real-life practice during their clinical education and there is a scope for students to develop their reflective practice and problem-solving skills at this stage. They believed that the interaction with patients and multiple other professionals was helping the students in preparation towards their future professional practice. Some of the senior students from the year 5 group also acknowledged the contribution of clinical education towards their readiness for professional practice. However, some junior students from the year 4 cohort thought that they were not yet ready for independent practice and looking for more experience in versatile areas of physiotherapy practice. Though they were confident to handle the simple and non-complex case, they felt they wouldn't be able to manage the complex ones. The clinical educators have thought that this was not a surprise for them, and they said that almost all newly qualified practitioners will have to go through these challenges and further they stated that it was normal for any student to feel this way. Clinical education provides multidisciplinary team working experience and thereby promoting the development of interpersonal skills. Clinical educators stated that the students did not demonstrate good interpersonal skills at the beginning of their placement, but they were able to see the changes in students' interpersonal skills as the placement progressed and when the students come to a placement with previous clinical experience. Thus, they believe that the clinical education had

a great impact on developing the students' interpersonal skills and both the students and clinical educators' have had different strategies to promote the interpersonal relationship with each other. Reflective practice is another skill that seems to be developing through the clinical education. Clinical educators have played a huge role in facilitating the students' reflections and helped them to learn from their mistakes. They have used different approaches to promote the reflective practice but in essence the students were made to think about their day to day experience and modify their future practice based on their previous experiences. Some of the students have also stated how their clinical education promoted their reflection and were able to articulate their own strengths and the areas that they needed improvement and also their action plan to achieve those goals. These are all the elements of reflective practice which the students have demonstrated during their clinical placements. Wessel and Larin, (2006) reported changes in physiotherapy student's reflection skills in their study conducted at a higher education institution in the United Arab Emirates. The authors concluded that the physiotherapy students demonstrated higher levels of reflection during their third clinical placement compared to the first placement. This suggests that the reflective practice develop through experience and a linear growth of reflection skills are expected from the clinical education experience. During clinical education the physiotherapy students are questioned by their clinical educators about their clinical reasoning and the decisions they have made based on that reasoning. The clinical educators expect the students to articulate the evidences for their treatment choices and thus they are promoting the evidence-based practice. Clinical practice guidelines and journal articles were the main sources of evidence that the students were using to justify their clinical reasoning and the decisions they have made. Clinical educators have stated that the students have had some prior understanding of evidence-based practice from their university-based education and they were able to locate, identify and summarize the key findings of the evidences. However,

the main difficulty for the students was to apply the evidence into clinical practice. Clinical educators said that the students had the knowledge and understanding of evidence-based practice, but they were unable to connect their evidence into real-world clinical practice. Apart from these, clinical education contributed to the development of autonomy and also inculcated the openness for feedback among the physiotherapy students. Almost all the students have stated that they have had opportunities for unsupervised practice in noncomplex cases which built their confidence that is vital for autonomous practice. Most of them were confident of dealing the simple and non-complex cases on their own which is a sign of autonomy. Clinical educators reported that the students were open minded for the feedback and they were always keen on informed decision making. They felt that the students' attitude toward feedback was good and have seen changes in students' performance after providing the feedback. This seems to be helping them to become better practitioners. But the students have had some contrasting information to share and they thought that the feedback was not constant and consistent. Students reported gaps in the feedback process where the clinical educators' at times given the feedback in front of the patients which the students felt was not appropriate and also the timing of the feedback was not regular and it was inconsistent or just the two summative placement feedbacks they received during their placement evaluation. Students were expecting to receive feedback at regular intervals as an ongoing measure to improve their performance in clinical practice.

5.5 Conclusion and Recommendations

From the above discussion it is obvious that the clinical education contributed to the development of clinical reasoning skills. Clinical education promoted autonomy, reflective practice and evidence-based physiotherapy practice among the undergraduate physiotherapy students. Therefore, it can be concluded that the clinical education contributed towards the

development of clinical reasoning skills and prepared the students for their future role as physiotherapists. However, the findings of this study also highlighted several gaps and barriers in the clinical education process which had an impact on the graduates' readiness for professional practice. The gaps identified in physiotherapy curriculum and the absence of an integrated method of clinical education were two main areas that needed improvement in the existing physiotherapy clinical education of the college of health sciences. Physiotherapy students were not exposed to clinical practice at the early stages of their study and this was mainly due to the nature of their curriculum in which all university based education occupied the first three and half years of program and the clinical placements were blocking the last eighteen months. The placements were not integrated with the theory course and there was a long delay in students entering clinical practice because of this end-stage blocked model of clinical education adapted by the institution. These factors have had significant impact on students' learning in clinical setting and affected the development of their clinical reasoning skills and thus it affected their readiness for professional practice. The higher education institution where this study was conducted need to revisit its clinical education strategies including the model, resources and planning in order to enhance the quality of clinical education. When the clinical education standards are up hilled it will ensure high standards of clinical education for the physiotherapy students' during their practice placements which is essential to promote the clinical reasoning skills and professional practice readiness among the physiotherapy students. Physical therapy is a healthcare profession which mainly focusses on rehabilitation of clients who are having impairments that leads to activity limitations and participation restrictions that affects the day to day life of the individual. Physiotherapist play a crucial role in enhancing the quality of life and promoting the health and wellbeing of those clients affected by the disabilities by identifying the social and environmental barriers (WCPT,

2019). According to Govender et al., (2018), healthcare students should demonstrate adaptability in 7 key roles that are “as practitioner, communicator, collaborator, leader, scholar, health advocate and professional”. Several authors have claimed that clinical education is vital for preparing the undergraduate physical therapy students to gain knowledge specific to physiotherapy, develop therapeutic skills and demonstrate social and ethical competencies that are required to practice independently (Ernstzen, Bitzer & Grimmer-Somers, 2009; Krause et al., 2006; Lekkas et al., 2007; Stiller et al., 2004). Although clinical education is fundamental for the preparation of students to practice autonomously, Ernstzen, Bitzer and Grimmer-Somers (2009) stated that there is only little evidence exists on the approaches to deliver an ideal model for training of the physiotherapy students. Morre et al., (2003) argued that the role of clinical educator or the preceptors in physical therapy education is of paramount importance for the “co-creation of knowledge and facilitation of learning”. Clinical education is vital for training the physiotherapy students’ in order to prepare them for autonomous practice in their future career physiotherapist. There is no evidence in the UAE context about the contribution of clinical education towards the preparation of work ready graduates and there is a gap in the literature on this aspect within the Gulf region, and this led to the purpose of the current study. According to Roman and Dison (2016) universities in South Africa were facing a lack of student preparedness, which was attributed to an array of factors, including the multilingual needs of the students and the large intake of students into university programs. However, according to Ramli, Ruslan and Sukiman, (2012) “students experienced anxiety towards initial exposure during clinical placements, but later they developed a sense of confidence in their professional competencies” and the findings of the presented study in the UAE context is similar to the findings of Ramli, Ruslan and Sukiman) (2012 study. In Rowe, Frantz and Bozalek (2012) study, interview with the community physiotherapists showed that they were able to feel that

their clinical education sufficiently prepared them for community physiotherapy roles. According to the authors undergraduate education should prepare the students with skills required for ongoing reflective practice for promoting life-long learning. Mostert-Wentzel, Frantz and Van Rooijen, (2013) argued in favor of reflection as a part of clinical learning in undergraduate education in order to enhance future clinical practice. Ramli, Ruslan and Sukiman (2012) believed that, when students are able reflect critically on their clinical education experience, it should influence their learning from their mistakes which will in turn deepen their learning. Clinical supervisors need to develop strategies to facilitate reflective practice especially for undergraduate students' so that they can provide effective clinical education and enhance the learning experience for students' (Ernstzen, Bitzer & Grimmer-Somers, 2009). Learning need forms and reflective portfolios are some of ways to enhance reflective practice, and it aid in developing critical thought processes and create a change in the students' personal learning strategies (Ramli, Joseph & Lee, 2013). Mostert-Wentzel, Frantz and Van Rooijen, (2013) suggested that small group discussions and case presentations could be considered as activities that promotes reflection during clinical placements.

Clinical reasoning skill is an essential competency of healthcare practitioners. Day 1 new graduate in physiotherapy is expected to demonstrate this essential skill required for safe practice and to meet the standards of proficiency for physiotherapist established by the "World Confederation of Physical Therapy" as well as the local and regional health professional regulatory bodies. Contemporary physiotherapy practice demands physical therapist to perform their role with autonomy and in a competent manner in order to ensure high quality of services to the clients referred for physiotherapy. Modern day healthcare settings are dynamic in nature and does not allow enough time frame for entry-level physiotherapist to adapt and orient to their roles, and lack of resources also limits the possibility of supervising and mentoring the newly

qualified physiotherapists. Therefore the university education should ensure the development of these skills sets during the student life and clinical education is believed to play pivotal role in developing the clinical reasoning skills and other associated or inter-related skills, and qualify graduates who are work ready from the first day of their professional life. Educational leaders, curriculum developers, faculty members and clinical staff all should take the ownership of ensuring high quality clinical education to the physiotherapy students and produce work ready physiotherapy graduates. It is recommended that the healthcare educational institutions develop a clinical education framework that addresses the actual and potential factors affecting the clinical education and the development of clinical reasoning skills as found in this study. It is important to understand the underlying factors for effective clinical education as it will help the higher education institutions in the health sciences disciplines to overcome the shortcomings if any and ensure effective delivery of clinical education to their students. Therefore, it is important to consider the factors underlying effective clinical education in order to provide a good learning experience for the students during their clinical placements.

5.6 Limitations

This was a case study conducted on the physiotherapy students of a health sciences educational institution within the emirate of Abu Dhabi. At the time of this study there were two other universities offering physiotherapy education within the United Arab Emirates. The scope of the study was limited to only one institution where the researcher had access and also the difference in curriculum followed at the other institutions limited the possibility of including the students of those institutions. Therefore, the recommendations of this study may not be generalizable to other institutions within the UAE but the findings of this research will provide a deeper insight into the development of effective clinical education strategies which will be useful for the larger student populations in healthcare institutions within the country and

globally. Another limitation of this study was all the students' who participated in this study were females as the institution where this study was conducted is an educational institution that allows admission of only female candidates. Hence the experiences and feelings reported by the students represent one sex and it will be interesting to explore the similar experience and feelings in male student population to determine if the sex has any influence on clinical education experience including the culture, learning styles and skills etc. The scope of this study was limited to finding the clinical reasoning skills development and professional practice readiness of the physiotherapy students and only included the students and clinical educators as participants. People in educational leadership roles were not included in the study and it will be a good idea to explore the views of educational leaders to understand the broader picture of the institutional related factors that may influence the effectiveness clinical education.

5.7 Contribution of the Research

To the best of researcher's knowledge this was first study in the United Arab Emirates that explored role of clinical education the development of clinical reasoning skills and professional practice readiness in undergraduate physiotherapy students. More than a decade ago, Wessel and Larin in 2006 reported the significance of clinical placements in developing the reflective practice skills of undergraduate physiotherapy students. Though the variables such as clinical reasoning skills and work readiness of healthcare students and new graduates are explore in-depth by several educational researchers, most of these studies were conducted on Australia, South Africa, United Kingdom, United States and in few European countries. Literature search in databases produced very limited evidences in the Middle East where only few studies were published in Saudi Arabia and Iran. Internationally the research on clinical reasoning process and professional practice readiness were mainly conducted on nursing and medical students and very limited studies were conducted on physiotherapy student population. The findings of this

study is expected to contribute to the literatures in healthcare educational research and believed to support the clinical teachers in devising their educational strategies for clinical education. Apart from the above-mentioned contribution towards the literatures, this study also makes contribution to the fellow researchers interested in health educational research from the perspectives of its theoretical framework and the methodology used. The conceptual framework for this study evolved from several clinical reasoning theories and also from the adult learning theories. The researcher developed his own theoretical framework for this study which is the combination of dual process theory of clinical reasoning and the transformative learning theory. Previous studies on clinical reasoning have included the clinical reasoning theories in its theoretical framework but the researcher thought that the clinical reasoning skills which is cognitive phenomenon that develops through learning in clinical settings and therefore the adult learning theory was added to the theoretical framework of this study. In addition, the mixed-methods research approach used in this study adds value as the previous studies on clinical reasoning were either relying on quantitative or qualitative methodology alone. So, the researchers who are interested clinical reasoning can benefit from this mixed-methodology approach for their studies.

5.8 Final word from the researcher

The researcher plans to disseminate his work by publishing it in peer-reviewed journals and presenting in the World Confederation for Physical Therapy conference that is scheduled to happen in 2021 in the UAE. Further, the researcher is keen on exploring the other dimensions of this research by including male participants in the study where feasible. The researcher believes that the recommendations of this study will inform the physiotherapy faculty and clinical educators at the host institution and the other institutions locally and globally about the strategies for effective clinical education.

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Appendices

Appendix A: SACRR Questions (Liker scale rating - 1 to 5)

1. I question how, what, and why I do things in practice.
2. I ask myself and others questions as a way of learning.
3. I don't make judgments until I have sufficient data.
4. Prior to acting, I seek various solutions.
5. Regarding the outcome of proposed interventions, I try to keep an open mind.
6. I think in terms of comparing and contrasting information about a client's problems and propose solutions to them.
7. I look to theory for understanding a client's problems and propose solutions to them.
8. I look to frames of reference for planning my intervention strategy.
9. I use theory to understand treatment techniques.
10. I try to understand clinical problems by using a variety of frames of reference.
11. When there is conflicting information about a clinical problem, I identify assumptions underlying the differing views.
12. When planning intervention strategies, I ask, "what if?" for a variety of options.
13. I ask for colleagues' ideas and viewpoints.
14. I ask for the viewpoints of clients' family members.
15. I cope well with change.
16. I can function with uncertainty.
17. I regularly hypothesize about the reasons for my client's problems.
18. I must validate clinical hypotheses through my own experience.
19. I clearly identify the clinical problems prior to planning intervention.
20. I anticipate the sequence of events likely to result from planned interventions.
21. Regarding a proposed intervention strategy, I think, "What makes it work?"
22. Regarding a particular intervention, I ask, "In what context would it work?"
23. Regarding a particular intervention with a particular client, I determine whether it worked.
24. I use clinical protocols for most of my treatment.
25. I make decisions about practice based on my experience.
26. I use theory to understand intervention strategies

Appendix B: The students' perspective about clinical education (Likert response 1 - 5)

Learning objectives

1. Provided with the objectives of the clinical placement on the first day
2. Clinical education is in alignment with the objectives of the placement
3. There is a link between educational objectives and expectations of the clinical educators from students
4. There is compatibility between theoretical curriculum and clinical activities.

Instructor

1. Clinical educator provides full support to the students
2. Clinical educator deal with student effectively
3. Clinical educator has a good understanding of the physiotherapy curriculum that the students' studied at their University/College.

How to deal with students in clinical settings

1. Clinical educators have necessary cooperation with students.
2. Clinical educators allow the students to make decisions in patient care planning

Clinical environment

1. There are sufficient number of patients for learning
2. There are enough facilities within the department as well as in the hospital.

Evaluation and supervision

1. There is always a supervision during the clinical training.
2. One to one performance evaluation of the clinical placement is provided

Appendix C: Interview guide for the Clinical Educators

Profile questions:

1. How long have you performed this role as clinical educator?
2. What is your total clinical experience?
3. How many students do you supervise at a given time?

Factors affecting the development of clinical reasoning skill: Based on your recent experience and observation of student performance in clinical placement, can you answer the following questions,

1. Do the students discuss with each other and question themselves while they are on clinical practice?
2. How do the students make their clinical judgments?
3. How do students act in solving the clients' problems?
4. Are the students applying and/or following evidence-based practice?
5. Do the students take the views of others such as colleagues and patient family members while planning the care?
6. How do students hypothesize patient problems and act to solve those?
7. Are the students reflecting on their practice experience? Follow-up questions if yes: how frequent? Who do they do it with? Individually or facilitated?
8. Are the students able to link the theories of physiotherapy concepts into actual clinical practice?
9. Do the students use or follow some clinical practice guidelines to treat the client group?
10. How do student act in demanding, changing and uncertain situations?

Appropriate clinical education model for UAE:

1. What are your thoughts about the current model of clinical education?
2. Can you list the strengths of the existing clinical education model?
3. What areas of this model needs improvement?
4. If there is an opportunity to revamp the existing model, do you have any suggestions and recommendations to incorporate into the new structure?

Appendix D: Interview Guide for the Physiotherapy Students

Factors underlying effective clinical education

1. How would you describe your clinical education experience?
2. What were your learning needs and/or objectives whilst you went out for clinical placements?
3. Were you able to achieve all those learning objectives you set for yourself?
4. What are the major challenges during clinical placements for you as a student physiotherapist?
5. How did you build rapport and trust with your clinical educators?
6. How did you build rapport and trust with the patients and their families?
7. What are your views about the clinical placement site/environment/facilities etc.?
8. How did your clinical educator support you to achieve your learning objectives?
9. Did you receive timely feedback on your performance and how did it affect your learning?
10. Do you think the university based education and the physiotherapy curriculum adequately prepared you for clinical placement?

Professional practice readiness

1. How did your clinical training prepare you for professional practice?
2. How confident are you to practice your profession independently?
3. What are the areas of your professional practice that needs improvement?
4. Are there any learning opportunities that you thought was not provided to you during clinical placements?
5. If there is an option to modify the current model of clinical education, what are your recommendation for it?

Appendix E: Cover Letter and Consent for Participating in the Survey

TITLE OF STUDY: Contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students in preparation for professional practice

Dear Participant,

I invite you to participate in a research study entitled Doctor of Philosophy. I am currently enrolled in the PhD program at the Faculty of Education in the British University in Dubai and I am in the process of writing my Doctoral Thesis. The purpose of the research is to investigate the contribution of clinical education in developing clinical reasoning skills of undergraduate physiotherapy students and its role in preparing students for professional practice.

The enclosed questionnaire has been designed to collect information on: How does clinical education contribute to the development of clinical reasoning skills and professional practice readiness among physiotherapy students?

Your participation in this research project is completely voluntary. You may decline altogether, or leave blank any questions you don't wish to answer. There are no known risks to participation. Your responses will remain confidential and anonymous. Data from this research will be kept under electronic storage with a high security password and reported only as a collective combined total. No one other than the researcher(s) will know your individual answers to this questionnaire.

If you agree to participate in this project, please answer the questions on the questionnaire as best you can. It should take approximately 20 to 30 minutes to complete. Please complete the survey online by clicking the below link.

If you have any questions about this project, feel free to contact Senthilnathan Ramakrishnan, PhD Scholar, The British University in Dubai at 2015152014@student.buid.ac.ae and/or on the mobile number +971-502752237

Thank you for your assistance in this important endeavor.

Sincerely yours,

Senthilnathan Ramakrishnan

Appendix F: Consent Form for Participating in the Interview

Title of the study: Contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students in preparation for professional practice.

Purpose of the research: To investigate the contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students and its role in preparing students for professional practice.

Investigator: Senthilnathan Ramakrishnan

Supervisor: Dr. Abdulai Abukari

Introduction: You are invited to participate in a research study that aims to find out the contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students in preparation for professional practice. Your contribution towards this will be highly appreciated. Please consider this request and the decision to join, or not to join, is up to you.

What will I be asked to do?

If you are willing to participate in this study, then you will be asked to participate in a semi-structured interview during which the researcher will ask you series of pre-written questions and any other relevant questions that may arise from the discussion.

Confidentiality, anonymity and storage of data:

All information regarding this research will be kept confidential and be used only for the purpose of this research. All identities will be protected, and the interviews will be conducted in a one-to-one manner in a private setting. There will be no mention of either the names of the participants or the institutions anywhere in the research report. All the data collected from this process will be the property of the researcher and access to the information collected will be kept confidential in the researcher's private computer which will have a high-security password lock.

Informed Consent:

I have read and understood the information about the research as provided in the information sheet above. I voluntarily agree to participate in the study titled “Contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students in preparation for professional practice”. I understand that I can withdraw from the study at any time without giving any reason. The procedures regarding confidentiality have been clearly explained. I have also been assured that the information that is obtained from this interview will be only used for the purpose of this research and all data of the interview will be stored only with the researcher. The use of data from this interview in research, publications, sharing and archiving has been explained to me and I agree to sign and date this informed consent form.

I do not mind the interview being audio recorded.

I do not want the interview recorded.

Participant:

Signature

Date

Researcher:

Signature

Date

Appendix G: Research Ethics Form BUiD



Research Research Ethics Form (Low Risk Research)

To be completed by the researcher and submitted to the Dean's nominated faculty representative on the Research Ethics Committee

i. Applicants/Researcher's information:

Name of Researcher /student	Senthilnathan Ramakrishnan
Contact telephone No.	0502752237
Email address	2015152014@student.buid.ac.ae
Date	11/09/2017

ii. Summary of Proposed Research:

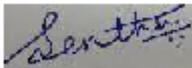
BRIEF OUTLINE OF PROJECT (100-250 words; this may be attached separately. You may prefer to use the abstract from the original bid):	Attached
MAIN ETHICAL CONSIDERATION(S) OF THE PROJECT (e.g. working with vulnerable adults; children with disabilities; photographs of participants; material that could give offence etc...):	I will be conducting a survey among Physiotherapy students who are in clinical placements and I will be conducting focussed group interviews and face-to-face interviews with the Clinical Educator.
DURATION OF PROPOSED PROJECT (please provide dates as month/year):	1 to 2 years
Date you wish to start Data Collection:	November 2017
Date for issue of consent forms:	October 2017

iii. Declaration by the Researcher:

I have read the University's policies for Research and the information contained herein, to the best of my knowledge and belief, accurate.

I am satisfied that I have attempted to identify all risks related to the research that may arise in conducting this research and acknowledge my obligations as researcher and the rights of participants. I am satisfied that members of staff (including myself) working on the project have the appropriate qualifications, experience and facilities to conduct the research set out in the attached document and that I, as researcher take full responsibility for the ethical conduct of the research in accordance with subject-specific and University Research Policy (9.3 Policies and Procedures Manual), as well as any other condition laid down by the BUiD Ethics Committee. I am fully aware of the timelines and content for participant's information and consent.

Print name: Senthilnathan Ramakrishnan

Signature: 

Date: 11/09/2017

If the research is confirmed as not medium or high risk, it is endorsed HERE by the Faculty's Research Ethics Committee member (following discussion and clarification of any issues or concerns)and forwarded to the Research Office to be recorded.*

I confirm that this project fits within the University's Research Policy (9.3 Policies and Procedures Manual) and I approve the proposal on behalf of BUiD's Research Ethics Committee.

Name and signature of nominated Faculty Representative: Dr John McKenny

Signature: John McKenny Date: 11/09/2017

iv. If the Faculty's Research Ethics Committee member or the Vice Chancellor considers the research of medium or high risk, it is forwarded to the Research Ethics Officer to follow the higher-level procedures.

** If the Faculty representative is the DoS, the form needs the approval of the Chair of the Research Ethics Committee.*

Approved by: Professor Ashly H. Pinnington, Dean of Research

Date: 11/09/2017

Appendix H: Ethics Approval for Research



Fatima College Research Ethics Committee (REC)

12th Novmeber 2017

Mr Senthilnathan Ramakrishnan
Lecturer Physiotherapy
Physiotherapy
Fatima College of Health Sciences
Al Ain Campus

Dear Mr Senthilnathan

Re: Ethics approval for research – Research Ethics application FCHS/RECA/003/2016-17

Study Title:	Contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students in preparation for professional practice
REC reference:	FCHS/RECA/003/2017-18
Submission number	1
Date application received	1 st October 2017
Approval date	12 th November 2017
Expiry date	12 th November 2020
FCHS REC Decision	APPROVED

The FCHS Research Ethics committee members reviewed the above application received on 1 st October 2017.

The following documents were received electronically:

1. Application for Ethical approval (REC version FCHS-EC-APF-003-2017-18)
2. Full research proposal of study
3. Research interview guides
4. Information sheet for research
5. Participant consent form

The Committee reviewed the application and on the basis of the information described in the application form and the accompanying documents, members agreed that your research application meets the requirements and that full ethical approval be granted.

This approval is based on the information provided and should any substantial amendments to any aspect of the study change, then it is incumbent on the investigators to notify the FCHS REC.

Statement of compliance

The Committee is constituted in accordance with the FCHS Director arrangements (11th November 2016) and the Terms of Reference for Research Ethics Committees (March 2017). The REC complies fully with the Research Policy, Section 13 of the FCHS, Policies and Procedures Manual, Version: REV-0, August 1st, 2016, Sections 13) and the international and local standards for research involving human subjects.

After ethical review

Now that you have completed the application process, please familiarize yourself with the Research Policy, Section 13 of the FCHS, Policies and Procedures Manual, Version: REV-0, August 1st, 2016, Section 13.

Please quote this number in all correspondence: FCHS/RECA/003/2017-18

With the Committee's best wishes for the success of this project.

Yours sincerely



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Dr Dhayaneethie Perumal
Chair, FCHS Research Ethics Committee

Appendix I: Ethical Approval THREC



Tawam Human Research Ethics Committee (T-HREC)

Date: 14th February 2018 Ref. No.: SA/AJ/563

To:

Principal Investigator: Mr. Senthilnathan Ramakrishnan
 Department: Physiotherapy
 Institute: Fatima College of Health Sciences

Subject:	<input checked="" type="checkbox"/> New Research Study <input type="checkbox"/> Amendment <input type="checkbox"/> Extension <input type="checkbox"/> Revision	
Research Title:	Contribution of clinical education in developing the clinical reasoning skills of undergraduate physiotherapy students in preparation for professional practice.	
Study Type:	Questionnaire/Survey	
Ethics Committee Approval #:	(THREC-563)	
Decision:	<input checked="" type="checkbox"/> Favorable <input type="checkbox"/> Unfavorable	<input type="checkbox"/> Favorable with Conditions
Progress Report Submission Requirement:	<input checked="" type="checkbox"/> Annual	<input type="checkbox"/> 6 Months
Study Expiry Date:	31 March, 2019	

Dear Mr. Ramakrishnan,

The Research Proposal was reviewed by the Ethics Committee members and voted towards the ethics approval.

Any ethical concern arising from the study in due course, should be informed. Annual report plus a terminal report are necessary and the Committee would appreciate receiving copies of abstracts and publications.

Studies approved can't be continued beyond the expiry date mentioned above. In case continuation of study is anticipated, extension request in the prescribed form should be submitted to the committee prior to 60 days of expiry date.

The Research Committee has been organized and operates according to the Good Clinical Practice (GCP) guidelines and the Department of Health, Abu Dhabi (DHAD).

It's mandatory to be compliant with the regulatory requirements of the Office of Research Governance ORG, Tawam, whenever required.

Yours sincerely,

Dr. Sultan Al Karam
 Chair, Tawam Human Research Ethics Committee (T-HREC)



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00971 3 7677834 - 00971 3 7677444 - هاتف - الإمارات العربية المتحدة - 15258 - العين، أبوظبي من ب. 15258 - مستشفى توام - SEHA - THREC
 Tawam Hospital - Al Ain - Abu Dhabi, P.O. Box 15258 - United Arab Emirates - Tel: 00971 3 7677444 - Fax: 00971 3 7677834



Appendix J: Transcript of the Clinical Educator Interview – Sample

Profile questions:

1. How long have you performed this role as clinical educator?
Clinical educator experience – Mostly, mainly since my time in X-Hospital. So since the first placement that you have been sending students on. I would say roughly about 3 years or so, would that be correct?
2. What is your total clinical experience?
Clinical experience – about 12 years
3. How many students do you supervise at a given time?
1:1 one to one

Factors affecting the development of clinical reasoning skill: Based on your recent experience and observation of student performance in clinical placement, can you answer the following questions,

1. Do the students discuss with each other and question themselves while they are on clinical practice?

I think! Okay! First of all, whether do they question themselves, I think it also comes to part of communication. They might be having questions arising in their head. But it depends on students. They might actually verbalize it or not verbalize it. Secondly, it's also lot dependent on student to student. You find students who are very proactive, do lot of questioning and they are very inquisitive. On the other hand, there might be a passive student who would need a lot of prompts. In either case, I think it's the role of the educator then to identify the student's personality and then still try and generate that discussions or questions. I think questions need to be happening whether the students initiate it or we initiate it. One to one scenario as it is in our hospital, I am not totally sure how much they discuss with their peers or fellow student. But we do try and get them engaged in some hands-on practice. I think to some extent that does happen, students do discuss and ask questions to each other and they take help in terms of resources. But I think, I can't really know that for sure, but definitely with me, as an educator there have been students who asking lot of questions, there have been students who don't. but in either ways I try and generate questions. Be it from the students themselves or I take a lead on that. Yes.

2. How do the students make their clinical judgments?

I think lot of students will come with a certain theoretical background. Alright. We have always been stressing on it, I think, it depends a lot on, how strong is their theoretical knowledge. The judgment is always based on, depending on, how much theory they know. If they don't know much of the theory in the first place, then their judgement is not good enough. There have some students with some family background of medical people in their family and then generally they tend to be a bit better in their judgement and approach for some reasons, either they have some kind of environment at home, or they have seen patients before. It also depends on whether it is a third year or fourth year student or they have been out on placements before. I think there are several factors to it and how good the student is while judging patients. But yes to some extent, there will be some difference in whether it's in week 1 or week 6, depending on the length of the placement.

What strategies do you employ to promote their reasoning?

Is that the follow-up question?... yes....okay. what we have done is, we try not have students see patients on their own, okay, its always under supervision. I will tell you my experience. what I do is, again when I feel confident that when the patient can lead the session, I let the student run through the session, be it an assessment or treatment. Post session is the time when I try and have that patient discussion with the student. Firstly by initiating some reflection, then we try and get answers for things which they don't understand or they had gaps in. so that's one of the main things we do. Us to have a one to one talk after the patient finishes, either at the end of the day or immediately after, they might theoretical gaps like I said, you can direct the student to go and read about it. the other ways to for students to prepare in advance about the patient. So they have an access to what patients come in the next day. That gives them some work to do at home. The more prepared they are the more they are able to apply their knowledge with their patients. Yes.

Are they able to arrive at a exact diagnosis or near hypothesis?

Can they do it on their own – I think if it a simple straight forward patient, most of the students are able to do it, but if its a complex patient with several comorbidities and health issues, they might struggle. It also depends on...

Can you give an example of what is a straight forward and what is complex patient? right. For example, knee pain with predominantly an osteoarthritis presentation may be something quite straight forward. Students are able to diagnose impingement and frozen shoulder as well. but having said that, the patient would present with only that condition. Let's say a chronic low ache, who has had several treatments and the back pain had been there for 10 years, has had a surgery or two, ...arriving at a diagnosis or a hypothesis for that patient could be quite challenging or somebody with a multiple areas of presentation, patients might say they have pain over 80% of their body! Things like that or if it is chronic, they can struggle with that. yes. To enhance that aspect, what I have also done is, I have used the APP tool, I think the APP tool is really brilliant in terms of generating clinical reasoning, especially the analysis part of the tool, I think the section 2 or 3 or 4, where getting the student to actually jolt down and writing several aspects of the patient, in terms of, what are the impairments the patient has, what is the problem list, what is the contributing factor, what hypothesis are they thinking, how is the condition affecting the patient's life, what psychosocial barriers does the patient have, what's the prognosis in your mind of the patient, what treatment should you give, what are the treatments within the scope of physio practice, what is outside the scope of physio practice, what will the patient be like in next 6 months' time, will the patient ever comeback with the same problem, so I try and generate all these thoughts, verbally and in writing, and also try and put this in their documentation. Again it goes hand in hand with the case based discussion that we would have after they see a patient. I think, several things, depending on the case, depending on the student's theoretical gap, or strengths, they either do well in that or they would need a lot of help.

3. How do students act in solving the clients' problems?

I have seen that happening. They was this one incident, where the student was really good at the psychosocial factors or life style factors, so the student would actually give feedback to the patient on what life style modifications they would need, how a psychosocial factors like stress or anxiety might affect their life style. There have also been students, who are very good at picking objective assessment, in terms of

weakness in the muscle or stiffness in the joint, then basing their treatment plan and giving advice to the patient based on that. They come strong, if they have already been out on a placement before, yes.

I think the students come with limited set of skills. Especially, what I usually do is, ask the student to stay within the limits of their strength, their strengths, generally are exercise and education and those two can be really effective treatment to modalities. What I have been doing with the student is, again, either I do it myself on a piece of paper or get them doing, is the student to write down all the problem list they would have identified in one column. The paper would have 3 column. One column is problem list, second column would be the impairments. For example the problem could be patient can't walk, the impairment is patient has claudication in legs or he has osteoarthritis, stiff knee, weak quadriceps muscle for example, and the third column would be treatment based on that. Then you can link the problem list to impairment then to the treatment. I think, generating a structured approach to that, I think, the students are able to do that.

I would say quite a minimal level, they would need a lot of guidance. It improves as the progress through the placement.

4. Are the students applying and/or following evidence-based practice?

Out of several students that I have seen, I think outside majority of students are not doing that, unless being poked by the educator, it doesn't come out naturally. I have had to make a smart plan for the student to actually put evidence based learnings into practice. But otherwise, it doesn't come naturally. I think there is also a difference between, when we say evidence based practice, we need to be careful, because what that would mean is, it would probably mean two things, one is to have the knowledge and then applying it in practice, well it doesn't happen, even if it is happening, lot of times students get away with reading a paper but not really applying it. I have been very keen on that and I am not giving enough marks to them if they were not able to apply it in practice. There is no point in knowing things if you cannot apply.

5. Do the students take the views of others such as colleagues and patient family members while planning the care?

Generally their attitude have been very good. Students have never come back to us and said that, I didn't like this feedback or I was not very happy with the way you stopped me. Most of the time they take it very positively. They understand that they need to, they are not good at something and this is for their own good, and they will grow into better practitioner with feedback. I think overall, it was good. I have couple of other incident where another educator, the way the feedback given and the student wouldn't like, but I think, if the feedback was given in a positive manner and the clinical educator has a good rapport with the students, generally the feedback goes well. They do take patient feedback as well, overall. Involving patient in decision making – again not proactively but prompted by the educator I think that tends to come.

Couple of things that you asked about analysis, problem list and involvement of patient in treatment, may be even biopsychosocial factors, I would probably say that is the second level of being a physiotherapist. A lot of students initially, I think, especially if their first placement or they are poor in the theoretical gaps, if that they would struggle with basic stuff like assessment, hands-on skills, giving the right exercises, I think once the student is already coming to us with those steps in place, then I think they do tend to demonstrate lot of what you are asking. But if they lack the first stage then they don't.

6. How do students hypothesize patient problems and act to solve those?

I think we all, at least I have been very much initiating a good detailed history. I try and get the student understanding the patient's aggravating factors, try and quantify what problem that the patient has, for example, walking outdoors for 30 minutes brings their leg pain on, trying to ask or asking them questions in terms of what do you think can be two or three diagnosis based on this problem, differential diagnosis, if the patient would give a cue and they would want to ask few more questions based on the que and not just stop at that, yes, things like that, that's how.... again I would say it varies, student who would have the basic knowledge of, may be trying to follow a

format, again in reasoning wise they would need some prompts, in terms generating the holistic problem of the patient.

7. Are the students reflecting on their practice experience? Follow-up questions if yes: how frequent? Who do they do it with? Individually or facilitated?

To some extent I would say. Depends on the student. If the student has been, well, demonstrates reflection in the first week, generally tends to stay that way, if a student is passive and needs a lot of prompts from the educator, then they would struggle reflecting. But hopefully with the discussion that we have they do tend to, you know, they have reflect in one way or the other. Yes. I think, coming back to your first questions, whether the students ask lot of question, if someone was to be asking questions, it would show us that they are reflecting, yeah, but it would depend on student to student. There has been a mixture of students, we have had some weak students, we have had some strong students, so yes, the thing is generalizing some of the actions as a whole is difficult.

8. Are the students able to link the theories of physiotherapy concepts into actual clinical practice?

I would say to some extent yes. Especially like I said in simpler cases, they are able to generate a diagnosis or a hypothesis or, if you like with the problem list based on their theoretical knowledge. They are also at times able to give specific exercises, again based on the theory. I have had student, even doing a detailed gait examination, for example, based on the theory, yes they are able to apply.

Are they text book driven?

No. Actually that's not happened. I have had that with the, again, very few quest students would do that, I would say. There have been instances, I can think of an example, where a student would had a good argument with me about what degree of SLR would mean what response from that patient. Then I have to mean that it may not although the textbook say this, clinically in the setting here, with this patient, still it may be positive although the textbook said NO for it. So yes, I have had that, but not too often.

9. Do the students use or follow some clinical practice guidelines to treat the client group?

I have seen that happening, especially with the last couple of batches, they have been quite good with that. Again I would say that, when you ask the question follow, they would be aware of that, but I think to a large extent they would just read an abstract or they would not really apply it in practice. I have had students who say, okay, this is the plantar fascia guideline, and but when it comes to actually treating that patient, they would hardly do any of it, on with the real patient, and may be they would stick to whatever they know rather than applying that evidence. Yes.

10. How do student act in demanding, changing and uncertain situations?

Okay. Sure. I will give you an example in the last placement that I was with the students. Well, in this session we have had two students in with us and myself. Patient was really challenging patient, was in lot of ways not onboard with what the plan of treatment was, and was in an agitated state, and was not agreeing with the plan of care. One student was leading the session at that time, got really nervous and almost gave up, and wouldn't want to talk to the patient at all, okay, she was, I think, just taken back by the whole situation and couldn't cope up with it, on the other hand, obviously, I was helping out the whole situation. The second student did take over and she was able to really communicate with that patient in a way that the patient actually left the session agreeing to plan of care. So we had two, two, you know, personalities there. I did have a discussion with the student who couldn't manage, and then we try to generate a discussion where the student who did well try to say, what was that she thought and how she handled the situation versus the person who couldn't do it, what went not so good with her. So yes.

Do they shy away?

No. I think they do comeback.

Appropriate clinical education model for UAE

1. What are your thoughts about the current model of clinical education?

Generally what we have found is, if the student has had got a quite large gap between theory and practice, they tend to struggle. I think we have discussed it with the university several times and you guys have taken steps as well to bridge this, isn't it? so Couple of things that would really be helpful is, I think you are doing it, one is to have recaps week or so before they go out on placements, they can recollect and reflect on whatever they need to know for the upcoming placement, there could also be, I think, a kind of a screening tool, where you would may be have an exam or practical session, where you would score the student, and then being fit either to go out on placement or not go out on placement. I think that doesn't happen actually as per the model. I think as part of clinical educators leading the placement, I think that is absolutely normal, no other way around it, and I think it works, generally, when I was a student and with the students that I have had, they tend to get quite comfortable with educators. You know, I think, in rare occasions that may not happen but most of the time, student does develop a good rapport with the educator, because they are there the whole day with them, and most of the students do enjoy the placements as well. They like the fact that they are getting into the next step. So I think that is fine. In terms of assessing a student, as an educator, I am comfortable doing that, I would feel it is fair for an educator to do an assessment because the placement was led by me, and then I would know the students strengths and weakness. But it may not be a bad idea for the lecturers to chip in as well. Because there might be certain, just to standardize the whole situation. One educator might rate the same student, the same performance in a different way than that would happen with, if the situation was where two people would do a combined scoring with the lecturer and the educator involved in the assessment. I have been out on a placement where that was the situation, the lecturer and clinical educator would sit together and do the assessment.

2. Can you list the strengths of the existing clinical education model?

I think especially the recent batch did show quite a good awareness of the latest practices in physiotherapy, which we were quite impressed with. So I think, also really

like the fact that you have case based learning and discussion, I think that already happens in the university which is very good. Evidence based wise, the recent batch was much better. We like the fact that it is quite research driven as well. So I would probably say those two are the strengths. Again I in an environment where I am just seeing musculoskeletal practice, and seeing students on this placement, so I can't really comment on the whole program.

3. What areas of this model needs improvement? & 4. If there is an opportunity to revamp the existing model, do you have any suggestions and recommendations to incorporate into the new structure?

The lecturer being involved in the assessment, at least being there would make a difference. Then the screening before the placement would make the students a bit more accountable to pass this and go out on placement otherwise they would be left behind in comparison to their fellow students may be. That would mean they are much more well prepared. Learning needs analysis form is a great tool that you have, but I don't think it's been really stressed upon, mostly from the university side I would say. What I have noticed is, never ever had a student, if I am right, maybe I am wrong may be one or two students, usually this learning needs form initiated by the educator, it doesn't happen right from the word go. If you have screening process in place, the learning needs form could be sent to us prior to the student arriving. So it doesn't happen in advance, I don't think the student puts a lot of thought behind that as well. Most of the time, I have never had like I said, on the first day the student comes at 8 o'clock and said this is my learning needs form. I have to give the student that form and ask them to go back home and write it down for the next day. That's something that definitely needs to be worked upon. 5 weeks is a better placement than 4 weeks placement. Students generally are found that they don't come with the textbook or don't sit the online databases to search for answers. They are very much internet based. May be I don't know, if you give out some presentations to them from lectures or they are more based on that. I think they would like to have summaries in their hand rather than going in-depth on a certain topic or knowledge

Appendix K: Transcript of Student Interview - Sample

Factors underlying effective clinical education

1. How would you describe your clinical education experience?

It was good. It was very beneficial for me on many aspects. First of all, I was introduced to many people in health professional care in not only physiotherapists! Nurses, doctors and in various other studies. This is number one. Number two, I learned to become more confident and how to speak with people in professional way. How to deal with people with different moods and behaviors. On the educational level, as I said, I think of myself as that I improved and now there are things that I use to think very hard, now yes that I can achieve whatever it is because I have people that can help me. Whether, I always have to ask because I am still learning. My clinical placement was a very good experience for me and even my family noticed that I am more professional in speaking about my major. I now when anyone speaks about anything in the hospital I ask for the terms and I answer in a medical way. Even our relatives, they are doctors, now I use medical terms with them. You know when you are in level 1 and you go to level 4 and this is how I see myself.

2. What were your learning needs and/or objectives whilst you went out for clinical placements?

Yes. I wanted to implement the conditions that we studied in the class, practically with the patients in a safe way, in a way that I will not harm myself or harm the patient. Second of all I wanted to learn, how time management is in the clinical placement, in the hospital and I had in mind that whoever my clinical educator is, I will try to learn and from their experience as much as possible. That's mainly it and remain updated on the information for various conditions that we have seen in the hospital as well as try to follow-up the conferences if there are any or seminars if there are available.

3. Were you able to achieve all those learning objectives you set for yourself?

I would say 70% yes. Yah. 70% yes because I have attended lectures that been done in both hospitals X Hospital and X X Hospital and I have took a credited points so that is a bonus for me as a student. The second thing is that in each rotation, every week I use to discuss with my clinical educator about the clinical guidelines, about the updated information and the research about various treatments and techniques for various conditions either musculoskeletal or stroke or the other conditions.

Were you able to implement your classroom learning into clinical practice?

Yes. As we say there is no patient by the book but yes the idea was set in my mind for most of the cases that this case needs a specific treatment and I follow that as my educator use to do.

4. What are the major challenges during clinical placements for you as a student physiotherapist?

In beginning yes. It was more psychologically, it was, I was very nervous in the beginning. I wanted everything to be perfect! I wanted to prove myself in the clinical placement, to have a nice reputation but then I learnt that it all comes with experience and I calmed myself down and at the end of my first week, I was actually very calm. I was very friendly with everyone. Team work makes everything easier and if I had any question, I asked. Yah, those were the main challenges which I overcame it.

5. How did you build rapport and trust with your clinical educators?

Yah. This actually was the best part of my placement. In the first rotation I was placed with, let me remember, yah, I was placed with a, the, she wasn't a manager but like she was responsible for the other physiotherapists with her. She was a team manager. Okay and she was older than me but still I was able to develop a nice relationship with her. First of all I try to stay updated to reach her level of thinking that was very, that was very difficult but I try to impress her. Second of all, I gave her the, I try to understand when she wanted me to speak and in what limit, it was our relationship. I was very professional and then I was shifted to the stroke unit. In the stroke unit my educator was very friendly. We shared lots of jokes, the team was very nice but everything was in a professional limit and the other thing that helped me is that in the hospitals there is many nationalities. So one way to develop a relationship is to get introduced and know who are working with. When they see that you are interested and you like the way they work and you compliment the strategies that they are following they become, they want to spend more time with you and teach you more things because you are accepting whatever they give you. I was not racist, I was not disrespectful, all within professional limits and that developed a really nice rapport.

6. How did you build rapport and trust with the patients and their families?

The patients and their family members....There was a relationship professional as well. The thing is that patients are very different from each other. I was with females and I was with males, adults and young children as well as elder people. So when I enter into a patient's room, I would understand from the environment how I would approach the patients. Some patients you have to very professional, some patients you have to a little bit calming but as well as professional in the same time. There is male patients that were very angry sometimes, so I just step back, I give them their treatment, if they have any consultations I would ask my clinical educator. The relationship with both female and male, whether adults, children or elder people was strictly professional. Some were nicer than others. They would offer chocolates or coffee. The nicest part is that whenever I finish a treatment for every patient they would say (god bless/ may god help you) for me, you know, that was the best part.

7. What are your views about the clinical placement site/environment/facilities etc.?

Yah, sure. I will begin with X X Hospital. Let's say in the infection control aspect, X X Hospital has a great infection control. They are always alert of the patient safety, their safety. The place has to be sanitary at all times. This is the infection control aspect. There are no down points in the sanitization in this hospital. As in the physiotherapy department all the equipment are available. Really, like I learnt on the many, like the diagnostic ultrasound, I was introduced to it. I got a chance to practice. The taping I got a chance to practice that as well. There is also another treatment but I don't actually recall its name also it was, all the equipment are there. Also there is another clinic in the physiotherapy department for orthosis where the equipment clinical was also available. Everything that a patient needs is available, like I put myself in the place of a patient, if I wanted to be treated what would I wanted to be available all there in X X Hospital. The professionalism, the communication, the team work all the aspects, the guidelines, everything is available and there is also from the HAAD there is always a group to come and check, and I also saw that they were not very nervous, they didn't clean only when this group came, no, it was always there. As far X Hospital the infection control is not 100% in the outpatient rehabilitation clinic. The environment is not as spacious as the other hospitals. There is so many patients at all times. It is not organized. Really, time management is not very available there. Even the workspace for the physiotherapists themselves, does not really help the physiotherapists to be really comfortable. Although, despite this both hospitals, the staff they are very dedicated. They are very respectful and I did not see like, not even 1% deficiency in the care and their dedication to their patients.

8. How did your clinical educator support you to achieve your learning objectives?

Yes. Major support. They were always giving me new information. They were always contacting me via what's app or via email that there is conference. Would you like to attend and till today they are asking about me and my daughter because I had delivery through the placement. Lots of support in voice of helping get more educated. Yah.

9. Did you receive timely feedback on your performance and how did it affect your learning?

On the second week and on the fourth week we use to have a meeting and they use to always give me the feedback. The feedback was always constructive. They always supported me and motivated me. They told me that yes you have a positive point but there is always place for improvement. So they always gave tips and they use to see that I am accepting those tips and I am implementing them and if any doubt I always ask. They were 100% supportive and their feedback was always constructive. They always make sure I am safe with the patient and I do not feel like I am like irritated either if it's a female or male patient. Yes. It helped me to improve my physiotherapy practice. It actually made me to love physiotherapy. First I was in it for let's say for the job, for the reputation, for the salary for instance but now I actually really really love what I am working.

10. Do you think the university based education and the physiotherapy curriculum adequately prepared you for clinical placement?

Actually I only understood what you guys made us go through after our placements. It was all in our benefit. When we use to get short deadlines, lots of feedback, maybe we took it as no this professor doesn't really like me. Look what he gave me! This was all in our own benefit because when you are out in the real world, you know that, yes I was actually well prepared. The staff in the college was 100% supportive and this something that only a student would understand after the clinical placement. We would know that yes the college prepared us with the information, with the facilities, with the trips, with the videos, with all the efforts, really it is highly appreciated.

Professional practice readiness

1. How did your clinical training prepare you for professional practice?

Yes. I would say 50% because I have half the way to go.

2. How confident are you to practice your profession independently?

In some cases yes. Like in the stroke cases they are my favorite, if I do my master's I will go to neuro part of physiotherapy. Other cases not so much. Some musculoskeletal yes for sure. But I would also need the supervision of those who are more experienced.

3. What are the areas of your professional practice that needs improvement?

More knowledge about orthosis and how they are implemented. I should attend more conferences about physiotherapy. There is some rare cases of musculoskeletal conditions that we don't really see in the region that we are in, so I think if I practice in more places then I might see that. So little bit more experience still, what we had is not enough, I am very interested to see more

4. Are there any learning opportunities that you thought was not provided to you during clinical placements?

No. No because in the last rotation I saw lots of equipment. Like I was taught and practiced to use. We learned a lot about taping in the college but I have never applied it. In the placements I have, patient's come to me asking for the taping and what makes me more comfortable is my clinical educator is very confident in me. He will say take this patient inside, apply the taping and come, I want to see it and he would be very satisfied with that, and as well as various treatments. So no there was no lack, all the opportunities were provided.

5. If there is an option to modify the current model of clinical education, what are your recommendation for it?

Any modifications? Okay. I think because as a student I said I only understood what you guys did for me after I was in a clinical placement. I think in first years of the physiotherapy students must go out for 2 or 3 days to the out world, to the real world to see what they are going to face. So when they come here they would actually appreciate what is there for them that is the only thing. I don't want them to understand in the late stage. They must understand the importance. Not only observation. They must listen to their educators, that it is very important because you to learn