EXPLORING STUDENT PERCEPTIONS OF PROBLEM-BASED LEARNING AND CLINICAL FIELD EXPERIENCES: A PHENOMENOLOGICAL STUDY

by

Ashley Michelle Boles

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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Abstract

The purpose of this phenomenological study is to understand the experiences of participating in a physical therapy course primarily taught using problem-based learning teaching methods for Doctor of Physical Therapy students at a university in the mid-western United States. This study aimed to understand student perception of PBL and its effects on clinical field experiences (CFEs), specifically related to higher-order processing skills. The theory guiding this study was the social constructivism theory as it explains how knowledge acquisition and learning occurs through social interactions during problem-based learning activities. The central research question this study attempted to answer was: What were the experiences of DPT students who participate in a PBL education? This study design was a qualitative, hermeneutic phenomenological study. Convenience sampling was done from a pool of DPT students at a university in the midwestern United States. Data collection methods included journal prompts, individual interviews, and focus groups. Data analysis was based on van Manen's data analysis methods. Findings reveal DPT students preferred PBL over traditional teaching methods and felt the use of PBL improved their higher-order thinking and processing skills. Participants felt that PBL teaching methods were conducive to their learning as the method allowed for real-time feedback and a perception of better content retention. DPT students also felt that using PBL teaching methods improved their ability to prioritize and funnel information to organize information in a way conducive to developing a solution to the problem. Participants felt that the problem-solving, critical thinking, and clinical reasoning they developed during the therapeutic

exercise course did carry over into their ability to apply these higher-order thinking and processing skills during CFEs.

Keywords: problem-based learning, medical education, higher-order thinking and processing, critical thinking, clinical reasoning, problem-solving, clinical field experiences

Copyright Page

Dedication Page

I dedicate this dissertation to my mother, who always taught me the value of education and a strong work ethic.

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Many important individuals have helped influence the writing of this dissertation whom I would like to acknowledge. First, Mary Strickland, EdD who chaired this dissertation and helped me in so many ways ensure this dissertation is the best reflection of the hard work we both put in. I would also like to acknowledge my committee member, Darren Howland, PhD, DC, LP for his hard work in ensuring the methodology and analysis for this dissertation is sound.

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Clinical Field Experiences (CFEs)

Doctor of Physical Therapy (DPT)

Problem-Based Learning (PBL)

Institutional Review Board (IRB)

CHAPTER ONE: INTRODUCTION

Overview

Problem-based learning (PBL) has been a topic of attention in education in recent years specifically regarding PBL and higher-order thinking and processing skills. Many medical students have limited higher-order processing and thinking skills, which has led to PBL being studied in various ways to address this problem including in the physical therapy domain. However, research regarding student perception of PBL, specifically in engaging higher-order thinking skills such as clinical reasoning and critical thinking skills specifically for Doctor of Physical Therapy (DPT) students during clinical field experiences (CFEs), has not been fully explored. Therefore, the problem is limited higher-order processing and thinking skills during CFEs of DPT students during CFEs of DPT students. In this qualitative, hermeneutical phenomenological study, DPT student perception of PBL and student perception of the role PBL has in affecting higher-order thinking and processing skills was explored. The effect PBL has on CFEs, specifically on higher-order thinking and processing skills, was researched from the perspective of DPT students. In this chapter, the background of PBL and context of the PBL method is discussed as it relates to historical, societal and theoretical contexts. The purpose statement and problem statement are also presented in chapter one. Chapter one also discusses the study's significance regarding the theoretical significance in the education field, the empirical significance to the body of research on the topic and the practical significance to the sample being studied and the general population. Finally, chapter one concludes with the research question and definitions for this study.

Background

The ability of healthcare providers to solve complex health problems through clinical reasoning is critical to the successful diagnosis and treatment of all patients (Fan et al., 2018). Therefore, healthcare professionals must be able to actively engage in clinical reasoning processes involved in problem-solving skills (Fan et al., 2018; Shrivastava & Shrivastava, 2021). While typical cognitive processes often fall into clear domains where knowledge is categorized into declarative knowledge or procedural knowledge, clinical reasoning skills reside in an area that is more difficult to ascertain (Luke et al., 2021). The reason clinical reasoning skills are more difficult to ascertain is because clinical reasoning often requires various cognitive processes, including emotional thinking, reflective thinking, and relational skills, in addition to typical cognitive and metacognitive strategies (Higgs & Jones, 2008). Standard teaching methods that follow traditional lecture-based models often lack the development of critical reasoning skills (Arian et al., 2022; Oderinu et al., 2019). To progress to clinical reasoning, critical thinking skills must be developed through a learner-centered design that engages active, self-directed learning (Arian et al., 2022; Jamshidi et al., 2021; Luke et al., 2021). A PBL curriculum approach has been shown in recent literature to engage higher-order thinking and develop these skills (Shrivastava & Shrivastava, 2021).

Over the last 30 years, PBL has been utilized successfully in many educational programs and continues to gain popularity (Walker et al., 2015). PBL can be used as an instructional method and a curriculum design approach (Luke et al., 2021). However, when PBL is utilized, the development of the learners' ability to perform research, engage in theory, and implement practice improves (Walker et al., 2015). During PBL, the learner begins to apply prior knowledge and skills to develop a solution to a given problem, which is the goal of the PBL

pedagogy (Walker et al., 2015). Throughout the history of PBL, the concept has been supported through a theoretical framework as well as through significant amounts of research regarding both the pros and cons of the idea for multiple outcomes in the educational realm (Fan et al., 2018; Luke et al., 2021; Shrivastava & Shrivastava, 2021). Further research is needed to fully understand the effects of PBL on clinical reasoning skills, specifically for physical therapy students during CFEs.

Historical Context

PBL originated in 1969 at McMaster University, led by Professor Howard Barrows, and was initially introduced into a health sciences education program (Fan et al., 2018). The PBL teaching method was created to improve the clinical reasoning of health science students after a gap in clinical reasoning and problem-solving skills had been identified (Fan et al., 2018). After World War II, higher education experienced extreme growth in the West, leading to the development of many higher education disciplines (Servant-Miklos, 2019). Dean Dr. John Evans, a McMaster Medical School professor, created an assembly of Canadian medical educators to begin an undergraduate medical program (Servant-Miklos, 2019.) The medical group of educators took a self-directed, small group and created a problem-based learning curriculum in which the instructor acted as a tutor and guide rather than a lecturer instead of opening a traditional school (Servant-Miklos, 2019).

Traditional teaching models before this had focused on program-centered, authoritarian, linear models in which the learning environment promoted more passive learning, which led to poor critical thinking and problem-solving skills (Thompson, 2019). Two schools of thought regarding PBL began to develop as the approach grew: the problem-solving skills approach and the knowledge acquisition approach (Servant-Miklos, 2019). The division was likely due to PBL

being highly experimental at the time (Servant-Miklos, 2019). PBL was still undergoing some trial and error during its initial implementation; therefore, the root of the division was a theoretical gap left by the founders at McMaster Medical School (Servant-Miklos, 2019).

The problem-solving skills approach is rooted in the idea that students engaged in PBL develop and hone their clinical reasoning skills through hypothetical deduction (Servant-Miklos, 2019, p. 622). Hypothetical deduction is the process in which the student creates a hypothesis based on the given problem and their knowledge through clinical reasoning (Abrahamsen et al., 2011). The hypothesis is then tested through research or diagnostic testing in the healthcare realm (Abrahamsen et al., 2011). The knowledge acquisition approach leans on the idea that PBL triggers students to understand an underlying problem or situation through the context of the problem itself (Servant-Miklos, 2019). Most medical educational programs follow the problem-solving skills approach in which it is believed that PBL engages clinicians in hypothetical deduction (Servant-Miklos, 2019). In the healthcare domain, the problem-solving skills approach occurs when a medical problem arises; thus, the clinician must formulate a hypothesis, including possible diagnoses, which can be confirmed through various medical testing methods (Servant-Miklos, 2019).

Since PBL began in the late 1960s, PBL grew in popularity in the 1980s and 1990s, and many medical schools in North America and Europe adopted the approach (Walker et al., 2015). PBL continued to gain popularity over the next decade and has expanded from medical schools to elementary schools, middle schools, high schools, and other university programs (Walker et al., 2015). In fact, by the year 2000, PBL had become a popular teaching model for many educational programs (Gustin et al., 2018). Today, PBL is one of the most studied curriculum models, especially in medical curricula, and is used in countless educational programs (Gustin et

al., 2018). While the approach is utilized in multiple healthcare domains such as physician training, nursing, dental, pharmacology, radiology, occupations, and physical therapy, the approach is also being used in other fields, such as engineering, business, economics, and architecture (Walker et al., 2015). Since 1985, the Illinois Science and Math Academy has trained high school students through a PBL curriculum (Walker et al., 2015). Furthermore, the University of Delaware and Samford University have actively engaged PBL in many interdisciplinary programs, such as nursing, pharmacy, science, art, education, and business (Walker et al., 2015).

Social Context

Society at large is affected by healthcare providers' abilities to problem-solve in each individual's care (Schmidt et al., 2006). Every person at some time in life will require healthcare in some format, thus the importance of having competent, skilled healthcare providers (Pruitt et al., 2017). Medical educational programs should be concerned with a program's ability to engage clinical reasoning through a PBL curriculum and course delivery methods to encourage hypothetical deduction in their students (Servant-Miklos, 2019). Hypothetical deduction is closely related to clinical reasoning and thus should translate to clinical practice through clinical experiences, culminating in healthcare providers who are competent problem-solvers (Servant-Miklos, 2019). Clinical reasoning skills are essential to competent patient care, and clinical experiences are imperative to training such skills under the supervision of experienced, licensed clinicians (Shrivastava & Shrivastava, 2021).

Theoretical Context

PBL is supported by a theoretical framework that is grounded in the constructivism theory, even more so in the social constructivism theory (Luke et al., 2021). Constructivism was

founded by Jean Piaget in the early 1900s and was based on the idea that knowledge is obtained through individual life experiences and takes place inside one's mind (Piaget, 1926). Constructivists believe that learning occurs through an active process in which the learner makes sense and meaning of their own experiences with content matter and that the learning process is unique to each learner (Piaget, 1952). Two schools of thought regarding how knowledge is constructed through personal experiences lead the way to two types of constructivist theories: cognitive and social constructivist theories (Thompson, 2019).

Social constructivism, credited to Lev Vygotsky, agrees that knowledge acquisition occurs through personal experiences but argues that knowledge acquisition occurs due to social interactions (Thompson, 2019). Theoretical interactions often happen around a shared experience or discussion with other community members, tutors, instructors, and other learners (Thompson, 2019). Social constructivists believe that cognitive development occurs beginning at an early age through sociocultural interactions, with the idea that children learn behavior through social modeling of behavior that is then internalized by the learner (Thompson, 2019). According to Vygotsky (1930), "When children develop a method of behavior for guiding themselves that had previously been used about another person when they organize their activities according to the social form of behavior, they succeed in applying a social attitude to themselves" (p. 11). Learning, therefore, is a product of social interaction in which the learner reframes knowledge based on applied social characteristics (Vygotsky, 1930).

Social constructivism is widely considered the theoretical framework supporting problem-based learning (Luke et al., 2021). In PBL, learning experiences are created based on a specific problem that involves problem-solving and solution creation through "purposeful group dialogue and collaborative learning" (Kemp, 2011, p. 48). PBL and social constructivism are

intertwined; thus, utilizing active, collaborative learning to engage problem-solving skills may also encourage the development of clinical reasoning skills, which is imperative to competent healthcare providers (Shrivastava & Shrivastava, 2021). However, medical education programs should recognize the gap in research regarding PBL and clinical reasoning skills, specifically during CFEs. Furthermore, DPT programs should be attentive to the possibility of utilizing PBL teaching methods as an avenue to develop clinical reasoning skills during CFEs. The theoretical context can also be found in Appendix C.

Problem Statement

The problem is that there is limited higher-order processing and thinking skills during clinical field experiences (CFEs) of DPT students. Traditional teaching methods typically involve lecture-based methods that are authoritarian and program-centered in nature (Arian et al., 2022). This often leads to a lack of higher-order thinking and process skills, including critical thinking and clinical reasoning (Hallinger, 2020; Willis et al., 2018). In the medical field, where patient problems are complex, clinical reasoning skills are essential to competent patient care (Macauley et al., 2021). CFEs, where students learn to apply learned skills in the context of a patient problem, are critical to the success of DPT students (Shrivastava & Shrivastava, 2021). During CFEs, students recall biomedical knowledge, search out information about the specific patient problem, and take an active role in how to solve the problem (Shrivastava & Shrivastava, 2021). Problem-based learning (PBL) has been successfully utilized for the last 30 years in medical education programs to enable students to engage in higher-order processing skills such as clinical reasoning, and critical thinking. PBL has also been used to engage students to apply prior learned knowledge to a problem and develop a solution to the problem similar to what is required in clinical care (Thorndahl & Stentoft, 2020). However, the perception of student

physical therapists regarding how participation in PBL affects higher-order thinking and processing has yet to be fully discussed in research. Furthermore, DPT students' perception of the transferability of didactic PBL to CFEs has yet to be fully explored.

Exploring how PBL can affect clinical reasoning and critical thinking has been done in academic research, however, student perception of the effect didactic PBL has on CFEs and higher-order thinking and processing skills during CFEs has not been fully explored. Limited higher-order processing skills during CFEs among DPT students are of the utmost importance. Therefore, understanding the experiences of DPT students who participate in a PBL course is of great value. Understanding DPT students' perceptions of PBL teaching methods and how they feel it affects clinical reasoning and critical thinking skills during CFEs may help educators and patients alike.

Purpose Statement

The purpose of this phenomenological study is to understand the experiences of participating in a physical therapy course primarily taught using problem-based learning teaching methods for Doctor of Physical Therapy students at a university in the mid-western United States. At this stage in the research, the central phenomenon of the study will be generally defined as the experience of participating in a therapeutic exercise course that was taught primarily using problem-based learning (PBL) teaching methods. The theory guiding this study is the social constructivism theory.

Significance of the Study

The evidence supporting the significance of this study is three-fold. Supporting the body of empirical research helps educators and programs determine if PBL is appropriate for their program, specifically for DPT programs and faculty. This study is also significant to theoretical

research. As educational theories are vast, it can often be challenging to determine which theories are appropriate for various student academic needs and teaching methods (Thompson, 2019). Therefore, this study is significant to theoretical research in helping educators understand what theories and teaching methods are appropriate to encourage higher-order thinking and processing skills. This study is also vital to all DPT programs, including the organization in which this study is set, as it will help the program to understand the use of PBL within its curriculum; furthermore, this study is essential to the sample of DPT students as the use of PBL within the educational program they attend may lend to their ability of clinical reasoning and critical thinking in both didactic and clinical fieldwork within the educational program. Finally, this study is practically significant as society at large is affected by healthcare professionals' ability to utilize higher-order processing and problem-solving skills to make clinical decisions based on patient problems (Schmidt et al., 2006). Therefore, having competent, skilled healthcare providers is essential to individuals, communities, and all of society (Pruitt et al., 2017).

Theoretical

While constructivism has existed for many years (Piaget, 1952), there are many other educational theories within the academic domain (Creswell & Poth, 2018). This study contributes to the body of knowledge and research regarding phenomenology and PBL being rooted in social constructivism. Social constructivists believe that obtaining knowledge occurs through personal experiences and social interactions (Thompson, 2019). Social interactions within the classroom may occur through shared experiences, large and small group discussions, interactive case studies, group problem-solving sessions, and discussions with tutors, classmates, and instructors (Thompson, 2019). Learning activities for PBL are formed and based on a given

problem that involves creation of a solution through intentional dialogue and collaboration (Kemp, 2011). Due to the active, collaborative nature of students engaging in problem-solving skills together, PBL and social constructivism are intertwined. Therefore, it is evident that PBL is rooted in social constructivism, as learning occurs through social interactions guided by an instructor about a specific problem (Luke et al., 2021). During PBL, activities, including small and large group discussions about the problem and solution, students acquire knowledge through social interactions which is supported by the social constructivism theory (Thompson, 2019). This study examined the teaching methods utilized during PBL and DPT students' perception of learning through the PBL social constructivism theory. The social constructivism theory applied in this study as students engaged in a phenomenon of PBL teaching methods within a specific physical therapy course. This study's goal was to determine if DPT students feel the social constructivism theory is effective in employing knowledge acquisition through the use of PBL. Thus, this study furthers the body of knowledge regarding the social constructivism theory and how it applies to PBL, knowledge acquisition, and whether the theory is perceived to be transferrable from didactic coursework to CFEs.

Empirical

While PBL has been linked to many didactic outcomes, such as improved critical thinking skills, knowledge acquisition, clinical reasoning, and academic achievement (Arian et al., 2022), more research needs to be done to determine if integration of PBL teaching methods translates to improved clinical reasoning skills during CFEs for DPT students through the lens of the students themselves. Research has shown that graduates of a PBL curriculum have better interpersonal skills and higher competency levels related to problem-solving and self-directed learning (Schmidt et al., 2006). Current literature broadly supports the use of PBL in medical

education programs with compelling evidence that PBL leads to deeper understanding, improved critical thinking skills, retention, and long-term understanding that can be better applied outside the classroom when compared to traditional teaching methods (Hallinger, 2020; Macauley et al., 2021; Schmidt et al., 2006). Educational programs, especially medical education programs, and individual educators should be concerned with their ability to utilize teaching methods that foster higher-order thinking skills, which could be engaged through a PBL curriculum and course delivery methods. The PBL teaching method has been shown to encourage hypothetical deduction in students that could carry over to CFEs and eventually into clinical practice, thus culminating in healthcare providers who are competent problem-solvers (Servant-Miklos, 2019). By exploring student perception of PBL and the perceived effects of the role PBL has during CFEs, this study adds to the limited current research linking PBL to higher-order thinking and processing skills for medical education programs. Therefore, this study contributes to the current research in PBL and added the element of student perception of PBL's possible effects on higher-order thinking and processing skills during clinical field experience, specifically for DPT students.

Practical

All members of society are affected by a healthcare provider's ability to problem-solve in a given situation in either their own care or the care of a family member (Schmidt et al., 2006). At some time in each individual's life, medical care will be required in some way. While it may not always be a life-or-death situation, at times, situations can be dire, thus the importance of having competent, skilled healthcare providers (Pruitt et al., 2017)). Clinical reasoning skills are essential to competent patient care, and CFEs are imperative to training such skills in potential healthcare providers under the supervision of competent, licensed clinicians (Shrivastava &

Shrivastava, 2021). Therefore, the significance of this study is evident in the need for research to understand student perception of PBL and its integration into CFEs. In an ever-evolving healthcare system, the ability of healthcare providers to solve medical problems is essential to a patient's quality of life. This study should be of interest to medical students, medical educators, medical programs, and all persons as patients of medical professionals worldwide.

Research Questions

As with any qualitative study, the research questions are essential to the identified problem, purpose statement, and significance of the study. The research questions are central to the aim of the study. This study aims to answer the following research questions in alignment with the problem statement and purpose statement, as well as the importance of the study itself.

Central Research Question

What are the experiences of DPT students who participate in PBL education?

Sub-Question One

How do DPT students perceive didactic PBL education in relation to the transition to CFEs?

Sub-Question Two

How do DPT students perceive PBL education to affect higher-order thinking and processing skills during clinical field experiences?

Definitions

1. *Clinical field experience* - practical learning experiences working with real-life patients in any clinical (non-didactic) setting (CAPTE, 2015).

2. *Clinical reasoning* - the process in which a healthcare professional integrates their own clinical knowledge about patient information which is representative of a clinical problem to make informed clinical decisions (Gruppen et al., 2018),
3. *Critical thinking* - the process of thinking through a given problem and formulating a hypothesis or decision-making by integrating prior knowledge and experience (Lovatt, 2014).

Summary

The problem of clinical reasoning and critical thinking skills has long been an area that students often struggle with in medical education (Thompson, 2019). While PBL has been founded upon theory, specifically the constructivist theory, and has been tested many times throughout history through various research methods, the effect of PBL on CFEs has yet to be fully explored, especially from the perspective of DPT students themselves. Understanding the experiences of DPT students at a university in the midwestern United States who participated in a physical therapy course primarily taught using PBL teaching methods helps support the historical and theoretical context of PBL and is significant to the body of research empirically, theoretically, and practically.

CHAPTER TWO: LITERATURE REVIEW

Overview

A systematic review of the literature was conducted to explore higher-order thinking and processing skills, such as clinical reasoning and critical thinking, engaged during problem-based learning (PBL). Furthermore, literature regarding student perception of PBL is discussed, as well as literature exploring the relationship between PBL and higher-order thinking and processing skills required during CFEs for medical students. This chapter presents a review of the current literature related to the topic of this study. First, the theory associated with PBL, the constructivist theory, is discussed, followed by a synthesis of the current literature regarding critical thinking and clinical reasoning skills engaged by students during PBL, as well as their perception of the use of PBL teaching methods. The literature illustrates how a PBL approach may encourage better critical reasoning and clinical thinking skills in medical students. Teaching strategies for healthcare professional programs are also discussed, and the use of PBL for healthcare professional programs is explored. The process of how knowledge acquisition occurs through PBL is provided, as well as a synthesis of literature regarding student perception of PBL. Additionally, the link between PBL, interpersonal skills, and CFEs in literature is discussed, as well as possible drawbacks to the PBL method. Finally, the need for the current study is addressed by identifying the gap in the literature regarding student perception of PBL and its effect on clinical reasoning and critical thinking skills needed during CFEs (CFE) for medical students, specifically physical therapy students.

Theoretical Framework

PBL was created to improve students' problem-solving and critical thinking skills through a learner-centered design that enables students to find solutions to problems through active and

dynamic education (Luke et al., 2021). In the early 20th century, after World War II, the growth of higher education boomed in the Western world (Servant-Miklos, 2019). That unparalleled growth led to educational progressivism and, eventually, PBL (Arian et al., 2022). PBL was first introduced into the curriculum at McMaster University in a health science education program in 1969 (Fan et al., 2018). PBL is founded on the philosophy that the learners should be actively involved in their education, which is supported by an extensive theoretical framework rooted in andragogy, experience-based learning, and the constructivism theory, specifically social constructivism. (Arian et al., 2022; Luke et al., 2021).

Constructivist Theory

Problem-based learning is a popular instructional approach for many healthcare programs and is grounded in the constructivist theory (Kemp, 2011). The PBL approach has been supported by constructivists as a teaching method that follows the constructivism learning theory "with the belief that learning is a mental activity that requires learners to construct knowledge rather than just acquire it" (Oderinu et al., 2019, p. 211). Constructivists believe that learning is an active process by which the learner makes meaning of their own experiences; thus, learning is a unique process for each learner (Piaget, 1952). The constructivism philosophy was created by Jean Piaget in the early 1900s through his works *The Language and Thought of the Child* (1926), *Judgement and Reasoning in the Child* (1928), and *The Origins of Intelligence in Children* (1952).

Social Constructivist Theory

In social constructivism, typically credited to Lev Vygotsky, learning and construction of knowledge occur through social interaction and discussion with others, including other community members, tutors or instructors, and other learners (Thompson, 2019). Social

constructivists believe that children learn from adult modeling of behavior that is eventually internalized by the child or learner (Thompson, 2019). Learning, therefore, occurs as a product of a social team, and reframing is done by the individual learner based on applied social characteristics rather than by passive means or through an authoritarian nature from teacher to student (Vygotsky, 1930). “Knowledge then evolves through social negotiation and through the evaluation of the viability of individual understandings” (Savery & Duffy, 1995, p. 31). PBL holds the constructivist view that learners can improve problem-solving skills as well as critical thinking skills by engaging in learning experiences that incorporate real-world problems. This requires students to employ the use of resources and past experiences to bring meaning to the problem itself, thus leading to the solution (Macauley et al., 2021).

The role of educators in constructivism is to create learning experiences in which learners participate actively in authentic, intentional, and constructive learning activities (Thompson, 2019). Active learning experiences encourage and facilitate the learner to make meaning of the experience independently, thus constructing their knowledge through the experience (Oderinu et al., 2019). This process is closely associated with the social constructivism theory; ergo, the problem-based learning instructional approach is widely considered to be founded on social constructivism principles (Luke et al., 2021). PBL includes creating learning experiences that focus on a specific problem or task (Kemp, 2011). The problem or task is then tackled by a group of learners to solve the particular problem through "purposeful group dialogue and collaborative learning" (Kemp, 2011, p. 48). Hence, the social aspects of each student's learning experience are central to the task context, which aligns with the social constructivism theory (Macauley et al., 2021). This study attempts to understand the connection between constructivism, specifically

social constructivism, and PBL to engage physical therapy students' critical thinking and clinical reasoning skills.

Related Literature

Knowledge construction and retention are critical constructs in all medical education programs (Thompson, 2019). However, clinical reasoning and critical thinking skills often reside in an area that is more difficult to ascertain (Luke et al., 2021). Higher education teaching methods typically follow traditional lecture-based methods that are strictly program-centered and driven by the instructor, which often leads to a lack of development of critical thinking and clinical reasoning skills (Arian et al., 2022; Oderinu et al., 2019; Thompson, 2019). To progress to higher-order thinking and processing, the approach needs to be learner-centered and designed to include active learning with a focus on self-directed learning (Arian et al., 2022; Hallinger, 2020; Jamshidi et al., 2021; Luke et al., 2021). Therefore, PBL is a logical step in improving a student's ability to synthesize and apply foundational knowledge and concepts into clinical practice. (Chang, 2016). Literature indicates that PBL has been shown to improve critical thinking and clinical reasoning skills, especially in healthcare education programs (Arian et al., 2022; Jamshidi et al., 2021; Luke et al., 2021). Research exploring these higher-order thinking and processing skills engaged during PBL may impact course delivery methods for all healthcare programs (Luke et al., 2021).

Problem-Based Learning

PBL is one of the most studied curriculum models in medical curricula and is believed to influence problem-solving and clinical reasoning skills in medical education (Gustin et al., 2018; Oderinu et al., 2019). Such higher-order thinking and processing skills are imperative for life in the 21st century, where solving real-world problems, both medical and non-medical, produces a

comprehensive thinker (Arian et al., 2022). The method was first introduced by Professor Howard Barrows at McMaster University in a medical sciences program (Chang, 2016; Luke et al., 2021; Prosser & Sze, 2014; Thompson, 2019). Professor Barrow's method involved students taking responsibility for their learning with the instructor acting as a guided tutor (Oderinu et al., 2019; Prosser & Sze, 2014; Thompson, 2019). The PBL method Professor Barrows proposed involved learning in small groups where the goal was to present students with an opportunity to work on team skills (Oderinu et al., 2019). In his proposed method, learning activities occurred without the instructor passively presenting information but rather by instructors asking questions that encourage students to use skills and knowledge that lead the group to a common solution to a problem (Prosser & Sze, 2014). Barrow's method was designed so that students are required to identify the content and knowledge relevant to the problem and create meaning of that content to apply it appropriately to the clinical situation at hand (Prosser & Sze, 2014).

The main goal of PBL in medical education programs is to develop a student's ability to synthesize and apply basic knowledge and foundational concepts into medical practice (Chang, 2016) This goal is met in three main ways: 1) students obtain basic biomedical knowledge through PBL sessions, 2) students learn to apply this knowledge to patient care, and 3) students gain the lifelong learner mindset required of healthcare providers as healthcare research is continually changing (Donner & Bickley, 1993). The core of the PBL model is constructed of six characteristics: student-centered learning, small student group discussions and activities that support learning, educators acting as guides of the activity, problems that are the primary stimulus for learning, problems are the avenue for which problem-solving skills are fostered, and new information is constructed through self-directed learning (Luke et al., 2021). PBL is a teaching method in which the learner is the center of the learning activity, where the learning

activity is focused on a given problem (Shrivastava & Shrivastava, 2021). The learning activity should be focused on self-directed learning by the students themselves and include teachers acting as guides directing the problem-solving activity (Fan et al., 2018). Students should also focus on the setting of the problem and engage in clinical learning and any research needed to solve the problem (Fan et al., 2018).

In PBL, students engage in group discussion and other group activities to solve the given problem by reactivating and building upon prior knowledge to construct a solution to the problem (Gustin et al., 2018). The PBL method has been reported to engage students in more active learning, thus improving skills such as teamwork, group discussion, and decision-making (Oderinu et al., 2019). PBL requires students to integrate both knowledge and skill, thus applying knowledge to solve a presented problem, which in the medical realm requires utilizing prior acquired knowledge to think critically and clinically reason to solve patient problems (Oderinu et al., 2019). Many authors argue that this is the foundation for effective medical clinical practice (Jay, 2014). The effects of PBL on clinical reasoning have been studied and shown in the literature to facilitate, develop, and enhance clinical reasoning skills (Scaffa & Wooster, 2004).

However, there are studies that report no statistically significant difference regarding PBL and critical thinking skills, such as a study done by McCarron and D'Amico (2002) with occupational therapy students. Limitations have been identified and are present in the research, with results varying (Jay, 2014). Furthermore, PBL's effect on higher-order thinking skills, such as clinical reasoning and critical thinking, specifically for physical therapy students during CFEs, is scarce (Oderinu et al., 2019). In an ever-evolving healthcare field, graduates of all medical disciplines need to be prepared for clinical practice (Jay, 2014). In medical education, clinical scenarios are often the problem in which medical students must recall already-known knowledge

but also search out new information about the problem and take an active role in how to solve the clinical scenario (Shrivastava & Shrivastava, 2021). PBL encourages medical students to learn how to solve problems they encounter in clinical practice, thus preparing them for their healthcare careers (Macauley et al., 2021). The PBL method, which is based on andragogical principles and supports active engagement, enables students to acquire new knowledge and develop skills utilized in practical clinical situations (Jay, 2014). Learners acquire more knowledge through the PBL process by practicing problem-solving skills and critical thinking, which has been shown to positively influence the student's perception of the learning process and educational context, thus fostering deeper learning (Gustin et al., 2018; Thorndahl & Stentoft, 2020).

Problem-Based Learning Versus Traditional Teaching Methods

Traditional lecture-only instructional methods, while one of the oldest, are ineffective for teaching skill-based competencies, according to many PBL proponents (Arian et al., 2022; Oderinu et al., 2019; Servant-Miklos, 2019). Studies have shown that medical students feel pre-clinical years should include clinical experiences and activities, not just traditional didactic learning opportunities (Eyal & Cohen, 2006). Furthermore, students taught primarily with traditional methods feel they have not had enough exposure to patient models, case discussions, and clinical simulations (Eyal & Cohen, 2006). Traditionally taught students also feel that their education lacks clinically relevant opportunities (Eyal & Cohen, 2006). Empirical evidence shows that traditional lecture-based methods are not effective for applying factual knowledge to critical reasoning that is required in higher education programs, especially in professional medical programs, including physical therapy (Arian et al., 2022; Oderinu et al., 2019; Shrivastava & Shrivastava, 2021).

Traditional lecture-based teaching methods are often regarded as instructor-centered, in which passive knowledge transfer from teacher to student is the primary method of knowledge acquisition (Oderinu et al., 2019). The PBL method is focused on active student engagement and aims to utilize activities that engage students in clinically relevant problems that will likely be present in their future clinical practice as healthcare providers (Arian et al., 2022; Eyal & Cohen, 2006; Gustin et al., 2018; Macauley et al., 2021; Oderinu et al., 2019; Shrivastava & Shrivastava, 2021). In PBL, the design is such that educators and instructors participate in the problem-solving activity as little as possible to ensure student learning occurs as a self-directed and autonomous process (Fan et al., 2018; Luke et al., 2021; Macauley et al., 2021; Oderinu et al., 2019; Thompson, 2019). Therefore, teaching methods that include learning activities that focus on the problem and finding solutions to such problems, as is the case with PBL, lead the learner to be involved in active learning and problem-solving that encourage critical thinking (Luke et al., 2021; Macauley et al., 2021; Thompson, 2019).

Traditional teaching methods involve passive, teacher-controlled learning, leading to a limited capacity for personal meaning in the subject, thus leading to poor critical thinking skills and the ability to apply learned skills to other situations (Gustin et al., 2018; Hallinger, 2020; Oderinu et al., 2019). In PBL, an instructor's role is to engage only to the extent that they guide constructive active learning activities (Gijselaers, 1996). In medical education, where conditions are complex, the ability to clinically reason in any situation is imperative to good patient care (Eyal & Cohen, 2006; Servant-Miklos, 2019; Shrivastava & Shrivastava, 2021). Thus, teaching students how to apply problem-solving, clinical reasoning, and critical thinking skills in all situations through problem-based learning may be superior to traditional teaching methods (Macauley et al, 2021; Schmidt, 2006).

As a result of PBL methods being utilized more readily in today's medical education, current research has shown PBL methods to be more effective at engaging critical thinking skills, improving knowledge acquisition, increasing academic achievement, and improving clinical reasoning skills during CFEs than traditional teaching methods in healthcare programs (e.g. Arian et al., 2022; Larin et al., 2010; Luke et al., 2021). While lectures are helpful in disseminating information to a large audience, research shows lectures are not an effective teaching strategy for skill-based competency, applying facts or knowledge, or clinical reasoning (Arian et al., 2022; Eyal & Cohen, 2006; Oderinu et al., 2019).

Some researchers, such as Kuiper and Pesut (2004), argue that both cognition and metacognition are integral parts of developing clinical reasoning skills in the healthcare field. Therefore, medical educators must utilize teaching strategies and teaching methods that incorporate both cognition and metacognition to encourage and develop clinical reasoning in their graduates both in the classroom and in practical application (Larin et al., 2010). According to Larin et al. (2010), student-centered educational programs such as the PBL approach may be more likely to produce desired characteristics in new physical therapy graduates. The reason for improved characteristics may be due to PBL facilitating cognition skills such as memory, critical thinking, and decision-making and metacognition skills such as evaluation, reflection, and comprehension of one's cognitive learning (Larin et al., 2010).

Traditional classroom teaching strategies are typically confined to lecture-based techniques in which the teacher presents information unilaterally (Kandi & Basireddy, 2018). The traditional method of instruction is not effective in yielding medical students of better quality (Kandi & Basireddy, 2018). Traditional teaching methods are typically a one-way approach to communicating content to a large audience and do not allow for perspective

variances or assess the level of meaning a student has with the content (Kandi & Basireddy, 2018; Luke et al., 2021). According to Arian et al. (2022), the classic lecturing method, while cost-effective in disseminating content to a large group of students, has been shown to have a 20% retention rate of said content, while continuous learning is more present with student-centered learning models such as PBL. Academic achievement and educational motivation have also been statistically significant in groups of students participating in PBL compared to non-PBL groups (Arian et al., 2022).

Oderinu et al. (2019) studied differences in student perceptions of PBL versus traditional teaching methods. In Oderinu et al.'s (2019) study, the authors compared a group of dental students engaging in PBL to a group of dental students who were primarily taught a specific course using traditional lecture-based methods. A questionnaire was given to those in the study to investigate student perceptions of the PBL method compared to traditional lecture methods (Oderinu et al., 2019). Results indicated that there was a statistical difference between the PBL and traditional lecture groups with higher mean values in all but one perceived area on the questionnaire, including "communication with peers, usefulness as a pedagogical method, organization, able to provide intellectual stimulation and interaction between students and tutors" (Oderinu et al., 2019, p. 209). The one area that yielded no statistical significance between groups was "adequacy of teaching" (Oderinu et al., 2019). Furthermore, students educated through a PBL approach have been shown to obtain more knowledge than those taught through lecture-based methods (Jamshidi et al., 2021). PBL, therefore, may produce better intellectual stimulation by connecting prior and new knowledge (Oderinu et al., 2019).

Several other studies offer compelling evidence that PBL can lead to deeper understanding, improved critical thinking skills, more excellent retention, and long-term

understanding that can be utilized outside the classroom compared to traditional teaching methods (e.g., Hallinger, 2020; Macauley et al., 2021; Jamshidi et al., 2021; Schmidt et al., 2006). A recent systematic review including thirteen qualitative and quantitative studies regarding the PBL approach for dental students revealed a difference between the PBL approach and traditional lecture methods in improving interpretation and knowledge scores (Luke et al., 2021). However, many studies indicate that the success of PBL is dependent on the responsibility of students to engage in self-directed learning as well as appropriate guidance from facilitators (Macauley et al., 2021). Proper training for facilitators of PBL is essential to ensuring adequate student and facilitator engagement and to encourage students to find meaning in the PBL method (Arian et al., 2022; Luke et al., 2021). As students engage in the PBL method and find meaning in the activities, the expected and desired outcomes of utilizing PBL are attained (Arian et al., 2022; Luke et al., 2021; Oo et al., 2020; Prosser & Sze, 2014). Therefore, it is recommended that those implementing PBL methods are knowledgeable and experienced professors who are dedicated to giving sufficient time to training in PBL as well as in implementing the approach and navigating challenges that come along (Arian et al., 2022).

While there is some research suggesting PBL does not improve problem-solving skills specifically and that clinical decision-making is based more off pattern recognition rather than problem-solving skills (Barrows & Feltovich, 1987; Jefferson, 2001), there is evidence in empirical research that clinical expertise is related to a student's knowledge base (Luke et al., 2021). A meta-analysis study comparing quantitative data between PBL and traditional teaching programs, PBL programs had higher performance in terms of knowledge retention, higher performance during clinical experiences, and clinical skill application (Prosser & Sze, 2014). The Prosser & Sze (2014) study only showed improvements in the short-term and not the long-

term. The literature widely supports the use of PBL teaching methods within medical curricula as an effective instructional method for improving medical students' clinical reasoning and problem-solving skills (Arian et al., 2022; Eyal & Cohen, 2006; Gustin et al., 2018; Hallinger, 2020; Macauley et al., 2021; Servant-Miklos, 2019; Shrivastava & Shrivastava, 2021, etc.).

Drawbacks to a PBL Curriculum

"The success of an intervention depends not only upon its theoretical soundness, but also on proper implementation that reflects the guidelines derived from its theoretical conception" (Hung, 2011, p. 529). PBL does have some potential drawbacks, which has led some researchers to be critics of the method (Barrows & Feltovich, 1987; Donner & Bickley, 1993; Jefferson, 2001). Donner and Bickley (1993) report higher costs related to the time faculty must expend for PBL session preparation, increased faculty workload, tutor quality variability, and the need for increased instructor training as drawbacks to the PBL method. The number of small groups required within a cohort may also require the need for more faculty member support (Donner & Bickley, 1993). Chang (2016) argues that PBL is not for everyone or every program and argues that some lecture methods may be needed in some subjects to disseminate information and to help students understand specific concepts. Some researchers have argued for the need for some foundational knowledge acquisition to precede PBL activities, as this would allow for more effective PBL activities (Jefferson, 2001; Larin et al., 2010; Norman & Eva, 2003).

Some researchers also argue that PBL de-emphasizes content and advises that PBL activities be selective, highly structured, and based on prior knowledge acquisition. (Jefferson, 2001; Larin et al., 2010). The importance of faculty buy-in to the PBL method, as well as the need for faculty training, cannot be understated (Arian et al., 2022). Many students may not have been exposed to the PBL method in pre-college or pre-healthcare program education; thus, they

will need time to adapt to the new method (Jay, 2014). First-year healthcare program students may have more difficulty as they are also gaining new knowledge through the PBL process (Jay, 2014). In contrast, students who have been in the program longer are now learning not only to gain further knowledge but also to apply it to clinical situations that vary more and are more complex (Jay, 2014). As a result, the faculty and program as a whole need to be prepared to offer additional support, make changes to assessments as necessary, and help these students navigate the new method (Donner & Bickley, 1993; Jay, 2014; Oo et al., 2020).

Other potential drawbacks include passive students being more reluctant to be engaged and communicate with peers during discussions within the small groups and more assertive students gaining more from the PBL method than their less-dominant peers (Oo et al., 2020). Another drawback is knowledge presented within small group PBL sessions are directed by students and can be skewed from the truth, which could cause confusion (Oo et al., 2020). Therefore, instructor-led debriefing and large group discussions are necessary to ensure that what is being learned is true and accurate (Oo et al., 2020). Disadvantages of PBL have also been acknowledged by the work of Oderinu et al. (2019), which include the need for proper training in PBL instruction for faculty administering the method and better learning facilities and resources such as computer and scholarly journal availability.

School political barriers may also be a challenge for some medical schools as radical change is necessary and may receive pushback from conventional school faculty who advocate for traditional teaching methods (Donner & Bickley, 1993). PBL does require faculty to be more accessible to students as well as give up authority over knowledge acquisition in traditional formats and within the curriculum (Donner & Bickley, 1993). Those changes are often not easily implemented within a conventional school model and may create growing pains as medical

programs work through the changes and challenges of such a transition (Donner & Bickley, 1993). Despite these drawbacks, many researchers agree that the benefits outweigh these challenges (Oo et al., 2020).

Knowledge Acquisition

The acquisition of knowledge is the key to successful education (Luke et al., 2021). However, the term "knowledge" is very broad (Luke et al., 2021). Cognitive psychologists have categorized knowledge into three domains: declarative knowledge, procedural knowledge, and the abstract, not well-defined area in between the first two domains in which problem-solving and critical thinking skills reside (Luke et al., 2021). The first step in the process of clinical reasoning is knowledge acquisition in the cognition domain, in which students gain factual knowledge that can then be applied to various healthcare situations through clinical reasoning in the metacognition stage (Hallinger, 2020; Norman & Eva, 2003). Then, in the PBL structure, a realistic patient case scenario is presented and facilitated by the PBL instructor to cultivate reflection and critical thinking (Kuiper & Pesut, 2004). "Psychological research and theory suggest that by having students learn through the experience of solving problems, they can learn both content and thinking strategies" (Hmelo-Silver, 2004, p. 235). Furthermore, as students learn to solve clinical problems, students acquire further knowledge and skills required to be a medical professional (Onyon, 2012). Patient problems are the focus of the PBL activity as this encourages discussion and analysis in the context of clinically relevant situations (Prosser & Sze, 2014). Students work in groups to effectively communicate, identify the problems within the scenario and patient needs, select and organize information, and critically apply findings to the given patient scenario (Dolmans et al., 2005). The ability to apply clinical information to real-life

patient problems depends on a student's ability to access prior knowledge and organize it effectively (Norman & Eva, 2003).

Knowledge acquisition is required for clinical reasoning and is a prerequisite for effective PBL (Larin et al., 2010). Potential problems may arise during PBL instruction if students are not on the same level of knowledge integration (Larin et al., 2010). PBL instruction may help close this gap as students learn to gain and apply new knowledge effectively through a team-based approach (Hammel et al., 1999). To develop critical thinking skills and the ability to problem-solve, students must move from focusing on one truth and one solution, known as convergent thinking, to a more self-directed learning approach in which students use resources to determine multiple solutions to a given problem based on the problem criteria, test that solution and continue to problem-solve if the problem persists (Luke et al., 2021).

Knowledge acquisition is significantly improved and solidified through PBL, according to some researchers (Jamshidi et al., 2021; Schmidt et al., 2006). With the PBL model, knowledge is not a tool to solve a problem; instead, knowledge itself is the product of the PBL process (Arian et al., 2022). Fan et al. (2018) describe PBL as an effective pedagogy for training practical skills and clinical problem-solving as "one criterion of PBL is that knowledge gained through the courses is skill-based regarding problem-solving as well as theory (p. 188). Therefore, PBL has been recommended as a method for knowledge acquisition for medical sciences education (Schlett et al., 2010). The recommendation of PBL for medical sciences education is supported by the work of many researchers (Hwang & Kim, 2006; Jamshidi et al., 2021; Larin et al., 2010; Luke et al., 2021; Schlett et al., 2010; etc.), Students involved in PBL education obtain higher levels of knowledge and clinical skill when compared to students engaged in lecture-based methods only (Jamshidi et al., 2021). Improved knowledge acquisition

and skill competency in PBL students is evident when compared to students who participated in lecture-based curriculum plans (Hwang & Kim, 2006; Jamshidi et al., 2021; Schmidt et al., 2006;). Several studies support the claim that students educated with a PBL approach yield higher knowledge and clinical competency skills than those educated using a lecture-based approach (Jamshidi et al., 2021; Larin et al., 2010; Luke et al., 2021; Schlett et al., 2010).

The PBL approach increases knowledge retention and application and results in higher knowledge and motivation for PBL students (Donner & Bickley, 1993; Hwang & Kim; 2006). One of the significant benefits of PBL in American medical education is that knowledge at the foundational level is mastered in the same way in which it will be utilized and applied clinically through the solving of problems (Donner & Bickley, 1993). Yew and Goh (2016) also echo the benefits of PBL for medical education, stating that PBL is effective for the long-term retention of knowledge and also for the application of such knowledge to clinical problems. Improvements in general academic knowledge and competencies for students involved in PBL are superior to those students involved in only traditional learning (Schmidt et al., 2006). As a result, literature appears to support using a PBL approach for knowledge acquisition, content retention, and application of skills, specifically for clinical education (Jamshidi et al., 2021). This study aims to understand the relationship between social constructivism and PBL, specifically through the lens of DPT students' perceptions of PBL on knowledge acquisition used during CFEs.

Student Perception of Problem-Based Learning

Constructivism supports the idea that knowledge is better constructed when the learner finds meaning in the material (Hallinger, 2020). Finding meaning in the material is often difficult to obtain with traditional teaching methods, but an area where PBL instruction may enhance learning. (Hallinger, 2020; Luke et al., 2021). An essential aspect of utilizing PBL is student

perception related to PBL (Oderinu et al., 2019). No one teaching method is the key to meeting every student's various needs (Fan et al., 2018). Student feedback regarding PBL teaching methods has been shown in research to have both advantages and disadvantages (Fan et al., 2018). Positive student perceptions of PBL have been linked to favorable academic results when compared to students who are part of traditional curriculum formats (Shrivastava & Shrivastava 2021). Positive reports of PBL from students regarding interpersonal skills, problem-solving, interpersonal relationships, communication, and satisfaction in their education have been emphasized in research (Oderinu et al., 2019). More research has yielded positive student perceptions of PBL related to the development of critical thinking and teamwork as well as communication (Fan et al., 2018). Students also have more satisfaction with PBL teaching methods for improving communication and self-directed learning (Rideout et al., 2002).

A study utilizing PBL versus traditional teaching methods in dental students indicated that students involved in PBL had a higher perception of six perceived factors, including the ability to communicate with other peers both academically and clinically, organizational skills, and interpersonal skills including professional interactions with peers and tutors (Oderinu et al., 2019). Students also felt that the PBL method was an effective pedagogical method for medical students (Oderinu et al., 2019). Students also perceive PBL as a positive method of producing advanced cognitive skills (Kandi & Basireddy, 2018). The PBL learning approach is reported to improve various skills, including working in teams, discussion among peers, the ability to make decisions, and searching out and explaining new information (Oderinu et al., 2019). The PBL approach has been shown to encourage students to be more actively engaged in their own learning process (Oderinu et al., 2019). Students also find PBL instruction to be more intellectually stimulating (Oderinu et al., 2019).

While some medical students are familiar with PBL, the perception of PBL compared to traditional learning is an important area of study, as students are the main stakeholders of the approach (Oderinu et al., 2019). Students also perceive a positive response to most of their tutors with the level of encouragement they receive during PBL sessions (Kandi & Basireddy, 2018). Research broadly supports a positive student perception of the PBL teaching method, including students feeling that the PBL method is the best teaching and learning model for medical education compared to traditional teaching methods (Kandi & Basireddy, 2018). Students also largely agree that participation in a PBL curriculum improves their self-efficacy, self-directed learning skills, and analysis processes and helps them apply basic foundational concepts to clinical problems more easily, thus improving their diagnostic skills (Oo et al., 2020).

Okoye et al. (2019) studied medical students' perceptions of PBL in Nigeria, with results indicating that most students preferred a combination of PBL and conventional teaching methods (71.3%). Additionally, students felt PBL was a suitable teaching strategy for all medical disciplines (76.8%) (Okoye et al., 2019). While some students may express anxiety over new learning situations initially, the literature supports that after this initial period, students displayed new abilities and more self-directed learning in which they were excited and confident (Williams et al., 2003). Programs that integrate PBL into the curriculum have shown higher levels of positive student perception regarding their learning approach and educational context (Gustin et al., 2018).

A positive perception of transitional DPT students was identified through the work of Larin et al. (2010), where five themes were identified, including accessing and applying information, the value of giving and receiving feedback in group settings, the value of

commitment to the group, awareness, and appreciation of the PBL process including personal, and professional growth. While students initially were concerned with giving and receiving peer feedback, students commented on liking the confirmation of other peers regarding their thought processes (Larin et al., 2010). Students commented on their ability to develop better information processing and organizing, as well as noting many positive aspects of group work (Larin et al., 2010). Student perceived themes also included that while the PBL course was challenging, the majority of physical therapy students felt PBL should have been introduced earlier in the physical therapy curriculum (Larin et al., 2010; Macauley et al., 2021). Positive student perceptions have also been reported in research by Macauley et al. (2021) and Luke et al. (2021).

Positive findings have been supported by many other researchers, including Santasier and Plack (2007), where critical thinking, commitment to learning, stress management, student interactions, and professional identity were themes identified by students to be areas that PBL helped to develop. Williams et al. (2003) associated improved learning, study strategies, information finding, and organization as areas in which PBL teaching strategies enhanced as identified by physical therapy students. Advantages of teamwork and doctor-patient relationships have also been reported to be linked to PBL (Fan et al., 2018). PBL could improve student's feelings of being prepared for clinical practice through training their higher cognitive skills (Anderson et al., 2008). Students perceive PBL as being instrumental in increasing their higher-order cognitive skills and feel it helps them retain and apply information (Kandi & Basireddy, 2018). Higher educational motivation has also been reported among student groups involved in PBL compared to non-PBL students (Arian et al., 2022).

Graduates of both PBL and non-PBL courses who were surveyed yielded results that PBL graduates felt more satisfied with their learning coinciding well with clinical practice than non-PBL graduates (Price et al., 2000). Improved critical thinking, problem-solving skills, self-confidence, personal growth, and use of theories were reported by physical therapy students in Larin et al. (2010). Current literature broadly supports a student preference for PBL as it is positively perceived to support higher intellectual simulation and real-world application (Fan et al., 2018; Larin et al., 2010; Oderinu et al., 2019; Okoye et al., 2019; Santasier & Plack, 2007; Williams et al., 2003). The literature further supports a positive student perception when it comes to feeling that the quality of their training utilizing the PBL method prepared them for clinical practice (Antephol et al., 2003; Prince et al., 2005; Schlett et al., 2010). An overall positive student perception of PBL, is evident in the related literature and as a result of many current studies, PBL has been associated with improving many important skills for medical professionals, which leads to strong advocacy and justification for the use of a PBL pedagogy (Gustin et al., 2018; Hallinger, 2020; Oderinu et al., 2019; Okoye et al., 2019; Shrivastava & Shrivastava, 2021).

Student Perceived Disadvantages

Some studies indicate less favorable student perceptions of certain aspects of PBL. Some challenges related to PBL, include time management, role management, access to information, differences in instructor expectations, and dealing with interpretation regarding knowledge and reasoning (Hammel et al., 1999). Frustration with new PBL teachers in relation to time management and instructor expectations has also been reported (Hammel et al., 1999). While Hammel et al. (1999) reported some perceived challenges of PBL, the authors also reported a

positive perception from occupational therapy students regarding elements such as management of information, communication, team building, and critical reasoning skills.

Other student-identified disadvantages to PBL, include missing basic points or facts, ambiguity of facts, longer time-commitment, focus on clinical knowledge-based rather than theoretical, and problems regarding clarification (Aziz et al., 2014). Another drawback of PBL students identify is the method having too much practical content versus pure academic knowledge thus making the method more time consuming for the student in their first year of a medical program (Jay, 2014). Students are also concerned that too much practical content takes away from academic content that is needed to pass board exams that are mostly built on academic knowledge thus making them feel passing written examinations can be more difficult (Jay, 2014).

Other drawbacks of PBL identified in research include having more dominant students in groups, variability from the problem or discussion points, and lack of debriefing sessions as identified by students in clinical years (Hammel et al., 1999; Jay, 2014; Oo et al., 2020). Kelson and Distlehorst (2000) indicate the importance of the group process and structure as key elements of predicted PBL outcomes. According to Jay (2014), who studied perceptions of occupational therapy students who were taught with PBL methods in a single course, 42% of 293 students disagreed that they would like other courses to follow the same structure (Jay, 2014). Some research has shown students who participate in PBL have no significant difference in feelings of preparation for most practical domains (Hallinger, 2020; Roche et al., 2003; Tsigarides et al., 2017). Inconsistencies are seen in research regarding student perception of PBL regarding student roles and attitudes toward others in PBL activity teams (Tsigarides et al., 2017). Inconsistencies related to selflessness, trust, and skepticism are also present within the

body of research as there are many studies indicating improved interpersonal skills and relationships among students involved in PBL (Arian et al., 2022; Hallinger, 2020; Jamshidi et al., 2021; Roche et al., 2003; Schmidt et al., 2006; Shrivastava & Shrivastava, 2021).

While the majority of current literature supports students having a positive perception of PBL, student perception of PBL in specific courses may vary (Oo et al., 2020). This is especially true with first-year students engaging in PBL for the first time (Oo et al., 2020). Studies show that students who have been engaging with PBL for longer have a more positive perception of the method than first-year students do (Jay, 2014; Oo et al., 2020). The time and effort required of students for a PBL curriculum may initially cause student anxiety, especially in beginner students (Williams et al., 2003). Regardless of these drawbacks most students still believe that the benefits of PBL instruction outweigh these drawbacks (Hammel et al., 1999; Oo et al., 2020)

While it can be reasoned that the PBL method is the most well-rounded approach for improving student cognitive processes and higher-order thinking skills, educators must be mindful of the challenges a PBL approach may entail for many students (Jay, 2014). The effect PBL has on problem-solving and critical thinking skills is varied among the current literature and inconsistent findings regarding student perceptions, attitudes, and ideas on PBL are limited in relation to clinical field experiences for DPT students (Larin et al., 2010). The need for further investigation and research (Fan et al., 2018) on student perception of PBL, especially for DPT students is therefore evident. This study aims to understand how DPT students perceive PBL teaching methods, both positively and negatively in relation to how they engage critical thinking and clinical reasoning skills during CFEs.

Interpersonal Skills

The ability to integrate interpersonal skills with skill competency is essential in PBL and in future endeavors in healthcare settings (Hallinger, 2020; Schmidt et al., 2006). Some studies show that graduates of a PBL curriculum have better interpersonal skills and higher competency levels regarding problem-solving and self-directed learning (Arian et al., 2022; Schmidt et al., 2006). Many researchers have also shown PBL students to have improved interpersonal skills, thus improving patient outcomes through professionalism, positive attitudes, and a human values approach both during CFEs and as licensed clinical practitioners (Arian et al., 2022; Schmidt et al., 2006; Shrivastava & Shrivastava, 2021). In fact, healthcare provider attitudes have been shown to be a precursor to unsafe events in the healthcare setting as attitudes have been shown to have an effect on behavior; therefore, a change in outlook or attitude can be associated with clinical decision-making in the patient safety realm (Jamshidi et al., 2021).

Students involved in PBL education showed a statistically significant difference in student attitudes toward patient safety, revealing students involved in the PBL program within the study had more positive attitudes after the PBL program (Jamshidi et al., 2021). PBL is an effective method of improving students' independence, relationship skills, communication, self-efficacy, self-reflection, and professional competence (Arian et al., 2022). Higher gains in interpersonal domains between medical disciplines such as physical therapy and nursing have also been reported (Schlett et al., 2010). Independent learning and psychosocial skills are also of better quality in PBL students compared to students who have not engaged in PBL methods (Schlett et al., 2010). Students also perceive PBL as instrumental in aiding their communication and speaking skills and be complementary to the teamwork experience (Jamshidi et al., 2021; Kandi & Basireddy, 2018).

PBL students have been shown to have higher independent working skills within the medical workforce, which is often a characteristic that employers seek in their employees (Schlett et al., 2010). PBL fosters both cognitive skills and soft skills, including characteristics of leadership, team collaboration, problem-solving, and critical thinking (Oo et al., 2020). PBL students agree that they have better communication with their patients, exhibit more leadership and interpersonal skills as well, and work better on a multidisciplinary healthcare team, thus producing better patient outcomes (Shrivastava & Shrivastava, 2021). The majority of graduates who participated in PBL during their education felt they were well prepared for their professional life, including communication skills with patients, collaboration with interdisciplinary healthcare professionals, problem-solving skills, attitudes toward the sciences, and critical thinking skills (Antephol et al., 2003). This study attempts to understand DPT students' perceptions of the effect PBL may have on a variety of skills required for successful CFEs including higher-order thinking and processing skills.

Problem-Based Learning, Clinical Reasoning, and Critical Thinking Skills

The original goal of PBL, according to Fan et al. (2018), was to "improve students' abilities to solve clinical problems" (p. 186). The method is believed to improve clinical reasoning and problem-solving skills in medical education students (Oderinu et al., 2019). In the rapidly growing field of medicine, according to Shrivastava & Shrivastava (2021), medical students need to acquire problem-solving skills and the ability to work as a healthcare team, as well as have critical thinking and clinical reasoning skills to ensure better patient outcomes. One characteristic of PBL is that while prior knowledge is used to help problem-solve, knowledge acquisition is further gained through a skill-based problem-solving process that integrates theory (Fan et al., 2018). In fact, according to Barrows (1996), PBL is an effective pedagogy for

educating medical students in clinical skills, application of those skills and clinical reasoning to solve clinical problems (Fan et al., 2018). Training that is focused on solving clinical problems may lead to better clinical reasoning skills by pre-professional students and licensed clinicians (Barrows, 1996). PBL could improve student preparation for clinical practice through training in higher-order cognitive skills (Anderson et al., 2008). PBL is considered an effective method for learning in general, but especially in medical education as it has been shown to foster critical thinking and clinical reasoning skills required for successful CFEs (Luke et al., 2021; Shrivastava & Shrivastava, 2021; Thorndahl & Stentoft, 2020; Wang et al., 2008).

PBL has widely been seen as a collaborative learning method that engages deeper thinking processes (Thompson, 2018). PBL has been described as an effective method for developing teamwork, information investigation, and decision-making, all of which are required for clinical competency in the medical field (Oderinu et al., 2019). While it has had its critics, the current literature supports using PBL to improve critical thinking skills in healthcare programs by engaging students to reach conclusions about medical scenarios (Thompson, 2019). Furthermore, the current literature suggests that graduates of a PBL curriculum have better knowledge retention, better problem-solving skills, and can integrate foundational science into clinical problems more easily (Oderinu et al., 2019; Shrivastava & Shrivastava, 2021; Thompson, 2019; Thorndahl & Stentoft, 2020).

In the PBL method, problems are made of clinical scenarios, which facilitates students to recall prior knowledge and encourages them to investigate the given problem or clinical scenario and take an active role in solving the problem through a team approach (Shrivastava & Shrivastava, 2021). The clinical scenario acts as the problem in the PBL method and is created in a way that resembles typical clinical problems seen in typical clinical practice, which require

students to utilize higher-order processing skills such as clinical reasoning and critical thinking to solve real-life patient problems, thus preparing them for clinical experiences and practice (Shrivastava & Shrivastava, 2021). PBL is an effective approach to long-term knowledge retention as well as the application of such knowledge, thus indicating that PBL is the preferred method for expanding knowledge horizons, content retention long-term and the application of clinical skills (Prosser & Sze, 2014; Yew & Goh, 2016). Although PBL and non-PBL students may have similar factual knowledge, in the realm of medicine, where these facts must be used to create a plan of care specific to each patient problem, PBL students yield better clinical performance and have been shown to be more efficient workers in clinical practice (Shrivastava & Shrivastava, 2021).

While critical thinking and clinical reasoning are often assumed as understood constructs, it is important to understand the meaning of these terms for medical education in the context of PBL (Thorndahl & Stentoft, 2020). For this study, the definition of clinical reasoning follows closely with the definition put forth by Gruppen (2016), in which the term is defined as a healthcare professional's integration of their clinical knowledge with the patient information within a given case which is representative of a clinical problem. The healthcare professional then uses the problem to guide the retrieval of additional data and then revises the problem and constructs a solution based on the information as a whole (Gruppen, 2016). Critical reasoning requires elements of Bloom's taxonomy, including the ability to analyze knowledge, synthesize prior knowledge, and evaluate what knowledge is relevant to the given problem; it also requires the ability to formulate clinical hypothesis, make clinical decisions, and justify those decisions through the use of evidence-based practice (Thompson, 2019). Clinical hypotheses are then tested until a solution to the problem is found (Thompson, 2019). The ability of students to

analyze a clinical problem, assess the problem and its contents in a critical way, and justify their assessment to peers and instructors indicates the student's ability to engage in critical thinking and clinical reasoning (Thompson, 2019).

Critical thinking in this study follows Dr. Stephen Brookfield's definition of "the process of hunting and checking assumptions" (Lovatt, 2014, p. 670). Critical thinking in healthcare professions is crucial to competent patient care and includes many higher-order thinking processes, including "analysis, synthesis, and evaluation" (Thompson, 2019, p. 1) and has been shown to improve work abilities such as teamwork and communication (Peng et al., 2021). Critical thinking, interpersonal skills, and information gathering are widely supported by PBL models in research (Oderinu et al., 2019; Peng et al., 2021; Schmidt et al., 2006). The ability of students to absorb a higher capacity of information through critical thinking, as well as student employability, is also positively correlated to PBL (Peng et al., 2021). Thus, advancing critical thinking skills through PBL enables students to participate actively in their learning environment while simulating real-world problems, and creates reflective clinical practitioners (Shrivastava & Shrivastava, 2021). This study explored student perceptions of the use of PBL teaching methods and its effect on engaging critical thinking and clinical reasoning skills.

Problem-Based Learning and Clinical Field Experiences

In an ever-evolving healthcare field, students must be prepared to not only be academically sound but also to perform competently in practical, clinical situations. Medical education is very complex and requires training in pre-clinical topics such as anatomy, physiology, and kinesiology. Training regarding intra-clinical subjects specific to each medical discipline, such as surgery, cardiology, orthopedics, physical therapy, occupational therapy, and many more, is also necessary (Kandi & Basireddy, 2018). Thus, medical education requires both

classroom and lab competencies as well as practical application (Kandi & Basireddy, 2018). Classroom education, which typically is taught through lecture-based methods, has not been shown to be an effective method in producing quality medical graduates (Kandi & Basireddy, 2018). The PBL method supports student participation and fosters the acquisition of knowledge by enabling students to acquire new knowledge that can be applied to clinical situations (Jay, 2014). Ergo, the PBL method is a logical approach to improving medical students' ability to analyze and synthesize knowledge and coalesce it into practical clinical application (Chang, 2016). Likewise, students respond better to PBL and view this method as superior to traditional methods when it comes to preparing them for CFEs (CFEs) (Kandi & Basireddy, 2018).

PBL has been adopted by some nursing programs in response to students being unsatisfied with their performance during CFEs (Arian et al., 2022). Students in the nursing program attributed this dissatisfaction to educational methods that emphasized memorizing biomedical content utilized with traditional teaching methods rather than through learning activities that encourage critical thinking and decision-making (Arian et al., 2022). Students also felt their dissatisfaction was due to feeling they were not trained effectively to perform clinical reasoning, problem-solving, and decision-making (Arian et al., 2022). It is likely students in many types of medical education programs, including DPT programs, feel the same dissatisfaction. DPT students are expected to be proficient and competent in many aspects, including professionalism, communication, clinical decision-making, critical inquiry, and the use of evidence-based practice (Larin et al., 2010). CFEs, which are typical of most medical programs, require all of these aspects, including clinical reasoning and critical thinking skills for various medical situations (Williams et al., 2003).

Transitioning from didactic coursework to clinical training can be difficult for some students (Oderinu et al., 2019). Prince et al. (2005) indicated that difficulties occur with this transition among students involved in PBL and students not involved with PBL, but that early patient contact as part of the PBL process helped mitigate these difficulties. Oo et al. (2020) posit that the PBL curriculum may facilitate better transfer of conceptual knowledge to new clinical problems and improve a student's ability to integrate basic foundational biomedical concepts into these clinical problems.

In the PBL method, the problem is presented as a clinical scenario in which students must recall prior knowledge and theory and engage with it to make an active effort to solve the given problem (Shrivastava & Shrivastava, 2021). As these clinical scenarios or problems are designed so that they represent real-world clinical problems encountered in clinical experiences and practice, the PBL may better prepare students for both CFEs and their future medical careers (Shrivastava & Shrivastava, 2021). Application of foundational science and medical concepts into relevant clinical scenarios is critical to comprehending, synthesizing, and integrating these concepts and foundations with clinical medicine (Chang, 2016). Hence, the ability to complete higher-order processing skills plays an important role in the comfort of the students in their future clinical practice (Chang, 2016). Students engaged in PBL report feeling better prepared to deliver optimized, individual patient care (Pruitt et al., 2017). The current literature suggests that students who graduate from medical programs with a PBL curriculum can solve problems, retain knowledge, and integrate basic science into clinical problems more easily (Shrivastava & Shrivastava, 2021).

Students who undergo PBL teaching methods also tend to perform better in clinical field situations and also better model a collaborative, teamwork approach that will later be needed as

practicing healthcare providers (Thompson, 2019). Support for the use of PBL in healthcare programs, specifically for clinical field experience problem-solving, is yielding favorable results both academically and for CFEs (Shrivastava & Shrivastava, 2021). PBL has been shown to improve interpersonal skills and cognitive competencies, including problem-solving, information gathering, and self-directed learning in graduate nurses who graduated from a PBL program (Schmidt et al., 2006). Evidence suggests that PBL students are better prepared regarding general clinical competencies than non-PBL students (Prince et al., 2005). Task competencies such as productivity, helping other colleagues, working independently, planning, efficiency, and working under stress are improved in PBL graduates (Schmidt et al., 2006). Therefore, findings support PBL for optimizing interpersonal and cognitive skills critical for success in clinical practice (Schmidt et al., 2006).

While students engaged in PBL and lecture-based learning are often delivered the same factual content and may have similar knowledge, clinical performance is far better among PBL students, and PBL students are better apt to be more efficient workers during clinical practice (Shrivastava & Shrivastava, 2021). Students also believe in the value that PBL provides for clinical practice both as a student and as a new clinician. Student perception studies show that they feel participation in the PBL method improves their ability to apply foundational medical knowledge to clinical problems, which leads to better diagnostic skills as well as intervention selection and, thus, patient outcomes, which should be the goal of all healthcare providers (Oo et al., 2020). This study aimed to understand student perceptions related to the connection between PBL and higher-order thinking and processing skills utilized during CFEs for DPT students.

Summary

A review of the recent literature illuminates the significance and importance of higher-order processing skills, including critical thinking and clinical reasoning skills, for all types of healthcare providers to ensure competent patient care (Macauley et al., 2021; Schmidt et al., 2006). Educators must be able to cultivate these skills in students within healthcare programs (Oderinu et al., 2019). The social constructivism framework for PBL reflects an active learning process where knowledge is constructed through solving problems within a social context (Thompson, 2019). The social constructivist theory lays the foundation for PBL and illustrates an effective teaching method to engage critical thinking skills throughout the literature (Wang et al., 2008; Shrivastava & Shrivastava, 2021; Luke et al., 2021; Thorndahl & Stentoft, 2020). Positive student perceptions of PBL are widely supported in the current literature (Hallinger, 2020; Luke et al., 2021; Oderinu et al., 2019; Shrivastava & Shrivastava, 2021). While PBL has some critics and drawbacks, the evidence relating PBL to better academic achievement is overwhelming (Luke et al., 2021; Macauley et al., 2021; Okoye et al., 2019).

While problem-based learning teaching methods may vary among programs, the use of PBL strategies in healthcare programs may encourage better higher-order processing skills and improved clinical reasoning and critical thinking processes which could result in improved communication, problem-solving skills, knowledge retention, and interpersonal skills (Pruitt et al., 2017; Schmidt et al., 2006; Shrivastava & Shrivastava, 2021). Better higher-order cognitive skills may also translate to more meaningful learning, more competent healthcare providers, and better overall patient care (Pruitt et al., 2017). While many studies have been done investigating PBL for didactic achievements, little research is present relating PBL to student performance during CFEs, especially for physical therapy students (Thorndahl & Stentoft, 2020). This study

aimed to help close that gap in the literature and understand student perception of PBL as well as the perception of how it may affect higher-order thinking and processing skills utilized during CFEs (Hallinger, 2020; Luke et al., 2021; Oderinu et al., 2019; Pruitt et al., 2017; Schmidt et al., 2006; Shrivastava & Shrivastava, 2021).

CHAPTER THREE: METHODS

Overview

The purpose of this phenomenological study is to understand the experiences of participating in a physical therapy course primarily taught using problem-based learning teaching methods for Doctor of Physical Therapy students at a university in the mid-western United States. This chapter discusses the research design, presents the research questions, describes the setting and participants, and discusses the researcher's positionality. Chapter three also presents the study procedures, including the study permissions and recruitment plan, as well as identifies the data collection methods, including specific journal prompts, individual interview questions, and focus group questions utilized. Finally, this chapter concludes with a discussion of the data analysis methods utilized as well as procedures implemented to ensure trustworthiness.

Research Design

According to Moustakas (1994), phenomenological research designs involve researching a particular human experience to gain a comprehensive description of the experience to yield a reflective analysis that "portrays the essence of the experience" (p. 13). Those lived experiences are called phenomena, and studying these phenomena is aimed at examining the subconscious and conscious meanings of the participants' experiences (Laverty, 2003). The phenomenological design was initially developed by Husserl to understand human experience through qualitative research (Moustakas, 1994). Furthermore, phenomenology is the study of lived experiences (Laverty, 2003). "In human science studies, human consciousness and purposeful behavior are investigated by creating objects of meaning that are expressions of how human beings exist in the world" (van Manen, 1997 (p. 3). Therefore, phenomenological research requires a human

description of the phenomena, interpretation of the description, self-reflection of the meaning of the phenomena, and critical analysis (van Manen, 1997).

In hermeneutical phenomenology, the researcher actively engages in interpreting the participants' intended meaning based on their descriptions and descriptive texts. (van Manen, 1997). In hermeneutical phenomenology, the participants' experiences are interpreted through the researcher's own eyes, prior experiences, and knowledge about the content (Ajjawi & Higgs, 2007). Where phenomenology indicates how someone adapts to a phenomenon, hermeneutics describes how one would interpret the description of life (van Manen, 1997). Martin Heidegger is credited with hermeneutic phenomenology, in which he believed that pre-understanding present before a phenomenon occurs is part of one's history and background and cannot be put aside as it is already within oneself (Laverty, 2003). Heidegger believed that every encounter requires reference to one's background and level of understanding of the encounter itself; thus, interpretation is critical to understanding a phenomenon (van Manen, 1997). This interpretive process is done by moving from the whole experience to parts of the experience and alternating between these to deepen the essential understanding of the description and texts of the research (Laverty, 2003). Hermeneutical phenomenology, therefore, involves the pre-understanding of the researcher performing the research to participate in the interpretive process of participants' texts (van Manen, 1997). Therefore, the researcher's opinions and prior understanding of the content are crucial for the interpretation of participant descriptions and texts in order to co-construct the meaning of the lived experience or phenomenon itself (van Manen, 1997).

The hermeneutical phenomenological design is appropriate for the current study as it allows the researcher to explore the perceptions of students who underwent the same phenomenon or experience of participating in a therapeutic exercise course that utilizes PBL

teaching methods. I am also a physical therapist who was a physical therapy student previously. Thus, the researcher's pre-understanding of being a physical therapy student, knowledge of physical therapy aspects, and ability to interpret experiences based on the pre-understanding of the field allows this study to align well with the hermeneutical phenomenological design. A qualitative study permits the researcher to interpret and understand themes related to student perception of the use of PBL teaching methods as well as how these methods affect higher-order processing skills during CFEs.

According to Moustakas (1994), the aim of a phenomenological study is to understand what a particular experience means for those who have gone through the experience and can provide a description of the experience and how it affected them. As the aim of this study was to understand the experiences of DPT students who experienced PBL teaching methods within a therapeutic exercise course and understand their perceptions of PBL related to CFEs, therefore, a qualitative, hermeneutical phenomenological study design is in line with this purpose.

Research Questions

To fully understand the experiences of DPT students participating in PBL teaching methods in a therapeutic exercise course, as well as understand student perception of PBL methods and how it relates to CFEs and higher-order thinking skills, three research questions are presented. The central research question explores the overall experiences of students participating in a therapeutic exercise course in which PBL teaching methods are heavily utilized. The first sub-question explores student perception of PBL as it relates to CFEs, and sub-question three explores how participants perceive any effect of PBL teaching methods on higher-order processing skills utilized during CFEs.

Central Research Question

What are the experiences of DPT students who participate in PBL education?

Sub-Question One

How do DPT students perceive didactic PBL education in relation to the transition to CFEs?

Sub-Question Two

How do DPT students perceive PBL education to affect higher-order thinking and processing skills during clinical field experiences?

Setting and Participants

The setting and participants are essential to the creation of this study, including the purpose and research design. The research site and participants must align with the problem statement, purpose statement, and research question, which will be discussed in this section. The site, and participants are fully described, and the alignment to the problem and purpose statement is evident in this section.

Site

The site for this study is an accredited university in the midwestern United States. The university is governed by a board of trustees. The university president and the executive cabinet, which consists of the president, the provost, and chief academic officer, the chief financial officer, and the chief of staff, are also part of this shared governance. The university's average undergraduate enrollment is 2101 students, and graduate enrollment is 608 students. The DPT program has a total enrollment of approximately 290 students per year. This empirical research study is set within the DPT program. The DPT program is a three-year program designed in a lock-step curriculum structure, admitting 80 students per academic year. There are 11 full-time

DPT faculty. The university's DPT faculty are committed to Christian education, including providing quality physical therapy courses, and faculty regularly participate in continuing education courses and workshops.

The first two years of the DPT program are didactic-based coursework, with the final third year consisting of four CFEs. Each of the four CFEs is eight weeks in length and consists of both inpatient and outpatient experiences that are randomly assigned to each student by the directors of clinical education. For this study, the intervention, which consists of problem-based learning (PBL) teaching methods, was delivered in a specific course setting. The course setting was a therapeutic exercise course that occurred during the second semester of the DPT program. The therapeutic exercise course consisted of one hour of didactic coursework in addition to a one-and-a-half-hour lab session per week for 16 weeks in which students learned and performed hands-on physical therapy skills. This particular DPT program was chosen for this study due to the target population of DPT students at this site accurately reflecting the characteristics of the larger, general population of DPT students in the United States as well as due to the convenience of sampling available to the researcher.

Participants

Participants for this study were DPT students from the Class of 2024 who experienced the phenomenon of participating in a therapeutic exercise course that was primarily taught using a problem-based learning curriculum and teaching methods. The participants must have also matriculated to the final year of the DPT program in which CFEs occur and have completed their first two clinical field experiences. To be admitted to the DPT program, each student must have completed a bachelor's degree and pre-requisite coursework. The target population consisted of 69 students, and a goal of 12 participants were used for this study. This target population was

appropriate for the research question as the DPT program accurately reflects the same characteristics as other DPT professional education programs in the United States that require both therapeutic exercise courses and CFEs as part of the program's curriculum that is required by the program's accreditation body.

Recruitment Plan

The target population for this study was DPT students. Through convenience sampling, the sample pool for this study was DPT students in the class of 2024 cohort who are in their final year of the three-year DPT program at the university. Convenience sampling was utilized in this study to reduce cost, improve efficiency, and utilize willing participants who are readily available, thus improving data collection time (Stratton, 2021). While convenience sampling can reduce generalizability (Emerson, 2015), the results of this study will likely apply to other DPT programs in which didactic work and CFEs are similar.

In order to be a participant, the student must have participated in the central phenomenon and be enrolled in their third CFE, thus having completed the first two CFEs. The cohort was briefed on the purpose of the study and what would be required of them in the form of journal prompts, individual interviews, and a focus group before conducting the study and becoming a participant. Participants in the cohort all had an equal chance to become participants in the study. It was clearly articulated in both the briefing and informed consent forms that participation in the study is voluntary and participating does not result in any benefit related to grading or standing within the program, nor does not participating affect non-participants in any way. The sample size for this study is 12 participants. Saturation is the point at which data collection about the topic and theory no longer yields new data or further insights about the phenomenon (Hennink & Kaiser, 2022). Various textbooks and publications offer varied information on adequate sample

size to reach saturation (Hennink & Kaiser, 2022). Through a recent systematic review process involving qualitative studies designed with an in-depth interview process, Hennink and Kaiser (2022) discuss sample size ranging from between nine and 17 interviews with a mean of 12 to 13 interviews to reach saturation. Final sample participants were given informed consent forms and made aware they can drop out of the study at any time. Liberty University IRB approval can been found in Appendix A followed by informed consent forms given to participants which can be found in Appendix B.

Researcher's Positionality

The motivation for conducting this study was based on the need for DPT students to begin utilizing higher-order processing skills that are required in clinical reasoning and decision-making. As individuals age, physical therapy is an important piece in healthcare to ensure quality of life among all patients (Macauley et al., 2021). Therefore, because society at large is affected by each healthcare provider's ability to problem-solve in each individual's own care, the ability of physical therapists to engage in problem-solving skills is essential to the physical therapy discipline (Schmidt et al., 2006). Every person at some time in their life will require healthcare in some format, thus the importance of having competent, skilled healthcare providers, including physical therapists (Pruitt et al., 2017). Therefore, medical education programs, including DPT programs, should be concerned with a program's ability to engage students in problem-solving and higher-order thinking and process skills, including clinical reasoning.

PBL curriculum and course delivery methods are often used to achieve this in medical education programs in order to encourage higher-order thinking and processing skills in their students (Macauley et al., 2021). PBL is often utilized in the hopes that learning then translates to clinical practice through clinical experiences culminating in healthcare providers who are

competent problem-solvers (Servant-Miklos, 2019). Clinical reasoning skills are essential to competent patient care, and clinical experiences are imperative to the training of such healthcare providers (Shrivastava & Shrivastava, 2021). However, getting students to buy into the PBL teaching method due to perceiving its benefits and finding meaning in their learning is imperative to using the method within a successful curriculum. Thus, the motivation for the current study was to explore the perceptions of students participating in PBL methods as they relate to higher-order processing skills and carry over to CFEs.

Interpretive Framework

PBL is supported by a theoretical framework that is grounded in the constructivism theory, even more so in the social constructivism theory (Luke et al., 2021). Constructivism was founded by Jean Piaget in the early 1900s and is founded on the idea that knowledge is obtained through individual life experiences and takes place inside one's mind (Piaget, 1926). Constructivists believe that learning occurs through an active process in which the learner makes sense and meaning of their own experiences with content matter and that the learning process is unique to each learner (Piaget, 1952). Two schools of thought regarding how knowledge is constructed through personal experiences lead the way to two types of constructivist theories: the cognitive constructivist theory and the social constructivist theory (Thompson, 2019).

The cognitive constructivist theory is based on the idea that knowledge acquisition is an active process in which one's personal experiences, ideas, views, values, and culture are processed subjectively rather than through passive, authoritarian means (Kimmons & Caskurlu, 2020; Piaget, 1926). Piaget believed that these ideas, views, and values change through life experiences that occur throughout the lifespan during four different cognitive stages from childhood to adulthood (Kimmons & Caskurlu, 2020). These developmental stages are the

sensorimotor intelligence state, the pre-operational thinking stage, the concrete operational thinking stage, and the formal operation thinking stage (Piaget, 1952). In this theory, the stages occur in order, and no stages are skipped (Piaget, 1952). In cognitive constructivism, learning occurs dictated by the personal experiences that occur in each stage, thus constructing knowledge across one's lifespan (Thompson, 2019).

Social constructivism, which is credited to Lev Vygotsky, agrees that knowledge acquisition occurs through personal experiences but believes that it occurs due to social interactions around an experience, such as discussion with other community members, tutors, instructors, and other learners (Thompson, 2019). Social constructivists believe that cognitive development occurs beginning at an early age through sociocultural interactions, with the idea that children learn behavior through social modeling of behavior that is then internalized by the learner (Thompson, 2019). According to Vygotsky (1930), "When children develop a method of behavior for guiding themselves that had previously been used about another person when they organize their activities according to the social form of behavior, they succeed in applying a social attitude to themselves" (p. 11). Learning, therefore, is a product of social interaction in which the reframing of knowledge occurs by the learner based on applied social characteristics (Vygotsky, 1930). Social constructivism is widely considered the theoretical framework supporting problem-based learning (Luke et al., 2021), as learning experiences are created based on a specific problem that then involves problem-solving and solution creation through "purposeful group dialogue and collaborative learning" (Kemp, 2011, p. 48). PBL and social constructivism are intertwined; thus, utilizing active, collaborative learning to engage problem-solving skills may also encourage the development of clinical reasoning skills, which is imperative to competent healthcare providers. However, here in the question lies if PBL teaching

methods are perceived by the major stakeholders, the students, to be effective teaching methods that prepare them for success in didactic coursework and CFEs. Therefore, this study was based on the social constructivist theory.

Philosophical Assumptions

This section includes my philosophical assumptions as the primary researcher of the study in relation to ontological, epistemological, and axiological assumptions. This section also includes the interpretive framework grounded in social constructivism that guided my positionality and motivation for this study as well as the methods. Basic belief systems and world views in the form of philosophical assumptions were used to describe my beliefs and ideals about the world and relationships (Palagolla, 2016). Ontological assumptions dealing with the nature of reality and why things are the way they are through my beliefs and values (Palagolla, 2016) are also discussed in this chapter. Epistemological assumptions that deal with the nature of knowledge and describe how I, as the researcher, understand the world through my own knowledge base and ideals are discussed in this chapter (Palagolla, 2016).

Ontological Assumption

My ontological assumptions involve a Biblical worldview in which there is one truth and one universal reality. My assumption that the world that is being investigated is populated by human beings created by God, who each have their own interpretations, values, thoughts, and meanings (Crotty, 2003) is present in this study. I believe that God's truth, as written in the Bible, is the authority and sovereign guiding power of the world. I believe the Bible to be God-breathed and the source of all truth. However, I understand that my own assumptions are not the same assumptions of all participants. Investigating the world through participants' feelings, thoughts, and meanings in this study will be done through various data collection methods,

including journal prompts, individual interviews and a focus group. The different data collection methods will allow for the data to clearly show an exploration of ontological assumptions that may differ among myself and the participants and co-researchers.

Epistemological Assumption

The epistemological assumptions in this study revolve around constructivism. According to Crotty (2003), "Epistemology is a way of understanding and explaining how we know what we know" (p. 3). Constructivism is the idea that learning occurs from human experience and practice and, therefore, is constructed through human experience and interactions with other humans through social experiences that shape the meaning of said experiences through a social context. In this study, I attempted to find an answer to the effect PBL has on higher-order thinking skills and CFEs. Interviews and focus groups explored the meaning of participant's shared experiences as well as interpreted data through a social context, thus supporting social constructivism. Qualitative research is subjective, and the assumption that knowledge is derived from experiences where a wide variety of participants interpret their own meanings from experience means there is not only one valid perception, and no one perception equates to the exact experience of another participant.

Axiological Assumption

I am a faculty member within the DPT program in which this study is set. I believe that DPT students are highly motivated students who aim to become competent physical therapists, which includes problem-solving, higher-order processing, and clinical reasoning skills. I was also a DPT student previously, and as both a faculty member, licensed physical therapist, and clinical instructor (CI), I believe that problem-solving, higher-order processing skills, and clinical reasoning skills are imperative to DPT student success during CFEs and to becoming a

competent physical therapist. My axiological assumptions presented here are discussed so the reader is aware of possible differences and distinctions present within this study and, in order to be aware of these axiological assumptions, understand the possibility of skewed participant responses due to my perception as a faculty member. Furthermore, the presentation of my assumptions here helps to reduce the risk of skewed interpretations of participant meanings through my assumptions as the researcher. These axiological assumptions also allow me to effectively implement the hermeneutical phenomenology process as I will utilize my own prior knowledge, understanding, and assumptions as a faculty member, licensed physical therapist, and the primary researcher to aid in the interpretation of the data.

Researcher's Role

In this study, I as the human instrument am both the primary researcher and a faculty member within the DPT program at the university in which this study is set. However, I was not be in an authority position over students who were participants in this study as I am not the primary instructor for the course in which PBL occurs and I was not involved in any grading of student participants within any course during which time this study occurs. Both myself and participants in this study were unaware of any future research regarding the phenomenon at the time the phenomenon occurred. The phenomenon occurred in spring 2022, and this study was conceived in spring 2023. Furthermore, I was not involved in any grading of the PBL course for any participants at the time the PBL phenomenon occurred.

I am also the assistant director of clinical education (ADCE) at the university in which this study is set; however, I recused myself from any authority or grading of any clinical education assignments, documents, or anything related to CFEs for all participants while this study was being conducted. Therefore, no authority over the participants was in effect at the time

of the data collection or data analysis or at any time during this dissertation process. Those tasks were performed by the director of clinical education (DCE) without any input or discussion from myself as the primary researcher for the participants in this study. I therefore, had no bias as to the expected outcome of the study, as my aim was to explore and understand any effect, positive or negative, that participants perceive about PBL in general and how it may relate positively or negatively to CFEs. As the primary researcher, some words and definitions within the physical therapy community will be better understood by me as I have the same educational background as the participants in this study which is why a hermeneutical phenomenological design was chosen. However, as stated above, during recruitment, data collection, and data analysis I was recused of all authority, grading, or discussion about participants in any form.

Procedures

Approval from Liberty University's Institutional Review Board (IRB) and the university in which the study will be conducted was obtained and can be found in Appendix A. The therapeutic exercise course in which the PBL phenomenon occurred is a 16-week course that meets one time per week for one and a half hours for didactic work and one time a week for one and a half hours for lab activities during the spring 2022 semester. The course was taught through hybrid teaching methods consisting of traditional teaching methods, such as lectures for the first three weeks during the didactic portion of the course to ensure all students have a knowledge base at a level that would allow problem-based learning to occur. For the rest of the 16-week semester, the course was taught using primarily PBL teaching methods, which included pre-written simulations and patient cases in which small group collaboration, small and large group discussion, and active, self-directed problem-solving skills were practiced. Once a month, optional, additional problem-based learning sessions guided by the instructor were offered to all

students within the sample pool, but attendance of these optional sessions was not required to be a participant in this study.

All data was collected mid-way through the third clinical field experience. Data was collected through three ways to ensure triangulation, which include journal prompts, individual interviews, and a focus group. Two journal prompts were conducted with the first occurring mid-way through the third clinical experience and the second journal prompt occurring at the end of the third clinical experience. An example of a journal prompt and response can be found in Appendix D. Individual interviews also occurred mid-way through the third clinical experience and an example transcript of an individual interview can be found in Appendix E. Focus groups occurred toward the end of the third CFE. At all stages of the study, data was protected and stored securely. Digital data, including digital journal prompts and interview audiovisual data, were stored on the researcher's password-protected laptop. Any written data was stored in a locked file cabinet. When not being utilized, the written data and secured laptop were stored in a locked file cabinet. The data will be retained for a period of five years after the completion of this research study.

Data Collection Plan

Data collection in this research study began after the approval of the IRB of Liberty University and the university in which this study is set. The data collection method followed the framework established for hermeneutic phenomenology established by van Manen (1997). Data was collected in multiple formats to ensure triangulation. Triangulation also deepened the accuracy of the data analysis (Erlandson et al., 1993; Lincoln & Guba, 1985; Merriam, 1988; Moustakas, 1994). The three data collection sources for this research study included journal prompts, individual interviews, and a focus group. All participants were asked to participate in

two journal prompts during the third clinical experience. The first journal prompt occurred mid-way through the third CFE, while the second journal prompt occurred toward the end of the 8-week CFE. Participants also participated in individual interviews that occurred mid-way through the third CFE. The focus groups were held at the end of the same CFE. There were two focus groups, each consisted of 6 participants.

Journal Prompts

Journal prompts were utilized throughout this research study to enrich and solidify participant perspectives as journal prompts allow participants time to reflect, draft, and modify responses that individual interviews do not allow for (Rudrum et al., 2022). Data collection in this format consisted of two journal prompts in which all participants were asked to participate. The initial journal prompt occurred mid-way through the third clinical field experience and was the first point of data collection in this study. The second journal prompt occurred at the end of the third CFE. Each journal prompting was requested to be returned within 1-2 weeks of when the prompt was given, and participants were asked to generate a 250–500-word response to the prompt. Each participant was asked to participate in individual interviews, which began after the first journal prompt was initiated, mid-way into the third CFE. The journal writing prompts are located in Table 1. Journal prompts allowed the participants to reflect on their lived experiences during their second clinical field experience, and allowed the researcher to dive deeper into the essence of the phenomenon being studied (van Manen, 1997). Two focus groups consisting of six participants each occured at the end of the same CFE.

Table 1

First Journal Prompt

In 250-500 words or more, please reflect on your experience during your first two clinical field experiences. Please include any new challenges you are facing or any prior challenges you are still facing, as well as challenges you have overcome and how you overcame them. Also include how you feel about your preparedness from didactic coursework, including how prepared you feel with higher-order processing skills (critical thinking and clinical reasoning), and how you feel these skills have translated to the clinical setting at this point in time.

Second Journal Prompt

In 250-500 words or more, please reflect on your overall clinical field experiences thus far with focus on the final two clinical experiences. Please include any new challenges or continued challenges you are facing. Also include how you feel about your preparedness from didactic coursework has affected your third and fourth clinical experiences and clinical time overall. Also, include how you feel about your higher-order processing skills during the third and fourth clinical experiences overall and how you feel about these skills during the last two clinical experiences compared to the first two clinical experiences and across the various clinical settings throughout your clinical experiences.

Individual Interviews

Individual interviews are the second data collection method utilized in this study. According to Moustakas (1994), “the phenomenological interview involves an informal, interactive process and utilizes open-ended comments and questions” (p. 114). The interview was aimed at understanding each participant’s account of the phenomenon as well as a participant's perspective of the essence of the phenomenon (Moustakas, 1994). The interview was also used to obtain participant narratives of the phenomenon to understand the experience and the meaning participants perceive within the phenomenon (van Manen, 1997). Individual

interviews were the main data collection method for this study and occurred mid-way through the third CFE. The third clinical field experience was eight weeks in total, and individual interviews occurred during the last four to six weeks of the experience.

Zoom video recording was utilized to conduct the interviews in a face-to-face format. Audio and video of the interviews was recorded and stored in Ponopto. I conducted each interview and interviewed each participant separately. After an initial ice breaker question to establish rapport with each participant using the recommendation from Marshall et al., open-ended questions were developed based on Moustakas's (1994) work *Phenomenological Research Methods* and was aimed at answering the central and subsequent research questions. The individual interview questions are listed below in Table 2.

Table 2

Individual Interview Questions

1. Please describe your educational background prior to attending DPT (DPT) school. CQ
2. Describe your experience within the didactic portion of the DPT program as a whole. CQ
3. Describe your experience within the therapeutic exercise course alone. CQ
4. What does Problem-Based Learning mean to you? CQ
5. Describe your experience learning from the problem-based teaching methods utilized in the therapeutic exercise course. CQ
6. What challenges did you encounter during the therapeutic exercise course? Please describe these challenges. CQ
7. How do you feel the problem-based learning teaching methods utilized compare to traditional teaching methods utilized in other courses within the program? CQ
8. How were the PBL teaching methods utilized conducive to your learning style? CQ
9. What does higher-order thinking or processing mean to you? SQ1

10. How do you feel the PBL teaching methods utilized affected your higher-order thinking skills such as critical thinking and clinical reasoning? SQ1

11. How do you feel the PBL teaching methods affected your higher-order thinking skills utilized in other courses? SQ1

12. Describe your clinical experience overall thus far. SQ1

13. Describe any challenges you have faced during this CFEs thus far? SQ1, SQ2

14. What areas do you feel have been your strongest during your CFEs thus far? SQ1

15. What areas do you feel have been your weakest during your CFEs thus far? SQ1, SQ2

16. How do you feel your didactic work throughout the DPT program as a whole prepared you for clinical experiences? SQ2

17. Describe your feelings related to the transition from didactic coursework to clinical training. SQ1

18. Describe any challenges you have faced in the transition from didactic coursework to clinical training? SQ1

19. How did you overcome these challenges during your first two CFEs? SQ1

20. How do you feel the PBL teaching methods utilized specifically within the therapeutic exercise course effected your other didactic coursework? CQ, SQ1

21. Did you attend any additional, optional weekend problem-based learning sessions? If so, how many did you attend? CQ, SQ1 (If no, skip to question number 21)

22. Describe your experience with weekend PBL sessions. CQ, SQ1

23. How do you feel attending weekend PBL sessions affected your higher-order processing skills? SQ2

24. Overall, how do you feel the teaching methods utilized affected your success during the first two CFEs? SQ1, SQ2

25. How do you feel about your problem-solving, clinical reasoning and critical thinking skills in your second CFE compared to your first CFE? SQ2

Questions one and two were introductory questions that develop rapport with the participants and establish the background of each participant. These questions assist the researcher in establishing the equal variance of participants as well as the participants' representation of the target population. Questions three through eight were aimed at establishing the participants' understanding and narrative experience of the phenomenon. These questions were aimed at understanding the participants' perception of problem-based learning in general and within the specific therapeutic exercise course. Questions nine through 11 were aimed at understanding the participants' perception of higher-order processing skills and how they relate to didactic coursework. These questions examined the participants' self-reflection of their own higher-order processing skills within the didactic portion of the DPT program and student perception of how participation in problem-based learning teaching methods affected these skills.

Questions 12 through 17 were aimed at understanding the clinical aspect of each participant's experience utilizing problem-based learning. These questions were developed to understand how participants perceive problem-based learning within the clinical environment as well as how participants perceive the relation of PBL to clinical experiences. Questions 18 through 20 aimed to understand if participants perceived increased practice utilizing problem-based learning methods affects both didactic and clinical field experience success. Questions 21 and 22 were aimed at an overall perspective of PBL methods and how those methods relate to

higher-order processing skills during clinical fieldwork. The goal of these questions was to understand the DPT student perspective of PBL methods in relation to success during clinical fieldwork. Individual interviews occurred after the first journal prompt has been initiated. Individual interviews were completed prior to beginning focus groups.

Focus Groups

Creswell and Poth (2018) describe focus groups as a means to allow participants to interact with one another and discuss their perspectives on the essence of their shared phenomenon. Focus groups allow me as the researcher to gather data in the form of further questioning and dialogue that occurs as a result within a group environment. The focus group was utilized as a data collection method to implement triangulation and vary the sources of evidence to explore common concepts and follow up on perspectives from a small group of participants. The focus groups consisted of six participants each. No students participated in both focus groups. Focus groups were initiated after the initial journal prompt was completed and all individual interviews were recorded. Focus group questions are listed in Table 3.

Table 3

Focus Group Questions

1. Describe your feelings related to problem-based learning teaching methods utilized in the DPT program, specifically the therapeutic exercise course CQ1.
2. Describe challenges you experienced related to problem-solving and clinical reasoning during your first two clinical field experience SQ1, SQ2.
3. Describe how you overcame these challenges during your first two clinical field experiences SQ2.
4. Describe how you feel about the problem-based learning teaching methods related to your preparedness for this clinical field experience SQ1, SQ2.

5. Describe the transition from didactic coursework to clinical training and any challenges you faced with the transition SQ1, SQ2.
6. Describe your thoughts on the PBL teaching methods utilized during the therapeutic exercise course in relation to the transition from didactic coursework to CFEs?
7. How do you feel the PBL methods helped or hindered this transition? CQ
8. Describe your feelings as to why you feel the problem-based learning teaching methods utilized did or did not affect your success during this clinical field experience. SQ2

Questions one and two are introductory questions to allow the participants to begin conversing easily, question three encourages participants to discuss how they felt about the PBL teaching strategies used during the phenomenon and are aimed at answering the overall central research question. Question four is designed to understand student perceptions of the utilization of higher-order thinking and processing skills during CFEs. Question five asks the participants to reflect on any challenges related to CFE to determine how the PBL teaching method relates to those challenges. Questions six, seven, and eight are aimed at understanding how the PBL method affected student perception of preparation in the transition from didactic coursework to CFEs.

Data Analysis

For this study, all three data types were analyzed utilizing van Manen's (1997) six-step hermeneutical phenomenology data analysis approach. The basis of this method is reading and identifying expressive constructs that are within transcriptions as a whole and identifying themes that are evident within the data and represent a composite meaning of the phenomenon. The six steps of the approach are as follows: " (a) turning to the nature of lived experiences, (b) investigating experience as we live it, (c) reflecting on the essential themes which characterize

the phenomenon, (d) describing the phenomenon in the art of writing and rewriting, (e) maintaining a strong and orientated relation to the phenomenon, and (f) balancing the research context by considering the parts and the whole" (van Manen, 1997, p.86).

In the first step, the research question is created about the phenomenon (van Manen, 1997). According to van Manen, "the aim of phenomenology is to transform lived experience into a textual expression of its essence-in such a way that the effect of the text is at once a reflexive re-living and a reflective approaching of something meaningful: a notion by which a reader is powerfully animated in his or her own lived experience" (van Manen, 1997, p. 80) Therefore, constructing the research question of what the researcher is trying to understand through the phenomenological study is the first step in the process. This step has been discussed in detail in chapters 1 and 3 of this dissertation. The second step involves orienting oneself to the phenomenon (van Manen, 1997). What this means is the researcher will understand the elements of the phenomenon in which they are approaching through a particular interest (van Manen, 1997). In the second step of van Manen's (1997) approach, the researcher is oriented to the phenomenon through the context of an educator and physical therapist. The second step also involves investigating the phenomenon itself through lived experience rather than conceptualization (van Manen, 1997). Therefore, the second step of hermeneutical data analysis approach involves the researcher attempting to understand the human experience of the phenomenon through various evaluation methods, which in this study included journal prompts, individual interviews, and focus groups (van Manen, 1997).

The third step of van Manen's (1997) data analysis approach involves reflecting on the essential themes of the experience based on the informant's expressed meaning of the experience through data collection methods in step two (van Manen, 1997). According to van Manen

(1997), “thematic analysis refers then to the process of recovering the theme or themes that are embodied and dramatized in the evolving meanings and imagery of the work” (p. 92). To accomplish thematic analysis, I created an interpretive file for each participant which included their individual interview transcript, journal prompts and focus group transcripts as well as interpretive comments for each data collection type. To accomplish thematic analysis, individual interviews and focus group answers were transcribed and returned to each participant for validation. I then reflected on the text of the data as well as their own interpretation of the transcribed text to conduct a thematic analysis and identify themes that characterize the phenomenon as a whole (van Manen, 1997). Thematic analysis was done by isolating thematic statements of the transcribed interviews and focus groups as well as formal writings in the form of journal prompts (van Manen, 1997).

The data was thoroughly analyzed with the first round of data analysis utilizing van Manen’s (1997) holistic approach in which the interview transcription from each participant’s interpretive file was read as one document and one central idea formed from the document was put into writing. The second round of isolating thematic statements was done through van Manen’s selective or highlighting approach. In this approach, the data was read and listened to many times in order to answer the question: “What statements or phrases seem particularly essential or revealing about the phenomenon or experience being described?” (van Manen, 1997, p. 94). These statements were highlighted by the researcher to bring them to the forefront of the researcher’s mind as statements describing the essence of the phenomenon (van Manen, 1997). Annotations were made of phrases that appear to yield a meaning of the phenomenon (van Manen, 1997). The last round of analysis was based on the detailed reading approach (van Manen, 1997). Each line of the text was read individually to seek out what each statement

reveals about the phenomenon. Through each stage of the analysis, linguistic transformations were developed by writing notes that link these statements to a thematic description (van Manen, 1997). The same process of the holistic approach, selective or highlighting approach and the detailed reading approach respectively, was followed for all data collection types. Once thematic descriptions have been identified, the participants were provided with the identified themes in order to ensure the validity of the original transcription and ensure the theme meets what the participant was trying to convey during the interview process, journal prompts, and focus groups.

Step four of van Manen's (1997) hermeneutical data analysis approach consists of writing and rewriting the descriptions of the phenomenon with the intention of bringing to the forefront the informant's feelings, thoughts, ideas, and attitudes (van Manen, 1997). In the fourth step of this data analysis approach, the researcher expresses the essential themes identified within the data as one data set and present specific participant expressions that support those themes (van Manen, 1997). Step five includes "maintaining a strong and oriented pedagogical relation to the phenomenon" (van Manen, 1997, p. 30). In this step, ensuring the researcher remains focused on the research question is of the utmost importance to determine what extracted themes are essential to the lived experience and what themes are incidental and not aligned with the research question (van Manen, 1997). The final step of the data analysis approach consists of the researcher measuring the methods and study design against the overall meaning of the texts from the informant's own words to ensure a balance between the individual parts of the research and the whole of the research (van Manen, 1997). Therefore, the identified themes of the study were utilized to develop composite meanings of the experience. These themes were supported by the participants' expressions to understand the essence of the phenomenon itself.

Trustworthiness

Trustworthiness is important in research studies of this nature to ensure four key measures are incorporated to ensure the credibility, transferability, dependability, and confirmability of the study. The position and trustworthiness of the researcher is important to ensure data collection and analysis is completed in a formative, non-biased way. By discussing the processes utilized to ensure data is collected and analyzed appropriately, the researcher may strengthen the research design. This section discusses in detail, each of the four key measures taken to ensure the trustworthiness of this particular study.

Credibility

According to Lincoln and Guba (1985), credibility is the degree to which this study's results describe the reality of the participants' ideas, values, and perceptions and regard them as truth in relation to the phenomenon being studied. Credibility describes the accuracy of the data collected and correctly reflects the position of the participants as the participants intended (Johnson et al., 2020). Credibility was achieved in three ways in this study: (a) triangulation, (b) peer briefing, and (c) member-checking.

Triangulation

Triangulation is the use of multiple, varied methods of data collection to ensure a comprehensive study of the phenomenon (Carter et al., 2014). Triangulation is utilized in this study to reduce the deficiency of using one single data collection method (Thurmond, 2004). The intent of triangulation is to balance the collection methods utilized to improve the ability to ensure the findings are interpreted correctly (Thurmond, 2004). Triangulation was performed in this study through the use of various data collection methods to allow for varied sources of data. Triangulation ensured that student perspectives were captured in multiple ways to explain the

phenomenon from the participants' lens. The methods utilized to collect data and implement triangulation include narrative inquiry through individual interviews and focus groups as well as through written journal prompts.

Peer Debriefing

Peer debriefing is the process by which the researcher and peers who are impartial discuss the data collection and analysis methods as well as the findings of the study extensively. This allows the impartial peer to identify ways the researcher's perspectives may bias the study so that the researcher can account for and eliminate this bias within the study (Spall, 1998). Peer debriefing was utilized to discuss results with colleagues and peers to ensure data analysis methods utilized were reasonable based on the data collected. Peers include colleagues who are DPT faculty members with Doctor of Philosophy (Ph.D.) backgrounds as well as non-PhD-holding faculty who are familiar with my research to give important insight as to the data collected and the analysis of such data to ensure clarity of the results and discussion of this study.

Member Checking

Member checking is the process of returning the raw and analyzed data, such as an interview transcription and researcher-identified themes, to the participant to ensure the accuracy of the participant's meaning (Birt et al., 2016). Having been a DPT student and undergoing the same type of CFEs myself that student participants also experience, gives me an *emic* perspective of the participants. That allows me to understand the meaning of participant's wording during the journal prompts, individual interviews and focus groups, which is an advantage of this study (Rossman & Rallis, 2016). Therefore, member checking is important to ensure that concepts collected on perspectives are representative of what each participant truly

meant during the data collection process. In order to ensure this and not assume I understand what each participant meant, participants were provided with their transcription of the individual interview to review for accuracy. Member checking will be further supported by providing a copy of what I, the researcher, believe to be the main points of the individual interview to each participant to ensure elucidation.

Transferability

Transferability is the degree to which the results and findings of a study can be generalized in another way, another context, or another setting with different respondents or similar participants (Burchett et al., 2013). The data analysis and descriptives used when discussing the research findings allow for a thorough, robust description of DPT students in one midwestern university. Most DPT programs in the United States will require similar didactic and clinical fieldwork and have a similar participant pool. Most DPT programs nation-wide also require pre-requisite courses within similar domains and also require an undergraduate degree prior to attending graduate DPT school (CAPTE, 2015). With participants of similar backgrounds educationally, this study could be easily reproduced, and it is likely similar results would be found among students who undergo the same phenomenon as participants in this study.

Other DPT programs should be interested in reproducing this study to determine the perceptions of DPT students related to PBL teaching methods yielding better higher-order thinking and processing skills during CFEs. This allows DPT programs to evaluate their curriculum more thoroughly and make decisions about how PBL will be utilized within the program. Therefore, this study is transferable to similar participants and similar DPT

programs. Furthermore, student perspectives of problem-based learning and its effect on CFEs is generalizable and transferable to other DPT programs that are similar in design.

Dependability

Dependability is the ability to reproduce the same methods and data collection as well as interpretation and findings when the same study is repeated (Morse, 2015). Clear descriptions of the procedures and methods utilized, as well as participant demographics and backgrounds and data collection methods utilized, allow for relatively straightforward repeatability of this study. Utilizing a similar population, this study could easily be replicated for various student populations who have undergone the same phenomenon in a different or similar setting. This study underwent a thorough inquiry, including auditing by a chair, committee member, and director of qualitative research within the Doctor of Education program at Liberty University.

Confirmability

The extent to which the results of a study are guided by neutrality and the participants' responses and not based on researcher bias or interest is confirmability (Amankwaa, 2016). To provide confirmability in this study, a detailed path of the procedures through which data is collected and analyzed was presented which include the raw data in the form of recorded word-for-word transcriptions from individual interviews and focus groups. Procedures also include raw data from journal prompt entries along with the data analysis that was done by the researcher. Triangulation, as described above, also increases the confirmability and validity of this study. Furthermore, as the primary researcher, I was not the faculty member instructing the problem-based learning teaching methods during the therapeutic exercise course, this reflects that I have no stake in the results of the study and I have no preconceived notions of the results of this study.

Ethical Considerations

To ensure ethics within this study, participant consent was obtained, as was consent from the university in which this study took place. IRB approval was obtained from Liberty University to ensure ethical considerations are met. Informing participants of the voluntary nature of the study and their right to withdraw from the study at any time as was conducted and urther supports appropriate ethics within the study. Confidentiality of participants and the university in which the study took place, as well as securing data for the study, was also considered ethically appropriate and was ensured in this study. Pseudonyms were used for participants when quoting specific data to ensure confidentiality. Furthermore, as both a faculty member and the primary researcher, I recused myself from being in a supervisory role of the participants during their participation in the problem-based learning therapeutic exercise course. I was also recused from any supervisory roles of the participants during their CFEs, in which time data will be collected. This recusal continued during data analysis and the whole of when this study was conducted. Therefore, there are no benefits to participants in order to keep ethical considerations at the forefront of this study. Risks to students were minimal within this study as there were no physical risks and no academic risks, as participation, non-participation, or dropping out of the study did not affect participants in any way academically. Furthermore, the results of the study did not affect participants in any way as the study looked at student perception only. The risk of being misinterpreted and misunderstanding participant meaning was present and is a limitation of hermeneutical phenomenological research designs.

Permissions

In order to begin this study, I presented a research plan and application to the Institutional Review Board of Liberty University and the university in which the study took place. IRB

approval was obtained through Liberty University and the university in which the study took place. The IRB approval letters are available in Appendix A and B with the site name redacted. The study was explained to the target population and potential participants, and they were informed that not participating in the study had no adverse effects on their academic standing, grades, clinical site placements, or overall standing within the DPT program. Participants were also made aware that participating in the study did not grant them any benefits within the DPT program. Informed consent was obtained from all participants who agree to become part of the study, as described below.

Other Participant Protections

Participants were provided with an instructional packet via email that clearly outlined the voluntary nature of the study and their right to withdraw at any time. The informed consent also has this information clearly stated so that participants understand what they will be consenting to. Prior to individual interviews and focus groups, the primary researcher conducting the data collection made a briefing statement regarding the voluntary nature of the study. The statement ensured participants understand that there were no benefits to agreeing to be part of the study related to their academic or clinical standing. Participant pseudonyms were utilized throughout the study to ensure the confidentiality of each participant. At all stages of the study, data was protected and stored securely. Digital data including digital journal prompts, interview and focus group audiovisual data wA stored on the researcher's password-protected laptop. Any written data was stored in a locked file cabinet.

When not being utilized the written data and secured laptop was stored in a locked file cabinet. The data will be retained for three years after the completion of this research study. While I am also a faculty member within the DPT program, I was not be involved in any grading

of participants during their CFEs. Therefore, there were no risks to the participants in this study as it aimed to understand their perceptions and participation and results had no bearing on the participants' academic or clinical standing within the DPT program.

Summary

While PBL has been used heavily in medical education in recent years and has been shown to improve the learner's ability to perform research, engage in theory, and implement practice, student perception of PBL teaching methods, specifically in DPT students, has not been readily explored (Walker et al., 2015). Furthermore, the perception of PBL and its effect on higher-order thinking and processing skills during CFEs has also not been empirically researched. This qualitative, hermeneutical phenomenological study was designed to explore these topics in an effort to understand fully and clearly the experiences of DPT students participating in PBL teaching methods. This was done utilizing a qualitative, hermeneutical phenomenological design as described above through data collection methods that include journal prompts, individual interviews, and focus groups to ensure triangulation. Data analysis methods utilizing van Manen's highlighting approach to hermeneutical phenomenology were utilized for the elucidation of identified themes throughout the data. To ensure competent future physical therapists who can problem solve and clinically reason, PBL teaching methods need to be explored further to determine if students perceive these methods to be useful in becoming entry-level physical therapists, which is what this study attempted to do.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this phenomenological study is to understand the experiences of participating in a physical therapy course primarily taught using problem-based learning teaching methods for Doctor of Physical Therapy students at a university in the mid-western United States. The findings of this study are discussed in this chapter. This chapter also includes a description of the participants, data analysis in the form of narrative themes, present outlier data identified, tables of identified themes, and research question responses.

Participants

Participants for this study were 12 DPT students from the convenience sampling pool at an accredited university in the midwestern United States. To participate in the study, participants must have completed a bachelor's degree before enrollment in the DPT program. Participants also had to have completed all didactic work and two CFEs prior to data collection. All participants in this study met the inclusion criteria and are listed below. The background context for each participant is also listed. Most participants had a background in exercise science, however other backgrounds were present among the participants are included in the participant information in this section.

Amanda

Amanda is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in biology.

Julie

Julie is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science.

Leah

Leah is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science.

Helen

Helen is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science.

Jennifer

Jennifer is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science. Jennifer is also married.

Alyssa

Alyssa is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science.

Betty

Betty is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in biology and psychology.

Taylor

Taylor is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science.

Dave

Dave is a third-year DPT student. He has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science.

Hailee

Hailee is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science.

Matthew

Matthew is a third-year DPT student. He has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in exercise science.

Crystal

Crystal is a third-year DPT student. She has successfully completed all CFEs. Prior to DPT school, she obtained a bachelor's degree in athletic training.

I contacted 69 DPT students via email to start the recruitment process for participants. I asked potential participants to return the informed consent form via email to participate in this study. Within a week, I obtained 12 participants, which was my goal for recruitment, so I used all participants who returned an informed consent form. I then sent each participant the first journal prompt and requested their response be returned within two weeks. Once I received the initial journal response, I scheduled a one-on-one audio-visual recorded interview with each participant. When all data was collected, the raw data was analyzed using van Manen's 1997 approach to data collection outlined in Chapter Three.

Table 4

Student Participants

Student Participant	Yr. in DPT School	Highest Degree Earned	Background Content Area
Amanda	3	Bachelor of Science	Biology
Julie	3	Bachelor of Science	Exercise Science
Leah	3	Bachelor of Science	Exercise Science

Helen	3	Bachelor of Science	Exercise Science
Jennifer	3	Bachelor of Science	Exercise Science
Alyssa	3	Bachelor of Science	Athletic Training
Betty	3	Bachelor of Science	Biology/Psychology
Taylor	3	Bachelor of Science	Exercise Science
Dave	3	Bachelor of Science	Exercise Science
Hailee	3	Bachelor of Science	Exercise Science
Matthew	3	Bachelor of Science	Exercise Science
Crystal	3	Bachelor of Science	Athletic Training

Results

This section includes data analysis from the body of data collected through two journal prompts, individual interviews, and two focus groups as described in Chapter Three. The perceptions of the participants relating to PBL and the successes and challenges of PBL in the eyes of the participants are discussed. This section also evaluates direct and indirect connections to higher-order thinking and processing skills during CFEs.

Table 5

Themes & Subthemes

Themes	Subthemes	Subthemes	Subthemes	Subthemes
Conduciveness to Learning	Knowledge Acquisition	Preference for PBL	Real-Time Feedback	Retention
Big-Picture Thinking	Funneling	Prioritizing		

Early PBL	Background Matters	Initial Experience	
Confidence	Higher-Order Thinking	PT Evaluations	
Carry-Over	Other Courses	CFEs	
Suggestions	Consistency	Repetition	
Challenges	No Standardization	Dominant Students	
Other Factors	Setting/Structure	Clinical Instructor	Daily Immersion

Conduciveness to Learning

Students agreed that PBL teaching methods were conducive to their learning within the DPT program. Amanda stated, “Whenever we did the PBL sessions, it really helped bring everything together and was my favorite part of the course. I went to extra PBL sessions offered on weekends because I enjoyed working through the patient problems that were presented so much.” Dave agreed stating, “Starting PBL was a turning point for me in DPT school, I really enjoyed the implementation of the PBL sessions because it made learning more practical.” This theme appeared across all three sources of data for most participants.

Knowledge Acquisition

Most students felt that PBL helped them apply information they already knew. Therefore, having a baseline of information to then apply was an important aspect. Helen said, “We had covered a lot of the concepts in prior courses, which allowed us to actually move to applying that

information when we got to the PBL activities, but we had to have that knowledge first." Dave said, [I like the PBL activities because it helped me build on prior knowledge and see where my gaps in knowledge were. If I had a hard time understanding part of the PBL activity, I realized, I had probably forgotten some basic knowledge and I could go back and look up information and then build on it so the therapeutic exercise course helped me build on my foundational knowledge.] Crystal said, "Obviously you have to have the knowledge to apply to a patient problem before you can understand where and how to apply that information, so the PBL activities gave us the opportunities to apply information and test our knowledge base as well." Matt stated, "Baseline information was key to success in the PBL activities. The PBL sessions helped me apply that baseline knowledge, without the prior knowledge of anatomy for example, it would have been very difficult to be able to come up with a viable solution to the problem."

Preference for Problem-Based Learning

Most participants found that they had a preference for PBL over traditional teaching methods. Julie stated "I like the PBL teaching methods better because it was more interactive than just being lectured at. The PBL allowed me to begin to apply knowledge, rather than just regurgitate it." Betty also preferred PBL teaching methods and reported " I think the PBL methods made concepts click more for me, so I definitely preferred it to courses that were just lecture and PowerPoint the whole time." Crystal also agreed with most participants stating that "I don't think lecturing really engages clinical reasoning as it is mostly just looking at the facts." Leah said, "I prefer the PBL type teaching, it made things more applicable and practical and let me see more into the life of a physical therapist and what they do every day." Helen stated, "After learning with PBL methods in the therapeutic exercise course, it led me to want more of

this type of teaching and learning across subsequent courses." This sub-theme was prevalent throughout all three data sources and over the majority of participants.

Real-Time Feedback

Students preferred PBL teaching methods, in part due to being able to receive real-time feedback from the instructor guiding the PBL sessions. Hailee said, "I really enjoyed the set-up of PBL activities as there was immediate feedback after the small and large group portions, which helped me understand right then, why my problem-solving was correct or not." Julie also noted, "The immediate feedback from the professor helped me see if I was on the right track with my problem-solving skills, which was very helpful as well." Helen noted, "I enjoyed getting immediate feedback so I could learn quickly how my reasoning was right or wrong."

Better Retention

Students also felt that PBL teaching methods helped solidify concepts during learning thus leading to more retention of knowledge and how to apply that knowledge. Betty emphatically said, "I feel like I retained a lot more when doing the PBL activities because of the application piece of the sessions rather than just memorizing because it added the component of why what we were learning was important." Alyssa agreed saying, "I can read in a textbook, but it won't sink in until I apply it to a real patient case like we did in the PBL activities." Haliee reported, "I feel like the PBL activities helped me solidify content better, it just stuck in my brain better after learning that way." Julie also stated, "The PBL methods solidified concepts more for me versus sitting in a lecture which is more passive and taking a quiz. The active engagement of the PBL sessions helped my retention of material."

Big Picture Thinking

The majority of participants also felt that PBL teaching methods helped them see the big-

picture when looking at a problem, in particular, a patient problem. The participants felt that they were better able to break down and prioritize information using the PBL teaching methods. This theme was prevalent throughout all participants and all data collected from all three data types. Jennifer stated, “I do think the PBL methods helped a lot because it made me think of the big picture not just facts I had memorized.” Amanda agreed stating, “I now feel that I am able to synthesize information to see the big picture of a patient’s problem and use that to lead me to a solution” and Julie stated, “Evaluating patients can give you cognitive overload and I think the PBL teaching methods helped me break down and prioritize what is most important to solve their physical problem.”

Funneling

Another prevalent sub-theme that is presented is weeding out non-relevant information. Students felt that the PBL methods helped them to better identify the true nature of the patient's problem by weeding out non-relevant information that was given about the patient or problem. Participants also noted that PBL helped them to funnel a presented patient problem down to more manageable and relevant pieces for the student to organize the information in a way that focused on the main problem at hand and the most probable solutions. Helen stated, “The PBL methods helped me to decide the most relevant pieces of the problem and formulate my initial hypothesis about what was going on and how to effectively treat the patient’s problem.” Julie stated, “PBL is like the penguin analogy where you only have room for so many penguins on your iceberg, so you have to problem solve and figure out how to keep the penguins on the iceberg and push everything else off to keep them all afloat.” Alyssa also agreed that PBL “improved my skills of being able to narrow down what should be initially treated to begin solving patient problems.” Jennifer also stated, “The PBL methods also taught me not to focus

too much on the little things a patient might present with, but to see the big picture and not get tunnel vision when it comes to solving their problem."

Prioritization

Students also felt that PBL teaching methods helped them to prioritize possible solutions to the patient problem at hand in a systematic way based on the knowledge they had already obtained. Matthew said, "I think the PBL methods introduced in this class helped me to look for a path or solution that is more lit up than others. It taught me to use the knowledge I have to lead me to possible solutions and to put them in the order I think will help best." Alyssa agreed stating "The PBL methods taught me not to chase non-relevant information but to prioritize the most relevant items and use all the information about a problem to come to a solution." Leah also stated, "The PBL activities taught me to break down the problem into more manageable pieces and then attack the problem in an order that makes sense and is systematic."

Early Problem-Based Learning

Most participants agreed that early PBL was conducive to their learning and began engaging them in problem-solving skills, However, some participants were vocal about their prior educational background being important to their success especially when initially involved in PBL activities. Betty stated, "My background not being in exercise science like most of my classmates, I felt like I had a hard time initially with PBL due to my courses not being taught that way before, so it was a brand-new way of thinking for me." Amanda agreed, "I felt very challenged most of the time with PBL teaching methods, I had a hard time at first switching from just memorization to critically thinking and applying my knowledge rather than just regurgitating it."

Background Matters

Participants who did not have exercise science degrees felt as if not having a background in a similar science caused early PBL to be difficult at first for them. Amanda stated, “Because of my background being in biology and not exercise science, I felt like the PBL methods were harder for me to grasp because my knowledge base to problem solve on wasn’t as strong as my classmates, so I had to spend more time with the content than others.” Betty agreed that her educational background may have played a role in her ability to problem-solve with early PBL activities. She stated, “At first I had a hard time with the PBL activities, it was really challenging because I felt my background knowledge wasn’t the same as other classmates so it was harder for me to apply information I was more unfamiliar with.” Julie on the other hand felt strongly that her background in exercise science and in being a collegiate athlete gave her an edge. She stated, “I think the therapeutic exercise course and the PBL methods were easier for me because of my background. I had some undergrad courses that also were structured similarly which really helped in DPT school.” Crystal also felt strongly that her background in athletic training helped her thrive with the PBL activities. She stated, “Having a background where I had already done some PBL in evaluating and treating athletes based on their problem and the solution, as well as being a physical therapy technician in a clinic where I got to see licensed physical therapists solve patient problems daily, really helped me feel comfortable with the weekend PBL patient case activities and the activities in class.”

Initial Experience

While a few participants felt that they were well equipped for the PBL methods, most participants reported that the PBL teaching methods utilized in the therapeutic exercise course were their first experience with PBL. These participants felt that this being their initial experience with PBL, it was a challenging experience and often more time-consuming than just

memorizing material. Helen stated, “Initially the PBL activities were challenging because I had never done anything like them before and I felt like I didn’t know how to think that way at first. After the first few sessions, however, I knew more of what to expect and it did get easier over time.” Matt stated, “This was the introduction of PBL for me, up to that point we hadn’t actively engaged in solving patient cases and problems yet, so just like anything you learn the first time, the initial process can be challenging.” Leah agreed reporting, “I felt like it took me a while to catch on to the PBL activities because it was a brand-new way of looking at things and I needed a lot of repetitions to feel comfortable in thinking that way.”

Confidence

Participants also felt that the PBL activities they were involved in within the therapeutic exercise course helped them gain confidence in their ability to clinically reason and think critically. Hailee said, “Having the therapeutic exercise course early on helped lay a foundation for a higher way of thinking. Without that course, my clinical reasoning skills would not be as good as they are now.” Jennifer agreed, saying “ I feel like I now have more confidence in using my clinical knowledge to guide the questions I ask patients in order to clinically reason through the source of their problem, and the solution.” Dave stated, “The PBL methods really helped me grow my confidence. When I was able to critically think and be right about what was causing their problem and find a solution to treat their problem effectively, I began to trust myself more and everything became more practical.”

Higher-Order Thinking and Processing

Students felt that the therapeutic exercise course taught them how to begin to perform higher-order thinking and processing skills such as critical thinking and clinical reasoning. Amanda said. “I was able to know how to dig deeper and go beyond surface level thinking and

begin to draw connections from the information I was able to gather about the problem to form a solution." Dave reported, "The therapeutic exercise course challenged me to think not just at surface level but to go deeper and listen to what information I have about the problem and use it and the knowledge I have to form a solution to the problem." Leah stated, "The PBL methods in the therapeutic exercise course helped me learn and gain confidence in beginning to think critically which I think helped me in subsequent courses as well as on my clinical rotations." Helen stated, "The PBL helped me be able to critically think much better and also helped me learn the appropriate questions to ask patients about their problem to help guide my thinking in a more clinical way to help solve their problem."

Physical Therapist Evaluations

DPT students also felt that the PBL methods helped them feel more confident in their physical therapy evaluation skills. This was prevalent among all data types and all participants. Jennifer stated, "The PBL activities helped a ton with my ability to perform physical therapy evaluations, I wouldn't have had the confidence I do now without that course." Helen reported, "The PBL helped me better picture what a physical therapist does during evaluations, which led me to have more confidence in performing evaluations during CFEs, because I had already practiced how to critically think through a new patient problem through the PBL activities and weekend sessions I attended." Julie said, "The PBL methods made me slow down and really dig into the patient's problem during evaluations while on CFEs rather than just taking what the physician put on a script and only treating that diagnosis." Leah agreed stating, "The therapeutic exercise course helped me with my higher processing skills and allowed me to identify the important aspects of a physical therapy evaluation, which helped me grow my confidence in my problem-solving skills."

Carry Over

Students also felt that they were able to carry over the problem-solving skills, content organization, and application they learned from the PBL activities in the therapeutic exercise course to other courses as well as into their clinical field experiences. Hailee stated, “Having therapeutic exercise early on in the curriculum helped me learn how critically think better and apply that same kind of learning style to the rest of my courses.” Crystal agreed reporting, “I used what I learned from the PBL sessions widely across the rest of my courses, it helped me learn better by trying to apply knowledge from other courses to a patient problem.”

Other Courses

Some students felt that they were able to carry over what they learned from PBL activities within the therapeutic exercise course to other courses that occurred later in the curriculum. Hailee also stated, “I don’t think I would have been as strong in my later courses as I am now if it wasn’t for having the therapeutic exercise class structured the way it was and developing my clinical reasoning skills early on.” Amanda agreed, stating “We didn’t have a lot of these types of activities in other courses, so I tried to carry over the way of thinking from therapeutic exercise into other courses like our neuro course and I think that it helped me think through different neuro diagnosis and how to solve those patient problems as well.” Leah also stated, “The PBL methods in the therapeutic exercise course helped me learn and gain confidence in beginning to think critically which helped me in subsequent courses.” Crystal said, “Even when I was going through lecture notes for other classes, I would make up a patient problem and apply the skills I learned from the PBL in the therapeutic exercise course to the new material because it helped me begin to apply the concepts better and retain the information better.”

Other students reported that they could not recall utilizing the PBL methods specifically during other courses but did feel that they probably were using problem-solving skills and critically thinking more without even realizing it after the therapeutic exercise course. Dave said, " I do feel like I was kind of able to integrate PBL into other courses, but in some courses where professors weren't doing as much PBL activities, I had the tendency to think too far into it, rather than just learn the material if I tried to integrate it too much, so I had to find a good mix of integrating what I learned in the therapeutic exercise course to other courses without diving in too deep." Matt also reported, "I used to get away with a lot because I have good memorization skills, so when I could just memorize something in other courses and do well, I often leaned that way. However, I did find myself learning more wholistically and I found that I wanted to try to translate what I was learning into real-life scenarios. I wasn't just there to take a test anymore after experiencing the therapeutic exercise course and weekend PBL sessions."

Clinical Field Experiences

Students also felt that the PBL teaching methods used carried over to their CFEs and helped them feel prepared for clinical work. Betty stated, "I think the PBL methods in the therapeutic exercise course did a really good job of laying the groundwork for preparing me to think critically as I went into my clinical experiences." Crystal agreed reporting, "I honestly think the way the therapeutic exercise course was structured was one of the biggest things that helped improve my higher-order processing skills before going on clinical rotations." Leah concurred stating, "Having the therapeutic exercise class and the way it improved my problem-solving skills helped me during my CFEs." Jennifer said, "I do feel like the combination of the PBL methods preparing me and then being able to put that into practice during clinical rotations, really helped me grow as a student." Taylor also said, "I felt like the PBL activities and weekend

sessions prepared me well for clinicals, I felt prepared and I still feel prepared and my confidence is growing." Amanda stated, "I definitely think the teaching methods used in the therapeutic exercise course helped me develop my critical thinking and differential diagnosis which was something that I carried with me into the clinic." Helen said, "Becoming a clinician means taking what I've learned and applying it with less and less guidance from instructors so that I can become a confident, competent therapist. I think that being able to practice that through the PBL methods helped get me to the point that I could do it on my own over time during my CFEs."

Suggestions

While the majority of students felt that the PBL teaching methods were beneficial to their learning and preferred it to traditional teaching methods, they did have some suggestions that were prevalent throughout the data to improve the implementation of the PBL activities. Some students felt that PBL could be better implemented with more consistency across courses. The majority of students felt that more repetition of PBL activities could aid in its implementation.

Consistency

Students felt that consistency in using PBL sessions across all subsequent courses would have helped them stay in the mindset of critically thinking more and helped them more in preparing for CFEs. Crystal reported, "The exposure to all the PBL activities helped me a lot, but in many of the following classes we didn't have that exposure and it was more memorization of material, which then made it harder to transition back to that type of thinking before CFEs." Leah reported "There were some challenges initially, there was a learning curve at the beginning that made PBL challenging at first. More consistency across courses and more opportunities for PBL activities through the weekend sessions and in other courses would help more."

Matt also reported, “I was born with good memorization skills, so I had to work hard to be the kind of student that didn’t just memorize material and begin to apply it in the therapeutic exercise course, but other courses didn’t require that, so in some courses I could go back and rely on my ability to remember easily and just plug in the answer and chug along.” Dave also said, I do feel like having the PBL activities throughout all courses would have been good, we had the therapeutic exercise course which had a lot of PBL but then the courses following didn’t have as much and often went back to just lecturing.” Julie agreed stating, “I would have preferred more of the problem based learning style among other courses, I think that they were more helpful in improving my higher-order thinking and processing skills rather than just being told information and then quizzed on it which happened a lot in other coursework.”

Repetition

Participants also felt that the more repetition and exposure they had to PBL activities, the better they became at problem-solving, critical thinking, and applying their knowledge. Helen stated, “I wish we had more exposure to that learning style and more opportunities. The optional weekend PBL sessions taught me so much and it made more sense to me and made me wish it was incorporated more into other semesters.” Betty said, “Having more opportunity to apply the PBL skills with new content and across the entire curriculum would help reinforce those skills.” Crystal agreed, “The more exposure I had to PBL activities, the better prepared I felt to think critically, in some other courses it was just memorization that didn’t help me with those skills.”

Challenges

Students also reported specific challenges to learning through PBL teaching methods. While most students were able to overcome these challenges, they identified difficulties with the PBL teaching methods. These challenges include a lack of standardization for answers or

problem solutions and more dominant students tending to take over the small and large group discussions and learning sessions. The challenges participants identified are discussed within this theme as sub-themes.

No Standardization

Many students felt that not having one right answer or solution to a problem was difficult. They felt like the lack of standardization in which they were used to having one right answer to a question in other courses made PBL more challenging. Leah stated, "There could be multiple ways to handle a problem, with many solutions, which made PBL more challenging at times." They felt that the lack of rigid guidance by the instructor to a specific answer made them sometimes question the solution to the problem they had created. Leah said, "I wish we had more time for instructors to explain their thought process, you could ask two different professors and get two different answers, or the response of "it depends", which made it difficult to see if your thinking was on track or not at times." The fact that there may be a few different ways to address the presented problem was a new concept to them and they had to learn to justify their method of attack to address the problem. Matt stated, "I had a hard time studying and knowing what to study because there could be 20 right answers and 20 wrong answers, so I found it difficult to study which is what I had become accustomed to doing to pass courses, so moving to learning to critically think rather than just plugging in the right answer made this course difficult for me." Julie agreed, she said, "I sometimes wished there was a more straightforward answer because that is what I was used to, from other courses, but over time I saw the value in learning how to think that way and just be able to justify my answers."

However, other students felt that not having one standardized answer allowed them to be more creative in their plan for problem solution. Cyrstal said, " I think realizing there could be

different treatments or ways to solve the patient problem, was one of the biggest things that helped me prepare for clincials. I could use clinical reasoning to choose what I think is the best course of action to attack the problem, but also then if that didn't work, had other options so it didn't feel like there was only one solution." Some students felt that this gave them more freedom to justify why they chose a particular solution and thus there were many right answers to the problem, which reduced the stress of always solving a problem the same way their professor would. Helen stated, "I liked the PBL sessions because it was more like what I would do as a physical therapist in the real world, I won't have that rigid guidance of exactly what to do to solve my patient's problem in the real world so displaying that in this course gave me more freedom." Dave agreed and said, "This course allowed me to use the knowledge I had gained to justify my course of action, and as long as I had sound clinical reasoning and the patient problem resolved, it was ok if someone else in the group chose a different path because we could both get to the same solution- the patient getting better, so I really liked that about this course, it made the course easier."

Dominant Students

Some students felt that another challenge was having more dominant students in group sessions, which kept them from participating in the larger group sessions as much. Crystal stated, "At times I shied away from answering or participating more in the large group sessions because I don't like speaking in front of large groups and there were often other students who tend to do that more." Jennifer agreed saying, "I like to do things on my own in my head before talking it out loud and I sometimes felt like I didn't have time to process information before more vocal students would come to a decision." Haliee said, "I do wish the groups were smaller at times, because it got hectic and the same people would be answering all the time without giving others

a chance." Dave said, "I wasn't always vocal in the group sessions, I was afraid I would say something wrong, and people would think I'm stupid or don't know what I am talking about."

Other Factors

Students identified other factors that they believe led to success or challenges during CFEs in addition to PBL. These include the clinical setting of their CFE, the structure of the clinical facility, their clinical instructor's teaching methods and personality and daily immersion in problem-solving skills.

Setting/Structure

Participants felt that some of their success during CFEs was affected by the setting they were in such as outpatient or inpatient or by the structure of the clinical site. Amanda felt that the structure of one of her CFEs affected her negatively regarding higher-order processing skills she said, "During one of my CFEs, I didn't really get much time to do higher-order process and critical thinking because the clinic was so busy that it was about just doing specific things for each diagnosis and that was disappointing." Alyssa said, "The setting made a big difference for me as far as feeling successful and utilizing the higher-order processing skills. In outpatient I used those skills a lot, but I used those skills less in acute care where my main focus was to just get the patient out of bed, that doesn't take much critical thinking sometimes." Julie said, "During one of my CFEs, I was in a very specialized vestibular clinic and we only get the basics during school so I felt very underprepared and not confident in my own skills."

Clinical Instructor

Most participants felt that the personality and teaching style of their clinical instructor during their CFEs was also an important factor in their ability to succeed during their clinical rotation and to feel confident and prepared to become a clinician. Crystal stated, "One of my

clinical instructors had really high expectations for me to be able to think critically and voice that to him throughout my patient evaluations and treatments, while it was more challenging than when I was with other clinical instructors, I think it helped me gain confidence and trust my own clinical judgement more, whereas other clinical instructors would just tell me what to do." Dave agreed, stating "My clinical instructor was an excellent resource for me during my CFE, she fostered my confidence by always letting me know what I was doing well." Betty reported, "Each CFE I feel like I was able to improve and voice my thoughts to my clinical instructors better. My first clinical instructor was really patient with me and let me process information which was really helpful as other clinical instructors in subsequent clinical rotations had higher expectations for me to quickly make clinical decisions so having a clinical instructor early on that allowed me time to work through problems was really helpful." Matt stated, "During one of my clinical rotations, my clinical instructor did not outline clear expectations for me, and our personalities clashed, which often made me question myself." He also said, "On the other hand, in another one of my clinical rotations, I had a very patient clinical instructor who helped guide my thought process and instilled confidence in me, so my clinical instructor has a lot to do with how I felt."

Daily Immersion

Most students felt that the daily immersion in problem-solving, clinical reasoning, and critical thinking that occurs during CFEs was crucial to their feelings of preparedness to become clinicians. Dave said, "I feel like there are just some things I can't learn in the classroom and can only learn in the real world." Amanda stated, "While the PBL activities helped prepare me to be a clinician, there are just some things you can't simulate and learn when doing it every day in the field." Crystal agreed stating, "I do feel that CFEs are the best place to improve and fine-tune

these higher-order processing skills because you encounter daily, real patient problems that you have to think through right then to develop a solution." Jennifer stated, "Spending daily one-on-one time with patients and actively solving patient problems has been a catalyst for improving my clinical reasoning and critical thinking skills."

Outlier Data and Findings

There were a few items that were outliers within the data. This outlier data reflects important items that one participant identified during data collection. The outlier findings are time spent studying and instructor experience.

Time Spent Studying

One student reported that they studied less due to there not being one specific answer to each problem. This student preferred traditional based teaching methods due to the ease of memorization and "plug and chug answers". Matt reported, "I studied less with PBL methods because I was used to studying tangible information right in front of me that I could just recall and repeat over and over. I felt that I couldn't do that with PBL, so I ended up studying less and had a much tougher time with this course than other courses." While the concept of critical thinking differs widely from memorization, the data did not reveal that other students studied less because of employing the PBL method.

Instructor Experience

One participant felt that because the PBL methods were also implemented by a new, less-experienced instructor there was a larger learning curve because the instructor was also learning how to teach effectively and hone their own skills while teaching the course. Alyssa stated "Because it was our instructor's first time teaching, it created a bigger learning curve for the students. It seemed as if we were learning alongside the instructor at times which made

expectations for the course challenging." Within the data, no other participant mentioned this as a challenge to their learning through PBL methods.

Research Question Responses

This section answers the research questions including the central research question and the two sub-questions. The answers to these questions are formed by data from all data collection methods using the participant's voices. The answers to the research questions are based on the perception of the participants utilizing quotes from the raw data to provide a rationale.

Central Research Question

What are the experiences of DPT students who participate in PBL education? The experiences of DPT students participating in PBL education were varied. However, most students felt PBL teaching methods were preferred to traditional methods as the method was conducive to their overall learning. Therefore, the "Conduciveness to Learning" theme indicated most participants felt they had a positive experience with PBL related to their overall learning and revealed a preference for PBL indicated with the sub-theme of "Preference for PBL." Dave said, "Learning with the PBL methods was a kind of turning point for me in DPT school, implementing that type of thinking made it more practical for me and I felt like I learned material better because it was more application based." Amanda reported that PBL was challenging, but she ended up enjoying learning through PBL and saw the value in it. She stated, "It was difficult at first being the first time I was challenged to critically think, but I ended up enjoying working through each problem, and learning that way helped bring everything together for me." Helen said, "After learning with PBL methods in the therapeutic exercise course, it left me wanting more of that type of teaching and learning in other courses."

While most students had positive experiences, some felt PBL was more challenging than others leading to the development of the "Challenges" theme and the "No Standardization" and "Dominant Students" sub-themes. Matt stated, "It was very challenging for me because I was used to there being one right answer I could memorize and pass the test, with PBL there could be multiple different correct answers, so I struggled to know how to study." Haliee said, "I do wish the groups were smaller at times, because it got hectic and the same people would be answering all the time without giving others a chance." Dave said, "I wasn't always vocal in the group sessions, I was afraid I would say something wrong, and people would think I'm stupid or don't know what I am talking about."

Students from different educational backgrounds had varied experiences with early PBL. Those with non-exercise educational backgrounds pointed out that they had a harder time with PBL at first. They felt that early PBL was harder for them due to their background not being in content areas that were more aligned with therapeutic exercise in general, whereas many of their classmates had come from exercise educational backgrounds. Amanda stated, "Because of my background being in biology and not exercise science, I felt like the PBL methods were harder for me to grasp because my knowledge base to problem solve on wasn't as strong as my classmates, so I had to spend more time with the content than others." Betty agreed saying, "At first I had a hard time with the PBL activities, it was really challenging because I felt my background knowledge wasn't the same as other classmates so it was harder for me to apply information I was more unfamiliar with." However, both students who felt this way also reported that after more time with PBL activities, they grew to value PBL as an effective learning tool. Betty said, "At first PBL activities were difficult, but even though it was challenging, I still enjoyed working through patient problems because it was more like what we will do during

clinicals and in the real-world." Amanda said, "I did enjoy the PBL activities after I had more repetition, it helped me see the big picture and bring everything together."

Some students with exercise science educational backgrounds felt strongly that their background in exercise science did give them an edge. Julie stated, "I think the therapeutic exercise course and the PBL methods were easier for me because of my background. I had some undergrad courses that also were structured similarly which really helped in DPT school." Crystal agreed that her background in athletic training helped her succeed with the PBL activities. She stated, "Having a background where I had already done some PBL in evaluating and treating athletes based on their problem and the solution, as well as being a physical therapy technician in a clinic where I got to see licensed physical therapists solve patient problems daily, really helped me feel comfortable with the weekend PBL patient case activities and the activities in class."

Sub-Question One

How do DPT students perceive didactic PBL education in relation to the transition to CFEs? Most participants' perspectives show that they felt PBL helped them in the transition from didactic work to CFEs. In the "Carry Over" theme, Taylor said, "I feel like having the PBL helped prepare me well for CFEs. I felt prepared. I still feel prepared to be a clinician." Crystal stated, "The PBL activities were very helpful in my transition to the clinic because it forced me to start applying information. Those activities were the closest thing we could get to simulating clinical work before actually being there." Leah said, "I think that the problem-solving skills utilized helped me trust myself more when starting my CFEs. I had a patient one day who came in and I had no idea what was wrong, but I went through his problem and was able to come up with three ways to start treating him and decide how to weigh the probability of each solution

working to prioritize what to do first." These statements represent the carry-over to CFEs subtheme.

Students also felt that PBL activities improved their confidence for CFEs which is discussed in the "Confidence" theme and supporting sub-themes. Participants felt that they had better higher-order processing skills after PBL which improved the transition into the clinical setting." Leah stated, "The PBL methods in the therapeutic exercise course helped me learn and gain confidence in beginning to think critically which I think helped me in subsequent courses as well as on my clinical rotations." Helen stated, [The PBL helped me be able to critically think much better and also helped me learn the appropriate questions to ask patients about their problem to help guide my thinking in a more clinical way to help solve their problem during clinical work.]

Multiple students also felt that they had better confidence going into CFEs especially when it came to performing patient evaluations due to the PBL activities they had performed prior to CFEs. Jennifer said, "The PBL activities helped a ton with my ability to perform physical therapy evaluations. I wouldn't have had the confidence I do now without that course." Helen also reported, "The PBL helped me better picture what a physical therapist does during evaluations, which led me to have more confidence in performing evaluations during CFEs, because I had already practiced how to critically think through a new patient problem through the PBL activities and weekend sessions I attended." Julie stated, "The PBL methods made me slow down and really dig into the patient's problem during evaluations while on CFEs rather than just taking what the physician put on a script and only treating that diagnosis." Thus, the majority of students felt they were prepared for the transition into clinical field work.

Sub-Question Two

How do DPT students perceive PBL education to affect higher-order thinking and processing skills during clinical field experiences? The perception of participants revealed that PBL enhanced their ability to perform higher-order thinking and process skills such as critical thinking and clinical reasoning during CFEs. In the "Higher-Order Thinking and Processing" theme Dave reported, "The therapeutic exercise course challenged me to think not just at surface level but to go deeper and listen to what information I have about the problem and use it and the knowledge I have to form a solution to the problem." Leah reported, "The PBL methods used in the therapeutic exercise course helped me expand my higher-order processing skills and helped me begin to identify important pieces of information about the patient problem to lead me to possible solutions. This course helped me organize information and prioritize solutions based on sound critical thinking and clinical reasoning." Jennifer stated, "My higher-order processing skills have rapidly grown and developed during my coursework and CFEs and I now feel confident in my clinical reasoning and critical thinking skills." Helen stated, "The PBL helped me be able to critically think much better and also helped me learn the appropriate questions to ask patients about their problem to help guide my thinking in a more clinical way to help solve their problem." Hailee said, "The PBL methods utilized helped build a foundation for thinking in a way that fostered my critical thinking, without that course, I would not be as confident in my clinical reasoning skills as I am now." Amanda reported, "I definitely think the PBL teaching methods used in the therapeutic exercise course helped develop my critical thinking and clinical reasoning skills. It helped me to break down the problem into manageable pieces to figure out what was going on with the patient and that is something I carried with me into my CFEs."

Summary

The findings in this chapter show that DPT students prefer PBL teaching methods to traditional methods. Participants felt that the PBL methods were not only conducive to their learning, but also enhanced their ability to perform higher-order thinking and processing skills. Students agreed that the PBL teaching methods were effective in engaging them in critical thinking and clinical reasoning skills that are imperative to becoming a clinician.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of this phenomenological study is to understand the experiences of participating in a physical therapy course primarily taught using problem-based learning teaching methods for Doctor of Physical Therapy students at a university in the mid-western United States. This chapter summarizes the thematic analysis and findings as well as the interpretation of those findings. Chapter Five also includes methodological and theoretical interpretation, implications for policy and practice, limitations and delimitations, and recommendations for future research.

Discussion

The discussion section presents the study's findings based on the developed themes. Theoretical and empirical implications are also discussed in this section. Finally, the limitations and delimitations of the study are discussed within this chapter, concluding with recommendations for future research.

Summary of Thematic Findings

The themes in this study were conduciveness to learning, big-picture thinking, early PBL, carry-over, confidence, suggestions, challenges, and other factors. The majority of participants had positive responses to PBL. However, participants at large also identified challenges to PBL and other factors related to their view of success during CFEs.

Interpretation of Findings

In this section, the interpretation of the themes is presented. The significance of the themes that emerged from participant responses within the study is discussed. The interpretations are supported by data including participant responses from all three data sources: journal

prompts, individual interviews, and focus groups.

Problem-Based Learning Enhances Learning in both Academic and Clinical Environments

Based on the presented findings, it is my interpretation that PBL teaching methods are an effective teaching method that is representative of being conducive to learning in a DPT program. This study supports the research claiming that medical students feel pre-clinical years should include experiences with clinical activities, not just traditional didactic learning opportunities (Eyal & Cohen, 2006). Participant responses reveal that DPT students are eager to learn via PBL teaching methods and desire exposure to this type of social collaboration representative of the social constructivist theory. This is reflected by the *conduciveness to learning* theme and the *preference for PBL* sub-themes supported by participant responses in Chapter Four. Furthermore, PBL is a valid teaching method for improving retention through real problem-solving sessions that simulate real vocational encounters. The data also indicates that PBL is superior to traditional teaching methods in engaging higher-order thinking and processing skills, thus applying knowledge through critical thinking and clinical reasoning. However, having some basic foundational knowledge, specifically in medical education, prior to attempting to apply critical thinking and clinical reasoning to specific concepts may be required for the successful implementation of PBL activities.

PBL activities may also enhance confidence with critical thinking and clinical reasoning skills during didactic work which is supported by the literature and the raw data represented within the *confidence* theme and *higher-order thinking* sub-theme. The increased confidence may be due in part to the real-time feedback provided during PBL activities thus allowing students to understand the clinical reasoning of possible problem solutions in real-time, rather that waiting for feedback typical of traditional assessment types. Real-time feedback may also

improve retention as students can receive immediate rationale positive or negatively related to their problem-solving skills and abilities to create problem solutions based on sound judgment, critical thinking, and clinical reasoning.

PBL activities that encourage DPT students to begin to problem-solve, just as they will during their assessment of patient problems in clinical practice (Shrivastava & Shrivastava, 2021). PBL may also improve DPT student confidence in performing physical therapy evaluations which is the basis of understanding a patient problem before beginning to implement solutions through various treatment strategies during CFEs. To accurately assess a patient's problem, a physical therapist must be able to determine what patient information is relevant to the problem at hand in the clinical sense (Larin, 2010). Oftentimes, patients may have their own view of what is occurring in their body. At times, they are correct but physical therapists must be able to use sound judgment based on clinical reasoning to determine what information the patient supplies them with is relevant to their physical problem. Furthermore, physical therapists must be able to see the big picture of a patient's problem and funnel out non-relevant information to be able to prioritize aspects of the problem solution (Shrivastava & Shrivastava, 2021). Based on the data of this study, it is the primary researcher's interpretation that PBL teaching methods may enhance many aspects of healthcare education, specifically for the physical therapy discipline which has been discussed above. After obtaining basic knowledge and fundamentals, PBL may, in fact, be the ideal teaching method due to the benefits of its use in improving a student's ability to transition to clinical practice (Anderson et al., 2008).

Consistency and Repetition Matter

The degree of consistency and frequency in which PBL activities are implemented within a curriculum may play a role in student success with PBL teaching methods. Earlier

implementation of PBL teaching methods within a curriculum that PBL may be correlated with a higher likelihood of student success in subsequent courses and CFEs. Participants felt that the more exposure they had to PBL activities, the better they were able to understand the method and utilize their higher-order thinking and processing skills across other courses and carry it into CFEs. Therefore, continued opportunities to utilize the learned skills through PBL is essential to continued growth in the areas of critical thinking and clinical reasoning. Furthermore, the lack of standardization for a single given answer in PBL teaching may be challenging for students, thus the need to reinforce student justification of their chosen solutions through increased opportunities to perform sound critical thinking and clinical reasoning is imperative to both academic and clinical success. All students should also be encouraged and required to participate in all PBL activities including both small and large group discussions and group problem-solving activities. Dominant students may often take charge of discussions, drowning out more passive students who may be fearful of speaking up and being wrong. Therefore, it is imperative the instructor foster a safe environment and require participation from all students as well as guide the direction of each problem-solving activity to ensure a more equitable discussion and ensure learning is occurring for each participant in a meaningful way.

Critical thinking and clinical reasoning are imperative to students becoming competent physical therapists. Thus, consistency and repetition are key as students need to continually foster higher-order thinking and processing skills until they can utilize these skills easily and quickly to solve patient problems. Hence, bouncing in and out of using PBL teaching methods in a single course or across courses is not ideal. The undergraduate background of DPT students may also have an effect on the initial PBL experience and student perception of the method. Knowledge acquisition prior to using the PBL method may improve the ease with which students

can begin to utilize problem-solving skills. Students with backgrounds outside of exercise science may have a harder time transitioning into higher-order thinking and processing skills as their prior knowledge may not be as strong as students with backgrounds more related to the physical therapy field. Therefore, DPT programs should implement PBL across all courses consistently to continue engaging students in higher-order processing throughout the program to enhance learning rather than just sparingly or only within specific courses.

Other Factors Influencing Student Success during CFEs

While PBL appears to be an effective tool for use in medical programs including DPT programs, it is not the only factor leading to success or lack thereof during CFEs. How a CFE is designed as well as the clinical setting may play a large role in student perception of CFE success. Some physical therapy clinics are set up in a way that tends to foster growth in critical thinking and clinical reasoning. This often includes one-on-one patient care, more time with each patient, a manageable schedule, and extra time to complete documentation. Students who experience a clinical rotation with this structure often feel more successful than students who are at facilities in which the student is seeing two or more patients at the same time in a short period of time without much time to complete patient documentation. Guidance from their clinical instructor may also play a role in student clinical success. Clinical instructors who are more engaged in teaching as opposed to clinical instructors who utilize students to improve their own workload as can often happen, have been identified as an important aspect of successful CFEs by DPT students. There is often little to no training in best practices for clinical instructors, with the only requirement to be a clinical instructor to a DPT student being a licensed physical therapist with one year of clinical practice experience. Therefore, a clinical instructor who is not trained in best PBL teaching practice may not be able to fully help a student grow in higher-order thinking

and processing skills during CFEs, thus leaving the student less confident than students who have clinical instructors who utilize the method.

While the utilization of the PBL method during didactic work may enhance higher-order thinking and processing skills, there may be no true substitution or simulation that directly correlates with student success during CFEs. The CFE I and of itself, with daily immersion in clinical practice, utilizing higher-order thinking and processing skills may be the best avenue for developing critical thinking and clinical reasoning skills based on prior knowledge acquisition as DPT students felt that their most growth in these processing skills occurred during their CFEs themselves.

Implications for Policy and Practice

In this section, based on the interpretation of the findings of this study, the implications for policy and practice are discussed. Participants felt that there were ways to improve the utilization of PBL teaching methods for DPT students within the "Suggestions" theme and corresponding sub-themes. With the goal of this study to further research of PBL, this study revealed that teaching through PBL methods could be improved with better professional development training, consistency in using PBL teaching methods across the curriculum, and increased educator accountability. Therefore, implications for policy and practice utilizing these recommendations are discussed in this section.

Implications for Policy

Student achievement is the main goal of education, for medical programs this includes both academic and clinical achievements (Anderson et al., 2008). Higher education is often very expensive; thus administrators, educators, and students all have a stake in ensuring that students are successful in their endeavors (Barrows, 1996). Medical educators also have a responsibility

to ensure they deliver high-quality, competent graduates who can go forth and solve patient problems within their communities (Baker et al., 2017). Therefore, medical educators are particularly interested in teaching methods that they believe are the most effective in achieving both academic and clinical student success (Aziz et al., 2014). This study aimed to understand if PBL teaching methods are a viable tool to ensure enhanced higher-order thinking and processing skills in both academic and clinical environments based on student perceptions. Policy creation that encourages and requires PBL teaching activities within each course in the curriculum may also be a viable option for DPT programs that could be evaluated by peers during formal teaching assessments and also by student course evaluations, increasing educator accountability.

Implications for Practice

The implications in this study support implications for practice including consistency of PBL use across the curriculum not just within a single course and educator professional development training regarding the structure of implemented PBL activities. Based on the positive perceptions of DPT students in this study related to PBL and participants' desire for more PBL activities consistently through the curriculum, programs should consider the use of PBL teaching methods consistently throughout the program. This would require devoting time and professional development training for educators on PBL teaching methods. The site should devote time to further educator training in PBL teaching methods concerning specific content areas. Peer-to-peer collaboration regarding the creation of PBL activities for the classroom among educators may also be recommended. Formal assessments including observations of teaching PBL lessons should also be implemented for educators, especially those new to PBL.

Empirical and Theoretical Implications

This study aligns well with the literature regarding student perception of PBL teaching

methods. Furthermore, this study adds to the body of present literature regarding PBL teaching methods from the lens of DPT students specifically in which current research is lacking. Therefore, based on the themes presented in this study, the majority of positive perceptions of participants, the body of literature surrounding PBL, and the implications for this study, educators of medical programs, including DPT programs, should consider utilizing PBL teaching methods as a viable option for course delivery.

Empirical Implications

The themes found within this study are similar to previous research studies regarding student perceptions of PBL that also found positive feelings about PBL. Studies have shown that medical students taught primarily with traditional teaching methods feel they did not have enough exposure to patient models, case discussions, and clinical simulations (Eyal &Cohen, 2006). Positive perceptions of the PBL method are present throughout most of the PBL research (Fan et al., 2018; Hallinger, 2020; Kandi & Basireddy, 2018; Luke et al., 2021; Oderinu et al., 2019; Rideout et al., 2002; Shrivastava & Shrivastava, 2021). Related literature on student perception of PBL indicates that students involved in PBL had higher perceptions both academically and clinically, better organizational skills, more advanced cognitive skills, improved ability to search out and explain new information, and better clinical decision-making (Fan et al., 2018; Kandi & Bassiredy, 2018; Oderinu et al., 2019; Okoye et al., 2019; Oo et al., 2020). Overall, students who have experienced both traditional teaching methods and PBL teaching methods, feel that the PBL is the best method for medical education, thus the body of research suggests that students prefer PBL teaching methods to traditional methods (Hallinger, 2020; Macauley et al., 2021; Jamshidi et al., 2021; Schmidt et al., 2006). Larin et al. (2010) identified DPT students' appreciation for the PBL process indicating they felt it yielded to their

personal and professional growth. This study confirms that ideal as the results yield data indicating the majority of participants preferred the PBL method to traditional methods and indicated a desire to have more PBL teaching methods utilized across the curriculum. Therefore, PBL may be the preferred method for medical education programs including DPT programs.

Traditional classroom teaching strategies are also typically confined to lecture-based techniques in which teachers unilaterally present information (Kandi & Besireddy, 2018). Retention of information is limited with this type of teaching method within the research (Arain et al., 2022; Luke et al., 2021). This study aligns with the idea that PBL improves retention of knowledge based on data from all three data sources indicating that participants felt they had better retention of knowledge when engaged in PBL activities as opposed to PowerPoint lectures.

The first step in the process that leads to clinical reasoning is knowledge acquisition (Hallinger, 2020). In this cognitive stage, the students must gain factual knowledge that can then be applied to healthcare situations in the metacognition stage (Hallinger, 2020; Norman & Eva, 2003). Therefore, knowledge acquisition is a prerequisite for effective use of PBL (Larin et al., 2010). PBL instruction may help close gaps in student knowledge through application (Hammel et al., 1999). PBL does significantly improve and solidify knowledge acquisition according to some researchers (Jamshidi et al., 2021; Schmidt et al., 2006). The results of this study align with the body of research in which students must have some basic foundational knowledge to apply the higher-order thinking and processing skills utilized during PBL activities. Participants in this study indicate that the PBL methods did improve their knowledge and help in bridging gaps in knowledge through application to real-world scenarios.

The PBL is believed to improve clinical reasoning and problem-solving skills in medical education students (Oderinue et al., 2021). Literature indicates that PBL is an effective pedagogy

for educating medical students in clinical skills, application of those skills, critical thinking, and clinical reasoning (Anderson et al., 2008; Barrows, 1996). Furthermore, PBL may improve student preparation for clinical practice through training in higher-order cognitive skills (Anderson et al., 2008). Therefore PBL research indicates that PBL is an effective educational teaching method for fostering clinical reasoning and critical thinking skills required for successful clinical work (Luke et al., 2021; Shrivastava & Shrivastava, 2021; Thorndahl & Stentoft, 2020; Wang et al., 2008). This study agrees that students perceive PBL as an effective teaching method for fostering higher-order thinking and processing skills that can be carried over into CFEs. However, this study further indicates that the PBL method may not be the only factor that improves higher-order thinking and processing skills as results indicate that daily immersion in clinical practice, clinical setting and clinical instructor knowledge, personality, and teaching style may also yield itself to a student's opportunity and ability to perform higher-order thinking and processing skills during CFEs.

Research also suggests that graduates of PBL programs feel more satisfied with their learning as the method coincides well with their clinical experience (Price et al., 2000). Furthermore, the body of literature suggests that students engaged in PBL feel the quality of their training prepared them for clinical practice (Shrivastava & Shrivastava, 2021). Students respond better to PBL and view the method as superior when it comes to preparing them for CFEs (Kandi & Basireddy, 2018). Transitioning from didactic coursework to clinical training can be difficult for some students (Oderinu et al., 2019). Research suggests that the PBL method may facilitate better transfer of conceptual knowledge to new clinical problems and improve a student's ability to integrate biomedical knowledge into clinical problems (Oo et al., 2020; Shrivastava & Shrivastava, 2021). The current research study corroborates this as participants indicated in all

three data sources that they felt they were more prepared for clinical fieldwork due to the PBL activities they were engaged in. Furthermore, students who attended multiple large group weekend sessions that were offered indicated a higher perception of preparedness for CFEs indicating that repetition is key to success with the PBL method.

Some drawbacks to the PBL within the body of research include limited faculty knowledge of the method, the difficulty for first-year healthcare students in utilizing the method, passive students being less engaged in social activities, and time required for utilizing the method (Donner & Bickley, 1993; Jay, 2014; Oo et al., 2020). The results of this study further indicate that the PBL method does have its challenges which are in alignment with the body of research including difficulty with no standardization of answers, more difficulty with the first experience of PBL, difficulty due to prior educational background, dominant students leading collaborative activities and outlier data that instructor experience matters.

Another challenge of PBL identified by participants in this study is difficulty with moving from memorization and regurgitation of information in a traditionally taught course to critically thinking through problem solutions in which there may be less rigid instructor guidance and less standardization of one specific answer. To develop critical thinking skills, students must move from focusing on only one truth, known as convergent thinking to self-directed thinking using knowledge and resources to determine multiple solutions to a problem that can be tested (Aziz et al., 2014; Jay, 2014; Luke et al., 2021). The results of this study relate directly to previous research that indicates possible drawbacks to PBL including ambiguity of problem solutions, increased time commitment, and concern over varying correct problem solutions.

The initial experience of students with PBL is another challenge to the method. Often students struggle more with their first experience as utilizing higher-order thinking is new to

them, therefore it can be more time-consuming for students in which this is their first experience with PBL (Jay, 2014; Oo et al., 2020). However, most students still believe that the benefits of PBL instruction outweigh the drawbacks (Hammel et al., 1999; Oo et al, 2020). The results of this study confirm that the first experience with PBL can be daunting as some participants indicated needing to spend more time on the course than courses traditionally taught, however, those same participants indicated that once they had more experience using the method, they saw the value in its utilization. Two participants in this study who indicated difficulty with their first experience with PBL also indicated that they believed it could be due in part to their educational background and thus prior knowledge, being in a non-exercise science content area, therefore they felt they had more knowledge gaps compared to their classmates, making the application of PBL more difficult initially.

Other challenges include more dominant students taking over and leading social, collaborative activities, leaving passive students less engaged (Hammel et al., 1999; Jay; 2014). This drawback was also identified by participants in this study further indicating that the makeup of each small group may lend itself to some level of student perception of the PBL method.

Organizational skills are mentioned more limitedly in research related to PBL as a perceived advantage of the method (Norman & Eva, 2003; Yew & Goh, 2016). While it has been identified in a few studies related to a perceived advantage of the use of PBL, this study indicates it may be a more substantial benefit of the method than the body of research suggests. The results of this study indicate that the majority of DPT students perceived PBL as an effective method for improving their ability to organize problem information in a way that allowed them to weed out non-relevant information and prioritize relevant information in order to solve the patient problem at hand. PBL teaching methods may help students prioritize and organize problem information

that is most relevant and needs immediate action. As licensed physical therapists in which most states have direct access laws in which patients can be seen by a physical therapist before seeing a physician, it is imperative that physical therapists can identify and structure information into categories that address the patient's problem. Referral to a physician or specialist may still be needed, however the physical therapist must be able to funnel out non-relevant information to prioritize relevant information that will lead to the best problem solution. This study indicates that students feel more prepared to prioritize and funnel out information and organize the information appropriately to obtain the best clinical solution and outcome.

By and large, this study confirms and corroborates the already extensive body of literature related to PBL in many forms. Furthermore, this study sheds light on PBL concerning DPT students specifically and to its effectiveness in fostering higher-order thinking and processing skills that may be carried over into CFEs and thus eventually into clinical practice. Based on the themes presented in this study, the majority of positive perceptions of participants, and the implications for this study, educators of medical programs, including DPT programs, should consider utilizing PBL teaching methods as a viable option for course delivery.

Theoretical Implications

The theoretical framework for this study is the social constructivist theory credited to Lev Vygotsky (Vygotsky, 1930). The basic premise of the theory is that knowledge acquisition occurs through experiences and social interactions (Thompson, 2019). Within the classroom, social interactions occur as shared experiences that include large and small group discussions, interactive case studies, group problem-solving sessions, and discussions with others guided by the PBL instructor (Schmidt et al., 2006). Previous studies have found that medical students have a positive perception of PBL and feel PBL enhances their ability to become clinicians, but few

studies have explored the perceptions of DPT students specifically related to PBL and CFEs (Anderson, et al., 2008; Chang, 2016; Hammel et al., 1999; Jay, 2014; Jefferson, 2001).

The theory underlining the PBL method is based on constructivism in which students participate in self-directed learning that aids the learner to actively seek knowledge and organize learning experiences into meaningful schemata using their prior knowledge (Yew & Goh, 2016). Thus, social interactions with classmates improve their cognitive development by applying said knowledge to problem-solving activities (Yew & Goh, 2016). In this study, PBL teaching methods included small and large group discussions as well as teamwork to enhance student learning which supports the social constructivism theory examined in this study. Students were given patient problems in which they had to analyze the problem, discuss in both small and large groups the source of the problem clinically, and determine a plan of action to solve the problem. These activities are in alignment with other PBL research methods. This study further evaluated PBL with CFEs specifically for DPT students.

While the data shows that students did perceive the PBL methods to be valuable to their preparedness for CFEs, it was not the only factor. Future research should attempt to limit other coursework between the PBL course and CFEs so as to isolate PBL from other factors. Future research should also analyze the phenomenological experience of students during their first CFE as personal experiences during CFE may bias students perception of their CFEs in general thus possibly skewing the data. Therefore, while the data does support PBL in the context of improving higher-order thinking and processing skills as well as in the context of transitioning to CFEs, other factors such as clinical setting and clinical instructor variables do reduce the power of the results. However, in the context of the body of PBL research, this study does corroborate and confirm prior research expressing that PBL is a highly valuable teaching method in medical

education. The PBL teaching method does appear to be a superior strategy based on its effectiveness, conduciveness to student learning, student preference for the method, and its ability to improve long-term retention, improve confidence for higher-order thinking and clinical skills, and the ability to help students organize information into relevant and non-relevant information that can be used to solve patient problems quickly and accurately which is imperative in the healthcare field not only for healthcare providers, administrators, and educators, but for patients worldwide.

The data from this study confirmed prior research that medical students in varying disciplines see value in PBL as part of their medical education, now including DPT students. This study contributed to the body of research regarding the theory of social constructivism (Vygotsky, 1930) by exploring DPT students' perceptions of PBL and how PBL activities relate to higher-order thinking and processing skills during CFEs. The results confirm previous research that social interactions as in the constructivist theory do increase higher-order thinking and processing skills such as critical thinking and clinical reasoning. This study also extends the constructivist theory through PBL teaching methods in the context of clinical field work, not just on didactic coursework which most current research has studied. This study sheds new light on the constructivist theory indicating that not only is the method effective in improving academic skills, but PBL is also an effective teaching method that when utilized improves higher-order thinking and processing skills that are more readily carried over into clinical experiences, which coupled with daily immersion in utilizing those skills with real patients during CFEs was vital to their success and confidence in becoming clinicians. The daily immersion during CFEs also supports the social constructivist theory that learning does occur through social experiences such as daily patient-clinician interactions, student-patient interactions, and student-clinician

interactions.

Limitations and Delimitations

Limitations and delimitations are present in every research study. “Study limitations are the constraints placed on the ability to generalize from the results, to further describe applications to practice and relate to the utility of the findings” (Price et al., 2004, p. 66). Study delimitations are the parameters or boundaries set by the researcher for the study in an attempt to narrow the scope of the study (Coker, 2022). The limitations and delimitations of this study are presented in this section.

Limitations

Limitations of this study include the site used, the timing of the phenomenon related to the timing of this study, and me also being a faculty memberir in the program in which participants attended. One limitation is that the participant pool was from one single site. The majority of participants were also female due to the majority of responding participants being female. While this was not the study's original intent, it may limit the study. It is possible that with a larger and more varied participant pool, a wider variety of participants might have been obtained, thus results may have varied more. The phenomenon that occurred during the therapeutic exercise course occurred during the first year of the DPT program. However, data collection occurred two years after the phenomenon. Students may have had other experiences within the timeframe from phenomenon to data collection related to other coursework that occurred during the time between the occurrence of the phenomenon and data collection which may have affected their responses and thus the data. Participants had also completed two CFEs before data collection which could skew results based on each participant’s personal experiences during CFEs. Participants were from one single site in which I am a faculty member. There were

no incentives or penalties for participation in the study and I was recused from any sort of grading or involvement with students who were participants in the study.

Delimitations

Delimitations of this study include the study design, the site, the sample size, and the research timeline. The study design as a hermeneutic phenomenological study was chosen due to my experience as a physical therapist and prior DPT student. This study design allowed me to understand the participants' responses within the context of my physical therapy experience and knowledge of the phenomenon. The site was chosen due to the ability for convenience sampling as well as the knowledge of the phenomenon occurring at the site and within the participant pool. The sample size of 12 to 15 participants was chosen as it is within guidelines for the recommended sample size to achieve saturation for qualitative studies by Hennick & Kaiser (2022).

Recommendations for Future Research

Future research must consider the findings, limitations, and delimitations of the study. Based on these constructs, my recommendations for future research are as follows. This study was conducted at a single site that was a private school in which PBL was utilized. Future studies should be designed to expand the participant pool to accurately reflect the diversity of DPT students. Therefore, future research should broaden to other geographical areas and multiple sites to ensure the findings' transferability. Future research should also attempt to limit the time between the occurrence of the phenomenon and data collection to narrow other variables that may skew the data such as student experiences in other courses and initial CFEs. This study presented many positive outcomes related to PBL but did not eliminate other possible reasons and factors for student's perceptions of PBL. I would also suggest that future research be

completed by a primary researcher who is not associated with the programs in which participants attend in order to further reduce any researcher bias.

Conclusion

In conclusion, DPT student perception of PBL is positive. Students felt that they would have been less confident during CFEs without the PBL teaching methods and activities utilized within the therapeutic exercise course. Therefore, as students value PBL and gained confidence in its use, it should be utilized among DPT programs with the ideal parameters as described in this study in place. The combination of early PBL and consistent use throughout the DPT program, followed by the opportunity during CFEs to continually practice the higher-order thinking and process skills fostered during PBL activities may be key to student success in DPT programs and to creating competent clinicians within a global society.

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Appendix A

IRB Approval

IRB #: IRB-FY23-24-1078 Title: EXPLORING STUDENT PERCEPTIONS OF PROBLEM BASED LEARNING AND CLINICAL FIELD EXPERIENCES: A PHENOMENOLOGICAL STUDY

Creation Date: 12-16-2023

End Date: Status: Approved

Principal Investigator: Review Board: Sponsor: Ashley Boles Research Ethics Office Study History Submission Type Initial Review Type Limited Decision Exempt - Limited IRB Key Study Contacts Member Ashley Boles Role Principal Investigator [redacted]

Mary Strickland Role Co-Principal Investigator [redacted]

Appendix B

IRB Approval

February 12, 2024

Re: Exploring Student Perceptions of Problem-Based Learning and Clinical Field Experiences: A Phenomenological Study

Dear Ms. Boles,

On February 12, 2024, a review of your application and supporting documents for the above named research proposal was completed. The Research Review Board (RRB) for [redacted] has determined that the proposed research project meets the criteria for Exempt status as per policy 1.15.3 (A.1) in the faculty guidelines. As per the above policy "If the project is certified exempt, the principle investigator need not resubmit the project for continuing RRB review as long as there are no modifications in the exempted procedures". The study has now been approved, therefore, work on the project may begin.

If any modifications to the exempted procedures are made, the RRB will need to complete a new review of the changes to determine if the project remains Exempt or if further review is necessary.

Congratulations on the approval of your project, we wish you well during its completion.

Sincerely,

Chair, Research Review Board

Assistant Professor of Education

Appendix C

Recruitment Letter

Dear Potential Participant,

As a doctoral student in the School of Education at Liberty University, I am conducting research as part of the requirements for my PhD degree. The purpose of the study is to understand your perception as a Doctor of Physical Therapy student related to the Problem-Based Learning teaching method utilized during your therapeutic exercise course. This study will explore your perception of the PBL method and how you feel it relates to your clinical field experiences and I am writing to invite you to join my study.

Participants must be a Doctor of Physical Therapy student in the graduating class of 2024 who have successfully completed all didactic work and have also successfully completed their first two clinical field experiences. Participants will be asked to complete two 250 to 500-word journal prompts, take part in a one-on-one, audio-recorded interview and take part in a video-recorded focus group. It should take approximately 30 to 45 minutes to complete each journal prompt and approximately 1 hour for both the interview and focus group. The total time to complete all the procedures listed is approximately three hours. Names and other identifying information will be requested as part of this study, but participant identities will not be disclosed.

To participate, please complete the attached Consent Form and return to me at [redacted] If you meet my participation criteria, I will contact you with an initial journal prompt for you to complete and to schedule an audio-visual recorded, one on one interview. I will also be asking you to complete a second journal entry in the weeks following the initial journal prompt. Your interview may take place before or after you receive the second

journal prompt. You will also be asked to participate in a focus group after all individual participant interviews have been conducted.

A consent document is attached to this email. The consent document contains additional information about my research. If you have any questions about my research please contact me at [redacted] If you choose to participate, you will need to sign the consent document and return it to me as soon as possible.

Sincerely,

Ashley Boles

Doctoral Candidate

[redacted]

Appendix D

Informed Consent Form

Title of the Project: EXPLORING STUDENT PERCEPTIONS OF PROBLEM-BASED LEARNING AND CLINICAL FIELD EXPERIENCES: A PHENOMENOLOGICAL STUDY
Principal Investigator: Ashley Boles, Graduate Student and Doctoral Candidate School of Education, Liberty University
Co-investigator(s): N/A

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be a Doctor of Physical Therapy student in the graduating class of 2024 who has successfully completed all didactic work as well as successfully completed your first clinical field experience. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research.

What is the study about and why is it being done?

The purpose of the study is to understand your perception as a Doctor of Physical Therapy student related to the Problem-Based Learning teaching method utilized during your therapeutic exercise course. This study will explore your perception of the PBL method and how you feel it relates to your clinical field experiences.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:

1. The first task is to complete a 250 to 500-word journal prompt expressing your ideas related to the specific journal prompt. The return time to return the journal prompt to the researcher will be two weeks from when the journal prompt is given to the participants. Participants will return the journal entry to the researcher digitally via email. The completion of the journal prompt should take 30 to 45 minutes.
2. The second task is to participate in an audio-recorded interview that will take no more than 1 hour. In some cases, the third task may occur before the second task, depending on interview scheduling.
3. The third task will be to complete a second 250 to 500-word journal entry expressing your feelings and ideas related to a second prompt. Participants will have two weeks to complete the journal and return it to the researcher digitally from when the prompt is given. This journal prompt should take 30 to 45 minutes to complete.
4. The fourth task is to participate in an audio-recorded focus group with other participants that will take no more than 1 hour.

5. The fifth and final task will be to review a transcript of your individual interview to check for accuracy ensure the researcher gleaned out of the individual interview what you intended to convey. Furthermore, you will be asked to review the researcher identified themes from your individual interview to confirm agreement of the themes. This task should take no more than 1 hour.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study.

Benefits to society include healthcare providers that are better able to think critically, clinically reason and make better clinical decisions for all patients in society through PBL utilized in more medical education programs.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

I am a mandatory reporter. During this study, if I receive information about child abuse, child neglect, elder abuse, or intent to harm self or others, I will be required to report it to the appropriate authorities.

How will personal information be protected?

The records of this study will be kept private. Published reports will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be kept confidential by replacing names with pseudonyms.
- Interviews will be conducted in a location where others will not easily overhear the conversation.
- Confidentiality cannot be guaranteed in focus group settings. While discouraged, other members of the focus group may share what was discussed with persons outside of the group.
- Data collected from you may be used in future research studies, and/or shared with other researchers. If data collected from you is reused or shared, any information that could identify you, if applicable, will be removed beforehand.
- Data will be stored in a password-locked computer. After three years, all electronic records will be deleted.
- Recordings will be stored on a password locked computer for three years and then deleted. The researcher and members of her doctoral committee will have access to these recordings.

Is the researcher in a position of authority over participants, or does the researcher have a financial conflict of interest?

The researcher serves as a professor at Southwest Baptist University. To limit potential or perceived conflicts, the researcher will be recused of any professional interaction including grading in any academic or clinical capacity of each participant during the duration of the study once participant selection has been completed. This disclosure is made so that you can decide if this relationship will affect your willingness to participate in this study. No action will be taken against an individual based on his or her decision to participate or not participate in this study.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University or Southwest Baptist University. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data collected from you, apart from focus group data, will be destroyed immediately and will not be included in this study. Focus group data will not be destroyed, but your contributions to the focus group will not be included in the study if you choose to withdraw.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Ashley Boles. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at [redacted] or [redacted] You may also contact the researcher's faculty sponsor, Dr. Mary Strickland, at [redacted]

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the IRB. Our physical address is [redacted]

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record and video-record me as part of my participation in this study.

_____
Printed Subject Name

_____
Signature & Date

Appendix E

Journal Prompts

First Journal Prompt

In 250-500 words or more, please reflect on your experience during your first two clinical field experiences. Please include any new challenges you are facing or any prior challenges you are still facing, as well as challenges you have overcome and how you overcame them. Also include how you feel about your preparedness from didactic coursework, including how prepared you feel with higher-order processing skills (critical thinking and clinical reasoning), and how you feel these skills have translated to the clinical setting at this point in time.

Second Journal Prompt

In 250-500 words or more, please reflect on your overall clinical field experiences thus far with focus on the final two clinical experiences. Please include any new challenges or continued challenges you are facing. Also include how you feel about your preparedness from didactic coursework has affected your third and fourth clinical experiences and clinical time overall. Also, include how you feel about your higher-order processing skills during the third and fourth clinical experiences overall and how you feel about these skills during the last two clinical experiences compared to the first two clinical experiences and across the various clinical settings throughout your clinical experiences.

Appendix F

Interview Questions

Individual Interview Questions

1. Please describe your educational background prior to attending DPT (DPT) school. CQ
2. Describe your experience within the didactic portion of the DPT program as a whole. CQ
3. Describe your experience within the therapeutic exercise course alone. CQ
4. What does Problem-Based Learning mean to you? CQ
5. Describe your experience learning from the problem-based teaching methods utilized in the therapeutic exercise course. CQ
6. What challenges did you encounter during the therapeutic exercise course? Please describe these challenges. CQ
7. How do you feel the problem-based learning teaching methods utilized compare to traditional teaching methods utilized in other courses within the program? CQ
8. How were the PBL teaching methods utilized conducive to your learning style? CQ
9. What does higher-order thinking or processing mean to you? SQ 1
10. How do you feel the PBL teaching methods utilized affected your higher-order thinking skills such as critical thinking and clinical reasoning? SQ1
11. How do you feel the PBL teaching methods affected your higher-order thinking skills utilized in other courses? SQ1
12. Describe your clinical experience overall thus far. SQ1
13. Describe any challenges you have faced during this CFEs thus far? SQ 1, SQ 2
14. What areas do you feel have been your strongest during your CFEs thus far? SQ1
15. What areas do you feel have been your weakest during your CFEs thus far? SQ 1, SQ 2

16. How do you feel your didactic work throughout the DPT program as a whole prepared you for clinical experiences? SQ 2
17. Describe your feelings related to the transition from didactic coursework to clinical training. SQ1
18. Describe any challenges you have faced in the transition from didactic coursework to clinical training? SQ1
19. How did you overcome these challenges during your first two CFEs? SQ1
20. How do you feel the PBL teaching methods utilized specifically within the therapeutic exercise course effected your other didactic coursework? CQ, SQ 1
21. Did you attend any additional, optional weekend problem-based learning sessions? If so, how many did you attend? CQ, SQ1 (If no, skip to question number 21)
22. Describe your experience with weekend PBL sessions. CQ, SQ1
23. How do you feel attending weekend PBL sessions affected your higher-order processing skills? SQ2
24. Overall, how do you feel the teaching methods utilized affected your success during the first two CFEs? SQ1, SQ2
25. How do you feel about your problem-solving, clinical reasoning and critical thinking skills in your last two CFEs compared to your first CFE? SQ 2

Appendix G

Focus Group Questions

1. Describe your feelings related to problem-based learning teaching methods utilized in the DPT program, specifically the therapeutic exercise course CQ1.
2. Describe challenges you experienced related to problem-solving and clinical reasoning during your first two clinical field experience SQ1, SQ2.
3. Describe how you overcame these challenges during your first two clinical field experiences SQ2.
4. Describe how you feel about the problem-based learning teaching methods related to your preparedness for this clinical field experience SQ1, SQ2.
5. Describe the transition from didactic coursework to clinical training and any challenges you faced with the transition SQ1, SQ2.
6. Describe your thoughts on the PBL teaching methods utilized during the therapeutic exercise course in relation to the transition from didactic coursework to CFEs?
7. How do you feel the PBL methods helped or hindered this transition? CQ
8. Describe your feelings as to why you feel the problem-based learning teaching methods utilized did or did not affect your success during this clinical field experience. SQ2