2020

Best Practice for Teaching Manual Therapy Techniques to Occupational Therapy Practitioners

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BEST PRACTICE FOR TEACHING MANUAL THERAPY TECHNIQUES TO OCCUPATIONAL THERAPY PRACTITIONERS

Presented in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Occupational Therapy

Eastern Kentucky University
College of Health Sciences
Department of Occupational Science and Occupational Therapy

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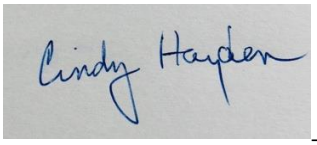
2020

EASTERN KENTUCKY UNIVERSITY
COLLEGE OF HEALTH SCIENCES
DEPARTMENT OF OCCUPATIONAL SCIENCE AND OCCUPATIONAL THERAPY

This project, written by Deana Jackson under direction of Dr. Cindy Hayden Faculty Mentor, and approved by members of the project committee, has been presented and accepted in partial fulfillment of requirements for the degree of

DOCTOR OF OCCUPATIONAL THERAPY

CAPSTONE COMMITTEE



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Certification

We hereby certify that this Capstone project, submitted by Deana Jackson, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the project requirement for the Doctor of Occupational Therapy degree.

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Executive Summary

Background: Occupational therapy practitioners do not always know how to treat the painful shoulder. This is often due to the lack of education in the occupational therapy curriculum regarding manual therapy techniques.

Purpose: The intent of this research project is to determine the best practice for teaching manual therapy techniques to occupational therapy providers thus increasing their knowledge, skills and ultimately improving patient care by reducing client shoulder pain.

Theoretical Framework: This research design utilized three type of learning styles which include: the behaviorist learning theory, constructivism, and active learning strategies.

Methods: The design was a quantitative study using a pretest/posttest to evaluate knowledge of the participants about manual therapy techniques and gathering data regarding the participants satisfaction with the different teaching strategies used in the in-service. A survey was emailed to all participants four-weeks post in-service to determine frequency and use of manual therapy techniques in practice.

Results: Objectives of the study were met. Seven of eight occupational therapy practitioners improved their scores on a twenty-five-question pretest posttest, showing an 18% mean difference, *t*-test <.05. Hands on demonstrations and other active learning strategies were rated very helpful in learning manual therapy techniques. In a four-week follow up survey participants indicated they had used manual therapy techniques on clients and non-clients.

Conclusion: Educating occupational therapy practitioners in use of manual therapy techniques using active learning strategies can increase their knowledge of preparatory methods. This increased knowledge can result in use of stretching, joint mobilization, and myofascial trigger point release with clients to ease shoulder pain, thereby increasing client's occupational performance.

Acknowledgements

There are many people that I would like to express my appreciation and gratitude to for being supportive and encouraging me during my occupational therapy doctorate program.

First, I would like to thank Dr. Cindy Hayden and Dr. Dana Howell for their many hours of editing, advice, and knowledge shared in the completion of this Capstone project. I especially want to thank Dr. Hayden, for the positive support and encouragement she has provided during the completion of my occupational therapy doctorate degree. I am so grateful.

Second, my parents have been very supportive and understanding of my limited availability during these past few years. I want to thank my mother for taking the time to talk with me when I needed encouragement and for preparing meals for me from time to time. Thank you for being there for me.

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CERTIFICATION OF AUTHORSHIP

Submitted to (Faculty Mentor's Name): Dr. Cindy Hayden DHEd., OTR/L, CHT
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Title of Submission: Best Teaching Strategies Teaching an In-service for Manual Therapy to Occupational Therapy Practitioner

Certification of Authorship: I hereby certify that I am the author of this document and that any assistance I received in its preparation is fully acknowledged and disclosed in the document. I have also cited all sources from which I obtained data, ideas, or words that are copied directly or paraphrased in the document. Sources are properly credited according to accepted standards for professional publications. I also certify that this paper was prepared by me for this purpose.

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Date of Submission: 5/3/2020

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Introduction to the Problem

Occupational therapy practitioners are not always prepared to treat patients who have painful shoulders. Practitioners are frequently faced with the need to help patients who suffer from painful symptoms and loss of function associated with frozen shoulder (Rainbow, Weston, Brantingham, Globe, & Lee, 2008). Practitioners must evaluate using evidence-based research and combine with clinical experience to guide the patient toward a successful outcome (Rainbow et al., 2008). Occupational therapy practitioners are lacking a key element in addressing shoulder dysfunction, namely manual therapy skills (O'Dunn-Orto, Hartling, Campbell, & Oswald, 2012). As a therapist working in several skilled nursing facilities, hospitals, and outpatient facilities, the researcher has observed occupational therapists and assistants who lacked knowledge and skills regarding manual therapy. Manual therapy and how manual therapy interventions could improve the occupational performance of their clients is often a missing component in formal occupational therapy programs (American Occupational Therapy Association [AOTA], 2013). When asking several occupational therapy assistants to administer manual therapy to a client's painful shoulder, the researcher discovered the assistants did not know exactly what manual therapy was nor how to provide this intervention to the client. O' Dunn-Orto et al. (2012) reported a need for an educational study regarding occupational therapy practitioners lacking knowledge of manual therapy, due to a gap in the content of their educational system.

By utilizing manual therapy as a treatment intervention for clients with painful shoulders, pain decreases, and the active range of motion increases (Camarinos & Marinko, 2009). Using manual therapy treatments, occupational therapists can improve their client's ability to perform

activities of daily living, such as combing one's hair. The ability of the client to complete self-care and other meaningful activities of daily living can become obtainable following hands on manual therapy techniques implemented by the occupational therapy practitioner. The lack of knowledge and inability to administer manual therapy interventions reduces the effectiveness of occupational therapy treatment.

This research was designed to meet the need for occupational therapy practitioners to increase their understanding and application of manual therapy techniques for treating clients with painful shoulder. An in-service teaching manual therapy techniques utilizing several active teaching strategies is proposed as a research study to train practicing occupational therapists and occupational therapy assistants to use manual therapy techniques successfully.

Needs Assessment

An annotated bibliography comprised of existing literature revealed a gap for manual therapy teaching strategies for occupational therapy practitioners. A needs assessment was carried out in the summer semester of 2018, addressing occupational therapists and occupational therapy assistants in order to determine the best teaching strategies to use when imparting manual therapy skills. Data was collected through a Likert scale survey describe for the needs assessment to justify this capstone project.

Best Teaching Practices

The pedagogy for adult learners of hands-on skills needs to be explored. Ebert reported that adult students learn in a different manner so didactic lecture may be ineffective (2016). Creative, diverse teaching techniques such as practicing skills, using new knowledge, and hands-on experiences provide the best teaching strategies for the hands-on learner of today (Ebert, 2016).

Elements of best teaching strategies such as student teacher interaction, motivation, learning styles, cognitive processing strategies, personality traits, and teaching strategies need to be delineated. Fook, for example, looked at higher education and the various teaching strategies employed (2012). Fook stated that there are three major approaches to teaching: "1) teacher-centered /content-oriented teaching which is instructing of content, 2) student-centered/learning-oriented which entails guiding a student, and 3) bridging the student and teacher interaction which is common in an apprentice-master or doctoral candidate-supervisor relationship" (Fook, 2012).

Student learning may be enhanced by incorporating small group discussions, classroom activities, and small assignments with feedback (Fook, 2012). Fook found that whatever the chosen method, instruction must produce a difference in the learner. As he stated, "teaching involves changing the beliefs and habits of a learner or student" (Fook, 2012). Any teaching that does not result in a change is therefore not effective.

One of the challenges to procuring change in beliefs and habits is the motivation level of the students. In the educational setting, the student must desire to learn and be open to others' ideas (Fook, 2012). Donche, De Mayer, Coertjens, Van Daal, and Van Petegem found that students' personality and academic motivation are important and influence learning (2013). These factors partly explain why students learn the way they do. Donche et al. (2013) also examined the impact of attitude, motivation, learning styles and teaching strategies as they sought to study the joint effects of personality, academic motivation, and teaching strategies on student learning. The Inventory of Learning Styles was a key tool they used to map students' processing and regulation strategies (Donche et al., 2013). The students provided self-reported measures to determine his or her own personality, academic motivation, and learning strategies

(Donche et al., 2013). Specific personality traits such as openness, conscientiousness, and neuroticism were identified as being associated with student learning strategies (Donche et al., 2013). Researchers further found that personality traits can influence the style of learning. Individuals who conveyed openness were more apt to utilize deep level strategies (Donche et al., 2013). Conscientiousness correlated with associated dutifulness in which external guidance and support were expected. Neuroticism appeared more frequently in students that had a more undirected learning pattern. In addition, students with neuroticism usually showed feelings of uncertainty and vulnerability (Donche et al., 2013).

There was substantial evidence that students in higher learning have different strategies for learning, studying, and approaching learning (Donche et al., 2013). Cognitive processing strategies were identified as key techniques utilized by students when assimilating new subject matter (Donche et al., 2013). When assessing teaching approaches, research showed that student learning is influenced by the way teachers teach (Donche et al., 2013, p. 241). An unexpected relationship between student learning and teaching strategies was identified in this study (Donche et al., 2013). Direct instruction was used more often by teachers and this was found to be associated with the students' use of lower levels of external regulation. When the lecturer applies more control over the students' discovery-oriented learning, the student scores less on external regulation. If the teacher is focused on learning and on the student's learning, the student will score higher due to being more motivated when given autonomy and self-regulation. (Donche et al., 2013).

Interestingly, teaching strategies have an independent effect upon each student which is determined by the way teachers teach regardless of student characteristics (Donche et al., 2013). Studies have shown that the learning environment and the teaching strategies have an effect on

the student's learning (Donche et al., 2013). Personality traits and academic motivation also help explain why students learn the way they do (Donche et al., 2013). Elements of best teaching strategies such as student teacher interaction, motivation, learning styles, cognitive processing strategies, personality traits, and teaching strategies have an impact on the student's ability to learn most effectively.

Best Teaching Practice in Allied Health Education

Some research has shown that using a myriad of teaching techniques is an effective way to impart manual therapy skills to healthcare workers. For example, O'Dunn and colleagues (2012) utilized patient educators, interactive small group learning and Computer Assisted Learning (CAL) to teach musculoskeletal clinical. Their study determined which structured educational interventions produced competency in medical trainees, including undergraduates, residents, and physicians (O'Dunn-Orto et al., 2012). The results of this study revealed that students involved in musculoskeletal clinical training became more engaged in learning when it was more meaningful to him or her (O'Dunn-Orto et al., 2012). This research revealed that students studying musculoskeletal concepts were more engaged in interactive small groups and CAL, while only a few favored peer learning interaction (O'Dunn-Orto et al., 2012).

Teaching strategies to enhance critical thinking for allied health students is essential for lifelong employment (Dowd, 1991). Dowd researched radiologic students and strategies to enhance critical thinking and learning (1991). Providing students with a safe and supportive environment encouraged clinical thinking and reasoning (Dowd, 1991). Teachers understanding the students' perception or metacognition facilitates problem solving and exploration of the subject matter (Dowd, 1991). Providing autonomy for students permitted problem solving and willingness to participate in matters that brought about effective change (Dowd, 1991).

Bennett, Hoffman, and Arkins (2010) provided research concerning an evidence-based practice course to determine if allied health students' confidence and knowledge improved. By a using multi-professional approach of training, it was demonstrated that shared learning experiences from two or more professions encouraged mutual understanding and awareness of different health professionals' roles (Bennett et al., 2010). Pretest and posttest were administered to determine the change in the students' attitudes, confidence, and perceived actual knowledge regarding evidence-based practice. The results of this study showed the attitudes changed, but the results were not statistically significant. The improvement in confidence and knowledge in using the skills for evidence-based practice was statistically significant. As a result, most of the participants agreed that evidence-based practice was important to allied health and can make a difference in patient care (Bennett et al., 2010).

Best Teaching Practices in Occupational Therapy Education

As noted earlier, the instructional strategies of interactive small groups, CAL, and patient educators were found to be effective means of teaching musculoskeletal clinical skills to first year higher education students (O'Dunn-Orto et al., 2012). The use of a multitude of methods were useful in teaching manual techniques (O'Dunn-Orto et al., 2012). There is a need for further research to clarify if these interventions are effective for occupational therapists and occupational therapy assistant practitioners. Students learn in various ways; therefore, several strategies need to be implemented in the teaching methods in order to have the greatest learning experience (Donche et al., 2013).

Due to the demand of on-line education, research by Hayden (2013) concluded that students can actually learn the psychomotor skills of teaching safe transfers online. Hayden used both quantitative and qualitative research to gather the data. Hayden determined that there were

many concerns for moving the traditional type of educational instruction to the online teaching environment. Overall student competency performances in an occupational therapy assistant program were found to be clinically competent or slightly better when trained online as compared to their classroom counterparts (Hayden, 2013). Therefore, the online teaching is another strategy that has been implemented to provide the most effective teaching for the fast-changing world.

Teaching Manual Therapy Skills

Finally, teaching manual therapy skills is best imparted using a variety of avenues. Small group discussions, interactive teaching, CAL, patient educators, structured interventions, student driven experiences, online learning, and audio-visual aids can be a part of occupational therapy practitioners educational experience (Donche et al., 2013). There appears to be a need for a multitude of teaching methods for hands on clinical skills.

Manual Therapy Techniques and Shoulder Pain

Individuals of all ages experience shoulder pain often as a result of musculoskeletal injuries. In 2014, the United States (U.S.) Bureau of Labor Statistics estimated 8.2% of musculoskeletal injuries involved shoulders (Marik & Roll, 2017). Older adults experience shoulder pain at a higher rate, estimated at 21% (Hermoso & Calvo, 2017 as cited by Marik & Roll, 2017). Three manual therapy techniques are important in reducing pain, improving elasticity, and increasing range of motion (ROM) of an injured shoulder. Often manual therapy stretching, joint mobilization, and myofascial trigger point release are techniques utilized as preparatory treatment to prepare the tissue for further motion and flexibility.

Research has shown the effectiveness of interventions administered by occupational therapists in the treatment of work-related injuries and clinical conditions of the shoulder (von

der Heyde, 2011). In one study, patients with chronic shoulder pain benefited minimally from graded exercise therapy (von der Heyde, 2011). In contrast, individuals with adhesive capsulitis and subacromial impingement had improvements with joint mobilizations. In terms of improved motion, diminished pain, and a shortened treatment time, deep friction massage and joint manipulations were found to be beneficial in patients with adhesive capsulitis (von der Heyde, 2011).

Manual therapy techniques were included in several treatment regimens for the shoulder. For instance, Marik and Roll (2017) provided research that encouraged occupational therapists to utilize preparatory interventions in daily treatment for shoulder pain due to positive outcomes in decreasing pain and increasing function. The preparatory evidence-based interventions included exercises, mobilization, manual techniques, and physical agent modalities such as electrotherapy, laser, cryotherapy (Marik & Roll, 2017). This research correlates with one's well-being in that when the pain decreased, the clients' functional independence and sense of health improved (Marik & Roll, 2017). Crowell and Tragord (2015) also described a conservative type of orthopedic therapy that included manual therapy to address the painful shoulder that exhibited reduced active ROM. The treatment options for the arthritic glenohumeral joint included manual therapy, physical therapy, medications, corticosteroid injections, viscosupplementation, and surgery (Crowell & Tragord, 2015).

Problem Statement

The problem that this Capstone project will address is that occupational therapy practitioners in underserved regions and in various types of settings have no instruction in the treatment of the shoulder utilizing manual therapy and preparatory methods to decrease pain. In reviewing the literature, research indicated that there is a need for this educational study.

According to the Accreditation Council for Occupational Therapy Education (ACOTE) occupational therapy education programs do not specifically teach manual therapy techniques in their curriculum, but allow them to be administered as a preparatory method mentioned in the specific ACOTE Standard B.5.3 (AOTA, 2013). Therefore, many occupational therapy practitioners are lacking in knowledge regarding manual therapy and how to utilize this intervention in patient care (O'Dunn-Orto et al., 2012). In numerous facilities where occupational therapy is practiced, many patients are not receiving manual therapy treatment that has been proven effective in treating shoulder dysfunction. Therefore, in order to improve current occupational therapy practitioners' skills and abilities, additional training with is needed to improve best practice and client functional outcomes after shoulder injuries.

Purpose of the Project

The purpose of this research project was to determine the best practice for teaching manual therapy techniques to occupational therapy providers thus increasing their knowledge, skills and ultimately improving patient care by reducing client shoulder pain. This in-service will educate occupational therapy practitioners in hands on methods for administering relevant manual therapy clinical interventions to decrease shoulder pain more effectively and thus improve the quality of occupational therapy interventions for shoulder pain (Healthy People 2020).

Research Questions

1. Does training in best practices for manual therapy techniques increase occupational therapists' knowledge for implementing manual therapy?
2. Which active learning strategies do the occupational therapy practitioners prefer when learning new hands-on skills of manual therapy?

3. Does training in best practices for manual therapy techniques increase occupational therapists' frequency of implementing manual therapy in practice?

Theoretical Framework

The Capstone project utilized three types of learning styles for the theoretical framework. The three types of learning styles included: the behaviorist learning theory, constructivism, and active learning strategies. Each learning style provided additional strategies of teaching to provide a more comprehensive way of learning. Together all three learning theories provide a cohesive method of learning styles to teach all types of learners.

Behaviorist Learning Theory.

The behaviorist learning theory is composed of the teacher-centered approach (Torre et al., 2006). In this theory, the educator manipulates the learning environment in order to elicit a specific learning response (Torre et al., 2006). The main goal of behaviorist learning is to create a behavioral change in the student in a desired direction (Torre et al., 2006). The desired observable behavior is the focus of the learning in an external setting (Torre et al., 2006). The main principles of the behaviorist learning theory are that knowledge is obtained through behavioral responses to the environmental stimulant and passive absorption of a body of knowledge by the learner is promoted through repetition and positive reinforcement (UC Berkeley, 2016). Furthermore, extrinsic motivation is provided by involving both positive and negative reinforcement (UC Berkeley, 2016). Finally, the desired behavioral responses are conveyed by the teacher and absorbed by the student (UC Berkeley, 2016).

The behaviorist approach influenced the design of the Capstone project, its implementation, and the analysis of the data. The instructor shared expert knowledge with the students and collected data through the pretest/posttest to measure the desired behavior (Flores,

2013). Other active learning strategies were developed to provide repetition and positive reinforcement, included in the behaviorist approach, which were significant in the learning process.

The behavioristic learning was the earliest identified method of learning through research (Bradshaw & Hultquist, 2017). The behaviorist learning theory is used to teach students who are in various health professions competency skills (UC Berkeley, 2016). This approach is used in the development and evaluation of clinical skills (UC Berkeley, 2016). Students observe the exact technique and manner in which the desired behavior is to be implemented (UC Berkeley, 2016). Teachers will demonstrate behaviors and specific techniques in which standard assessments are completed (UC Berkeley, 2016).

The behaviorist learning theory is important to the clinical setting. By teaching the behavioral learning theory, occupational therapy practitioners are skill building (Davis & Arend, 2013). Through practicing tasks and procedures, occupational therapy practitioners can gain the knowledge and the skills to administer manual therapy techniques to clients with shoulder pain. the learner will gain the knowledge and clinical skills necessary to improve his or her client's occupational performance (Davis & Arend, 2013). Practicing the manual therapy techniques on each other in lab is a great way to reinforce the learning (Davis & Arend, 2013).

Constructivism Learning Theory.

The constructivism learning style is composed of cognitive constructivism and social constructivism. The cognitive area consists of combining new information with the old knowledge (UC Berkeley, 2016). During this process, the combining of information allows the student to make changes to his intellectual framework to adapt and work with the new information (UC Berkeley, 2016). Social constructivism focuses on motivation and views this as

both intrinsic and extrinsic (UC Berkeley, 2016). The internal drive of the learner also influences their ability to understand and encourages the growth in the learning process (UC Berkeley, 2016).

The constructivism theory of learning was used in this Capstone project during the in-service to allow the occupational therapy practitioners to process new information by relating it to previous experiences (Clark, 2018). This allows the occupational therapy participant to connect the old information with the new learned information (Clark, 2018). Constructivism is a learner-centered approach that requires the student to take responsibility in the learning process (Clark, 2018). Constructivism provided the learner with active learning while the instructor is the facilitator (Clark, 2018). Clark believed that individuals learn best when they actively discover and construct their own meaning from information presented (2018).

Social constructivism was influenced by providing different active learning strategies to influence the learner. According to Brandon & All, constructivism builds up the curiosity of the student and motivates him or her (2010). Constructivism provides the learner with reflecting, predicting, manipulating, and constructing new knowledge that is more meaningful (Brandon & All, 2010).

Active Learning Strategies.

Lastly, active learning strategies allows the student to be involved in the learning as they are actively participating. The active learning strategies implemented into the in-service training included practice on a partner, hands-on demonstrations of the manual therapy techniques, and questions and answers. Practicing on a partner reinforces learning through the instructor guiding the student through the information and then allowing time to practice (Fook, 2012). This is due

to being able to participate in the learning process by actively performing the manual therapy technique on a real shoulder.

Case studies were used to provide a type of active learning for the occupational therapy practitioner during the in-service. Case studies can promote discovery-oriented learning and deep processing (Donche et al., 2013). Case scenarios provide students with insight, information, and perceptions to real life situations. This active learning style also can require critical thinking and clinical reasoning through inductive, deductive, and intuitive analyses (da Silva Bastos Cerullo & da Cruz, 2010). Students analyze, use critical thinking skills, and clinical reasoning to practice his or her hands-on skills.

The PowerPoint presentation provided the lecture in a more active format to effectively engage the learner (O'Dunn-Orto et al., 2012). The PowerPoint presentation also provided videos of demonstrations of manual therapy techniques to increase active learning and clinical skills demonstration. The teaching strategy of questions and answers facilitated clinical reasoning, critical thinking and reflection of the participants. When participants are comfortable in asking questions, this encourages professional learning and positive attitudes (da Silva Bastos Cerullo & da Cruz, 2010).

Teaching musculoskeletal clinical skills to medical trainees was found to be more effective through interactive small groups (Donche et al., 2013). Demonstrating manual therapy techniques on each other in the classroom is an interactive lab exercise that can encourage a deeper understanding of hands-on skills. Also, peer teaching and learning has been used an active learning strategy for training musculoskeletal clinical skills.

Significance of the Study

During therapy, occupational therapy providers are challenged with situations that they are not always prepared to address. Practitioners are often faced with patients experiencing painful symptoms and dysfunction due to adhesive capsulitis or other painful shoulder diagnoses (Rainbow, Weston, Brantingham, Globe, & Lee, 2008). Many painful shoulder problems can benefit from manual therapy techniques. There is a need for this educational study due to the gap in the content of the educational system according to ACOTE standard, section B.5.3 (AOTA, 2018). Most occupational therapy providers lack knowledge in manual therapy techniques because it is not required in the university curriculums (AOTA, 2018).

Occupational therapy providers need this knowledge to decrease client's shoulder pain, increase ROM, and increase functional use of the upper extremity (Camarinos & Marinko, 2009). This practitioner knowledge can improve the client's ability to complete self-care as well as overall daily occupational function.

Occupational therapy practitioners, occupational therapy students, educators and other health care professionals need to provide the most effective teaching strategies and methods for teaching manual therapy for the treatment of shoulder pain. The goal of this educational in-service will be to improve the knowledge and ability to administer manual therapy techniques to clients by occupational therapy providers. As a result, this Capstone project is significant for healthcare/occupational therapy outcomes, occupational therapy practice, the ability of occupational therapy practitioners to deliver effective treatment, and possibly encourage a change in curricula of occupational therapy programs.

Occupational therapy practitioners must continue to improve in their knowledge as well as ability to provide interventions that improve the outcomes of patients. The ability to provide

and deliver therapy that is most effective can reduce a patient's pain more quickly. The need for this study is evident and must be communicated in order to influence manual therapy training for occupational therapy practitioners, improved recovery from shoulder pain for the patients' benefit, and possibly for new policy development. By educating occupational therapy practitioners about manual therapy, techniques will improve best practice and client outcomes.

Summary

The Capstone project can provide evidence-based practice research for utilizing best teaching strategies to teach manual therapy techniques to occupational therapy practitioners. This research can show whether students preference for learning in small group discussions, interactive teaching, CAL, patient educators, structured interventions, student driven experiences, or audiovisual aids. Each student's personality and motivation for learning may be a factor in determining the best teaching strategy for learning (Donche et al., 2013). All students learn in his or her own way, therefore several strategies will be implemented in the teaching methods to encourage the best possible learning experience for each student.

Occupational therapy practitioners need educational reinforcement and repetition regarding administering manual therapy techniques to decrease shoulder pain in patients in all settings. This research can demonstrate what teaching methods are best for occupational therapy practitioners to improve his or her knowledge and clinical skills regarding manual therapy techniques to better serve the clients.

Section Two: Literature Review

The focus of this study required an understanding of best teaching strategies and learning styles for a continuing educational in-service. It also addressed the lack of manual therapy skills among occupational therapists and occupational therapy assistants. Finally, thorough knowledge of the efficacy of manual therapy was needed. A review of the literature enabled the study to be optimally designed for both methods of teaching and content in order to address the disparity of knowledge in manual therapy among occupational therapy practitioners.

Best Teaching Strategies

In order to determine the best strategies for teaching in higher education, research has been completed regarding styles of teaching as well as learning. This research showed that current education has been redirected back to the purpose of teaching, learning, and assessment. Studies reveal that college educators are being required to pay greater attention to enhancing student learning (Fook, 2012). The core processes behind education and teaching were found to include assessments that focus on ways in which teaching and learning are assessed and methods via which content is taught and learned (Fook, 2012). There are three major approaches to teaching. These include: "teacher-centered/content-oriented teaching which is instruction of content", "student-centered/learning-oriented which entails guiding a student", and "bridging the student and teacher interaction which is common in an apprentice-master or doctoral candidate-supervisor relationship" (Fook, 2012, p. 4818).

Teacher-centered learning.

Light, Cox, and Calkins stated that "Teaching involves changing the beliefs and habits of a learner or a student" (as cited by Fook, 2012, p. 4818). During this study, there were drawbacks in the teaching. Many students reported that their teachers needed to have a richer repository of their topics (Fook, 2012). Even though everyone learns in individual ways, a good

teacher is able to successfully teach to different learning styles. Teacher-centered learning encourages, "students to learn some content for a certain purpose" (Fook, 2012, p. 4818).

Student-centered learning.

Fook found that a student's learning may be enhanced by incorporating small group discussions, classroom activities, and small assignments with feedback (Fook, 2012). In the educational setting, the student must be motivated to learn, be continually searching for understanding, be respectful to others and their viewpoints, and be receptive to others' ideas (Fook, 2012). Computer-assisted learning (CAL) is also an active learning teaching strategy that encourages student-centered learning (O'Dunn-Orto et al., 2012). Health care practitioners often learn through the student-centered learning strategy. Research has supported medical professionals participating in the CAL to learn through active learning strategies and having increased ability to retain the knowledge (O'Dunn-Orto et al., 2012).

Bridging the student and teacher interaction.

Fook described this style of teaching as being utilized in an apprentice-master or doctoral candidate-supervisor relationship (Fook, 2012). The majority of the time, the goals were not well defined (Fook, 2012). All universities wanted to declare that they are offering 'high quality learning and teaching' (Fook, 2012). However, each university was attempting to achieve these goals in various ways (Fook, 2012).

The manual therapy in-service conducted for this study utilized all three major approaches to teaching which include teacher-centered, student-centered, and bridging the student and the teacher. The teacher-centered approach was used when the content of the course was taught through active teaching strategies. The student learning approach was implemented during the guiding of the student hands-on experiences of practicing the manual therapy

techniques. The final teaching approach included bridging when the teacher interacted with the students during case scenarios, hands-on experiences, and the practicing experience.

Current Learning Styles

It was found that the learners of today are different than the learners of the past. The learners of today are using a combination of two types of active learning like interactive small groups and hands-on experiences and the learners of the past used the lecture style of learning. This study revealed that students are learning in different ways in which didactic lecture is ineffective (Ebert, 2016). The researchers also found that the millennial learners are not afraid of a challenge or assignments requiring new technology, and they attack the active learning assignments with vigor (Ebert, 2016). One study determined that in-class projects are an effective method of teaching the millennial learner through the active learning component (Ebert, 2016).

New teaching strategies were found to modernize higher education by maximizing participation in the teacher-centered learning process. As a result, active learning strategies provide meaningful and purposeful knowledge as they inspire students (Imran & Tahir Ullah, 2016). This study also noted that the lecturer method of teaching that has been common in higher education for many years has focused on the transmission of knowledge. Now this teaching method is being criticized (Imran & Tahir Ullah, 2016). The lecture method was not conducive for producing deeper understanding or creativity unlike the new strategies of teaching that are now being implemented (Imran & Tahir Ullah, 2016). Therefore, the traditional methods of teaching have been tossed aside and reborn in a form of active learning that focuses on innovation and employability in society (Imran & Tahir Ullah, 2016).

Student-centered interactive learning.

One study revealed current learners offer new challenges for educators today (Ebert, 2016). As a result, this presents learning opportunities for the teachers who are teaching them. This has required new and different techniques for teaching to be implemented into higher education in order to provide the best teaching strategies for the learner of today (Ebert, 2016). New teaching strategies were found to change students' attitudes and motivations and thus cause a change in the way students feel about the topics (Ebert, 2016).

A different study compared the use of didactic lectures versus interactive learning for an orthopedic undergraduate course (Costa, Rensburg, & Rushton, 2007). The sample used by the study included seventy-seven medical students that were assessed in three consecutive groups. The first group received twelve formal lectures, and the second group received twelve discussion sessions with self-directed learning. Each of the groups covered the same orthopedic and trauma material. The discussion group learners rated the presentation of their learning higher than the group who listened to lecture presentations. Both groups of learners rated their content the same. In addition, both groups performed well on the end of placement written test; however, the learners in the discussion group performed better. The active learning group's better performance was attributed to the learners enjoying the discussions, being engaged in the learning process, and therefore retaining more factual knowledge. This study confirms that interactive discussion was a preferred method of learning in undergraduates of orthopedics and trauma and that interactive learning demonstrated an improvement in the student's learning and knowledge (Costa, Rensburg, & Rushton, 2007).

Teaching Clinical Skills of Manual Therapy

Manual therapy can be defined as administering techniques for restoring tissue to its normal extensibility which improves the range of motion, decreases pain, and improves function (Duenas et al., 2019). This capstone project educated occupational therapy practitioners by defining stretching, myofascial trigger point release, and joint mobilization techniques that were effective in reducing shoulder pain and improving occupational performance.

Several studies raised concerns regarding the inadequacy of clinical skills teaching and its consequences on the implementation of appropriate interventions. Such questions can negatively impact the reputation of the healthcare systems, healthcare education, and ultimately patient therapeutic services.

According to a study carried out by O' Dunn-Orto et al. (2012), the optimal methods for teaching musculoskeletal clinical skills were patient educators, interactive small groups, and CAL. The students learned clinical skills through direct observations and interactions with the patient educators regarding their musculoskeletal injuries. These small groups allowed the students to interact with others in discussions or demonstrations to enhance their learning regarding the medical aspects of the patients. CAL was another educational method used to reinforce the teaching of clinical skills to students in the health care setting (O' Dunn-Orto et al., 2012). Even though the study was not able to recognize a best method for the learner to learn, these interactive methods seemed to complement each other and provided an opportunity for the students to become engaged (O' Dunn-Orto et al., 2012). The findings indicated there was a need for further research to clarify how and why these interventions were effective (O' Dunn-Orto et al., 2012).

Many new methods for teaching clinical skills have increased in the last few years and have provided several benefits. One of the benefits listed by O' Dunn-Orto et al. (2012) was the increased cost-effectiveness of using patient educators compared to the didactic lecture style and other traditional strategies. Another benefit mentioned was that educators have new methods to maximize the efficiency of teaching due to limited time for instruction, and some of these implemented strategies have limited evidence to support them (O'Dunn-Orto et al., 2012). In conclusion, "the heterogeneity of populations, designs, interventions, comparators, and outcomes measured prohibited the deductions of a single most efficient teaching method" (O'Dunn-Orto et al., 2012, p. 100).

An adequate knowledge level in professors who teach higher level education was found to be critical for students to be successful. "A skilled and professionally trained teacher is the prerequisite for quality teaching in higher education" (Imran & Tahir Ullah, 2016, p. 3). The teacher's role in higher education, is to provide knowledge and to mold the abilities of college learners (Imran & Tahir Ullah, 2016). Universities seek professionally trained, research oriented, and knowledgeable faculty to teach students at the higher level of education (Imran & Tahir Ullah, 2016). While this was relevant in all areas of studies, this was especially pertinent when dealing with clinical skills of healthcare clinicians.

Students in another study were influenced by the methods and style in which the teacher decided to deliver the information. Teachers have the ability to provide educational teaching methods that engage the learner and provide the most effective learning environment for the students. An unexpected relationship between student learning and teaching strategies was identified in a study by Donche et al. (2013). Direct instruction was used more often by teachers

and this was found to be associated with lower levels of external regulation (Donche et al., 2013).

Teaching strategies were noted to have an independent effect on learning strategies, regardless of student characteristics (Donche et al., 2013). It was noted that both a student's personality and academic motivation influence learning which partly explains why students learn the way they do (Donche et al., 2013). This research provided valuable information regarding how both the teacher and the teaching strategy are very influential in learning (Donche et al., 2013). Many of the teaching strategies used in the research by Donche et al. have been shown to be related in teaching clinical skills in the healthcare field.

The FIDeLity Feedback was used during the role play, encouraging the critical thinking, and clinical reasoning regarding specific situations of shoulder pain (Fink, 2003). A participant was evaluated and assessed by all students through practice of these manual therapy techniques on one another (Fink, 2003). FIDeLity Feedback was also applied in the application taxonomy to give immediate feedback. To ensure students were learning appropriate techniques, critical thinking and clinical reasoning allowed the students to evaluate the case scenario to provide the correct interventions. Integration was using FIDeLity Feedback during hands-on and observation of technique applied to the student (Fink, 2003). Through this exercise and reflection, the participants gained a better understanding of themselves and gained a better way to implement manual therapy techniques in their treatment. As can be seen, using a variety of methods to teach a subject was shown to be useful in promoting learning in general and more specifically, the learning of clinical skills. The motivation of the learner is one factor that was noted to be beyond the control of the instructor. However, using an interactive approach was

determined to likely enhance involvement and thereby promote the retention of knowledge (Fink, 2003).

The information from this researcher's needs assessment revealed there was a need for this educational study because occupational therapy practitioners lack knowledge skills regarding manual therapy as well as implementation (O' Dunn-Orto et al., 2012). Also, occupational therapists appear to need additional education modules that can broaden their scope of occupation-based practice (O' Dunn-Orto et al., 2012).

In summary, the needs assessment has helped to outline the possible best teaching strategies for implementing an in-service for manual therapy. The data collected from the needs assessment was used to help structure the capstone project for occupational therapy practitioners. Also, the data become influential in preparing the manual therapy in-service and designing the capstone project. Furthermore, research provided information regarding how students learn and what teaching strategies provide the most effective active learning for healthcare workers. By providing occupational therapy practitioners with the best teaching strategies for teaching manual therapy techniques such as stretching, myofascial trigger point release, and joint mobilizations, practitioners will be more knowledgeable and confident when addressing a client's shoulder impairments.

Painful shoulder.

Occupational therapy practitioners treat clients with different types of painful shoulders. Shoulder function is often impeded by symptoms of pain and limited AROM due to different conditions of the tissue in the glenohumeral joint. There are several types of shoulder pain diagnoses. The shoulder conditions articles reviewed are rotator cuff tendinopathy, rotator cuff tear, painful shoulder, glenohumeral joint osteoarthritis, adhesive capsulitis, and shoulder

impingement. and. All of these painful shoulder conditions have symptoms of pain and limited AROM. There are several possible interventions for a painful shoulder.

In two studies, spinal manipulation and joint mobilization were interventions for treatment of the painful shoulder and rotator cuff tendinopathy. The focus of spinal manipulation was found to be returning the physiological movement in areas where there is restriction or dysfunction (Da Silva et al., 2016). Da Silva et al. reported that thoracic vertebral manipulation may be helpful in reducing pain and dysfunction in the painful shoulder. Haddick (2007) suggested that impairments of the cervical spine and upper limb neural tissue may contribute to shoulder pain and dysfunction. By addressing the impairments in the cervical and upper thoracic spine, research showed that a more positive effect on functional outcomes could occur (Haddick, 2007).

The second type of intervention for painful shoulder in the research was joint mobilization. "Studies analyzing the effect of cervical spine mobilization in patients with signs of increased upper limb neural tissue mechanosensitivity have also produced favorable outcomes (Haddick, 2007, p. 343). It was noted patients with shoulder pain and functional disability who receive a manual therapy approach experienced improved occupational performance (Haddick, 2007).

A painful shoulder can also be caused by damage to the rotator cuff. The rotator cuff was found to be an important part of the shoulder and was also found to be a common structure for injury. The researchers noted that the rotator cuff is composed of four muscles and tendons (supraspinatus, infraspinatus, teres minor, and subscapularis). As people age, impingement syndrome and rotator cuff tears were found to become more frequent (Capelle et al., 2010). It was also noted that impingement syndrome occurs when there is a pinching and irritation of

tendons located under the shoulder bones (Capelle et al., 2010). Researchers found that rotator cuff injuries occur when there is damage to one or more of the four tendons that make up the rotator cuff. This type of injury causes severe or continuous pain and disability depending on the injury being a full or partial tear (Capelle et al., 2010). Doctors often inject steroids into the shoulder to reduce the pain and inflammation associated with a rotator cuff injury and increase ROM (Capelle et al., 2010).

Providing a mix of different types of manual therapies can improve ROM and occupational performance secondary to painful shoulder. By utilizing manual therapy and joint mobilizations as interventions, clients suffering from painful shoulder can experience significant improvements in their ROM. Research by Camarinos and Marinko regarding manual therapy demonstrated this increase. Passive range of motion (PROM) allowed the examiner to assess the amount of available ROM in the participants' joint and the resistance of connective tissue. Based upon the results of the assessment, the examiner could determine appropriate interventions (Camarinos & Marinko, 2009).

Although manual therapy has been described as a way to reduce pain in the painful shoulder, the research completed by Camarinos and Marinko (2009) could not fully support this conclusion. In the studies that assessed pain as an outcome, it seems that there is not a reliable method in the literature for measuring shoulder pain. Thus, the efficacy of manual therapy reducing pain could therefore not be adequately determined (Camarinos & Marinko, 2009).

Manual therapy was also found to be a positive intervention for the painful shoulder that occurs in the joints of the shoulder. Crowell and Tragord (2015) researched manual therapy for shoulder pain with glenohumeral joint osteoarthritis. Although they acknowledged the need for more research, they determined that potential benefits were associated with these interventions.

Sueki and Chaconas (2011) reported that manipulative techniques directed at the thoracic spine in therapeutic interventions are directed towards rehabilitation of the painful shoulder. This was derived from the premise that shoulder dysfunction could be potentially related to dysfunction of the spine (Sueki & Chaconas, 2011). Manipulative techniques can vary. Therapists must let the patient's clinical presentation guide the type and selection of the manipulative technique (Sueki & Chaconas, 2011).

The painful shoulder required various types of preparatory methods including manual therapy, exercises, and corticosteroids to reduce the shoulder pain and improve the overall function. There was not one specific intervention that is a cure all for the painful shoulder. However, it was suggested that the preparatory interventions could improve function and decrease pain in people with musculoskeletal disorders, with stronger emphasis on exercise interventions (Marik & Roll, 2017). Strong evidence for post-surgical interventions for rotator cuff tear concluded that progressive tendon forces and standard rehabilitation programs were successful (Marik & Roll, 2017).

From the literature review, three manual therapy techniques emerged as skilled intervention for a painful shoulder. The three manual therapy interventions that occupational therapy practitioners can learn to treat individuals with a painful shoulder are stretching, joint mobilizations, and myofascial trigger point release. Each of these manual therapy techniques will be defined, described, and researched to be a part of evidence-based practice.

Stretching.

Stretching is often mentioned as a preparatory method to initiate interventions for the painful shoulder. Manual stretching for ROM is typically a precursor to a client's active movement during purposeful activity (Earley & Shannon, 2006). Occupational therapy

treatment can incorporate self-stretching along with structured tasks, such as Pilates and reaching to write on a chalkboard to encourage active ROM and occupational performance (Earley & Shannon, 2006). In this research article, the application of heat was applied to the shoulder before stretching of the upper extremity during therapy which maximized the safety and comfort of the client (Earley & Shannon, 2006). Earley and Shannon researched stretching and determined a preparatory method as an essential intervention as the "means to-an-end" to facilitate function for the client with shoulder adhesive capsulitis.

Stretching was found to be a preparatory method complimented by other interventions. Stretching was utilized as an intervention in the treatment of athletes, specifically baseball players. Bailey et al. (2017), researched the effectiveness of manual therapy along with stretching to treat baseball players with deficits in shoulder ROM. This research determined that manual therapy reduces the risk factors of decreased ROM in baseball players with motion deficits when compared to stretching alone (Bailey et al., 2017).

Before stretching is completed, heat can be applied to reduce the pain and increase the elasticity of the shoulder muscles. Once pain reduction in the joint was achieved, therapists attempted to increase the ROM in the joint capsule. Nitz (1986) reported that stretching increases the length and the typical physiological motion occurring in the joint. Nitz also described in detail how to complete joint mobilizations to the shoulder and how this provides freedom to the scapula and decreases pain and increases function.

Many types of interventions included stretching but it was difficult to determine which of these was best. Also, another study was inconclusive regarding the best type of rehabilitation post shoulder surgery (continuous passive motion, supervised versus unsupervised therapy, land -versus aquatic-based therapy or therapist-guided programs; Marik & Roll, 2017). This research

study provided strong evidence that a wide spectrum of interventions is effective in decreasing pain and increasing function depending on the type of shoulder disorder (Marik & Roll, 2017).

One study found that there were several different methods in manual therapy which provide stretching to increase shoulder range of motion. The contract-relax with proprioceptive neural facilitation (PNF) technique was noted to use a five to seven second isometric stretch of the muscle while it is contracted. The muscle is then relaxed for two to three seconds, followed by a ten to fifteen second stretch that occurs farther than was initially attained (Dajah, 2014). This stretching technique was used for glenohumeral external rotation. It was proven to immediately reduce pain as well as increase active range of motion in clients with shoulder impingement dysfunction (Dajah, 2014). When treating clients with shoulder impingement, soft tissue mobilization and stretching were found to be pertinent for increasing passive range of motion, active assistive range of motion, and active range of motion. By stretching and elongating shortened structures, joint function may be restored as well as overall range of motion (Dajah, 2014).

Joint mobilizations.

Manual therapy techniques such as joint mobilization and soft tissue manipulation were also implemented in the treatments of different diagnoses that produce shoulder pain. Joint mobilization can be defined as a type of passive range of motion that addresses joint gliding and is administered by the therapist as an intervention to improve mobility of the shoulder (Reed, Begalee, & Lauder, 2018). Joint mobilization is an intervention shown to improve joint motion and kinematics (Reed et al., 2018). A few joint gliding techniques that were used in treatment for the shoulder include glenohumeral joint anterior/posterior glides, glenohumeral internal rotation, pull arm distraction of the glenohumeral joint, and scapular release. Soft tissue

manipulation was used to increase blood circulation, decrease pain, and increase tissue elasticity. Soft tissue manipulation included applying pressure to tissue to reduce trigger points and scar tissue, elongating muscles via techniques like cross friction massage, and oscillating joints and muscles to loosen tension (Reed et al., 2018).

Joint mobilizations are important techniques utilized in the treatment of adhesive capsulitis or frozen shoulder (Deshmukh, Salian, & Yardi, 2014). Adhesive capsulitis is defined as a condition that occurs when adhesions are formed in the shoulder capsule of the glenohumeral joint (Deshmukh et al., 2014). In adhesive capsulitis the capsular pattern of restriction occurs in which external rotation was found to be most limited, followed by abduction and then by internal rotation (Deshmukh et al., 2014). In the field, adhesive capsulitis is often referred to as frozen shoulder.

In the research article by Donatelli, Ruivo, Thurner, and Ibrahim (2014), pain and restricted active range of motion were the characteristics that identify adhesive capsulitis or frozen shoulder. When examining a shoulder with adhesive capsulitis, shoulder abduction was determined to be a motion that is typically limited and caused the client significant pain. This article further reported that the subscapularis was the stabilizer of the glenohumeral joint (Donatelli et al., 2014).

Most of the time a patient with a diagnosis of adhesive capsulitis is not provided with a stage of dysfunction. Often the therapist will try to determine the clinical stage of frozen shoulder and then choose the appropriate intervention. O'Sullivan (2018) described the four clinical stages of frozen shoulder contracture syndrome (FSCS) by examining the clinical presentation, histology, and arthroscopic findings. During the early stages of impairment of adhesive capsulitis, many different forms of treatment were found to be on equal footing.

Through a study, Fukushima (2009) examined the glenohumeral joint restrictions and the relationship of the painful stiff shoulder and the appropriate intervention for returning to normal range of shoulder abduction to the frozen shoulder. All participants of this study were educated regarding pendulum exercises and then were randomly assigned to one of four treatment groups: the intra-articular steroids group, the joint mobilization group, the ice therapy group, and the placebo group (Fukushima, 2009). The study found little long-term advantage in any of the treatments, but the steroid injection was found to benefit pain and range of motion during the early stages of the impairment (Fukushima, 2019).

One particular type of joint mobilization was described as scapular mobilization. Patients having frozen shoulder syndrome were noted to have difficulty with scapular upward rotation, posterior tilt, superior tilt, and external rotation and these were the movements or patterns of dysfunction (Surenkok, Aytar, & Baltaci, 2009). Scapular mobilization was essential in the active range of motion and use of the shoulder in occupational performance. Limited scapular mobilization presented with abnormal active range of motion of the shoulder as well as increased pain. By assessing abnormal scapular biomechanics, the impaired scapular mobility was identified first. Then scapular mobilizations were performed to reduce the impairment (Surenkok et al., 2009). The interventions for this study included superior and inferior gliding, rotations, and distraction to the scapula of the affected shoulder (Surenkok et al., 2009).

Practitioners were found to be continually faced with addressing the need to help patients who suffer from painful symptoms and disabilities associated with frozen shoulder (Rainbow et al., 2008). Practitioners were seen as needing to evaluate by using clinical, evidence that exists, combined with clinical experience in order to guide the patient toward a successful outcome (Rainbow et al., 2008). When working with patients that have comorbidities such as

impingement syndrome of osteoarthritis, researchers stated that therapists must be aware of the concern that aggressive mobilization or manipulation may worsen or prolong adhesive capsulitis in the acute, inflamed stage (Rainbow et al., 2008).

The Maitland's joint mobilization technique was touted as a good technique for providing distraction in the shoulder joint to increase active range of motion. This technique was utilized in the treatment of adhesive capsulitis by stretching the fibers around the joint capsule. This helped to increase room in the joint capsule and decrease pain. The myofascial release arm pull technique preceding the Maitland's joint mobilization technique resulted in a significant difference with respect to pain, function and range of motion (Deshmukh et al., 2014).

Myofascial trigger point release.

Two trigger point/tender point articles examined the effectiveness of the release of trigger points and the reduction of pain in the shoulder (Paz, Kerppers, & Frez, 2014). Trigger points were described as areas of taut tissue that cause pain in joints and may limit active range of motion of the joint. According to researchers, trigger points often appear as knots in muscle tissue and tendons. Ischemic pressure was used to release myofascial trigger points by manually compressing the muscle at a specific point, certain intensity and adequate duration to alleviate the pain in the muscle (Paz et al., 2014). This ischemic pressure was administered by the application of digital pressure sustained over a point until the heartbeat feeling dissipated (Paz et al., 2014). McPartland and Simons (2006) referred to the ischemic pressure as the "trigger point pressure release" where a single finger pad palpated the taut area of muscle. The tension in the taut area was identified and then palpated by the pad of the finger (McPartland & Simons, 2006). Pressure was applied by the pad of the digit until the heartbeat sensation subsided (McPartland & Simons, 2006). This sequence was repeated over and over until the area of pain diminished in

the shoulder. The technique called the "press and stretch" was also used to mechanically release the tight bands of tension in the muscles which help release the "stuck" feeling of the shoulder joint (McPartland & Simons, 2006). Reducing caffeine, nicotine, and other chemicals that produce hyperexcitable in muscles were also found to help reduce pain in the motor-end plate where the synapse originates (McPartland & Simons, 2006).

Myofascial trigger points can be very painful to the client. This pain was found to originate in the peripheral tissues as a harmful stimulus to the nervous system, better known as nociception (McPartland & Simons, 2006). McPartland and Simons reported that posture was important and this often was a contributing factor to the development of myofascial trigger points in the shoulder and upper spine areas. Haddick (2007) suggested that addressing the impairments of cervical and upper thoracic spine with manual therapy may contribute to a positive outcome.

Another trigger point release technique defined in the literature was dry needling of the upper trapezius and infraspinatus muscles. One research article described the molecular theory of myofascial trigger points which has provided a path for new techniques to treat trigger points (McPartland & Simons, 2006). Myofascial trigger points were described as containing both a sensory and motor component and manual therapy was found to reduce the pain and increase the range of motion (McPartland & Simons, 2006).

Myofascial trigger point release was further found to be very effective in reducing pain found in tender point areas. The researchers stated that occupational therapy practitioners must be able to identify the key signs for when it is appropriate to administer myofascial trigger point release (Kamali, Sinaei, & Morovati, 2019). The key signs identified include local and referred

pain, limited range of motion, hypersensitivity to stretching, and weakness due to pain, without atrophy (Kamali, Sinaei, & Morovati, 2019).

The similarity in the trigger point research articles for dry needling included targeting the upper trapezius muscle. The trapezius muscle and the infraspinatus were determined to have the most frequent trigger points and often muscle imbalance and weakness of the rotator cuff cause tightness in the upper trapezius (Kamali, Sinaei, & Morovati, 2019). Muscle imbalances in the shoulder often have caused pain and shoulder impairments.

As noted, manual therapy was shown to be effective in the treatment of the painful shoulder joint in numerous studies. Although a few studies did not show a significant outcome, the lack of a reliable pain scale to show improvement was a detriment in at least one study. Based on the overall positive benefit of manual therapy in improving joint range of motion, reducing pain and optimizing function, these techniques were seen as a needed part of the occupational therapists' repertoire when treating clients with a painful shoulder.

Conclusion

A review of the literature enabled the study to be optimally designed for both methods of teaching and content in order to address the disparity of knowledge in manual therapy among occupational therapy practitioners. The manual therapy in-service conducted on January 25, 2020, compiled all three major approaches to teaching which include teacher-centered, student-centered, and bridging the student and the teacher.

According to a study carried out by O' Dunn-Orto et al. (2012), the optimal methods for teaching musculoskeletal clinical skills were patient educators and interactive small groups (O'Dunn-Orto et al., 2012). These methods of teaching were integrated into the manual therapy in-service to enhance and engage each unique learning style of the participant.

Students in another study were influenced by the methods and style in which the teacher decided to deliver the information. It was found that teachers have the ability to provide educational teaching methods that engage the learner and provide the most effective learning environment for the students. This method is often blended with other interactive teaching methods to enhance the learning experience.

Another research revealed that teaching strategies were noted to have an independent effect on learning strategies, regardless of student characteristics (Donche et al., 2013). Also, it was found that a student's personality and academic motivation influence learning which partly explains why students learn the way they do. This research provided valuable information regarding how both the teacher and the teaching strategy are influential in learning (Donche et al., 2013).

Further research of the literature was completed that described the three manual therapy techniques of stretching, myofascial trigger point release, and joint mobilization and how clients have benefited through their implementation. According to the research, the overall positive benefit of manual therapy in improving joint range of motion, reducing pain and optimizing function, proves these techniques are a needed part of the occupational therapists' repertoire when treating clients with a painful shoulder.

Section Three: Methods

Project Design

This project was a quantitative, one group, research study that used a pretest/posttest design to examine if occupational therapy practitioners increased their knowledge regarding manual therapy techniques following an educational in-service. During the in-service, three manual therapy techniques were defined as the treatment utilized to reduce shoulder pain which include stretching, joint mobilization, and myofascial release. The design of this project used the best teaching practices as the independent variable and the occupational therapy practitioners gaining knowledge as the dependent variable. The intervening variables include the effectiveness of strategies taught. The quantitative measurements show how the best teaching practices are exerted and effect the knowledge provided (Creswell & Creswell, 2018).

A Likert type scale survey evaluated the teaching strategies and the effectiveness of the in-service. In addition, a follow up survey was sent to all participants by email four weeks after the initial in-service. The follow up survey evaluated if the manual therapy techniques introduced during the in-service were being utilized in the clinic. This research study was designed to determine if occupational therapy practitioners gained knowledge about manual therapy techniques and what were the best teaching strategies for learning those techniques. This study was approved by the university institutional review board (IRB) and included the date of approval.

Setting

The in-service occurred at a skilled nursing facility center in central U.S. This location functioned as an unbiased site as none of the study participants currently worked there. The setting contained a large room that had two mat tables and chairs that occupational therapy

participants used to practice. This location was chosen because of its availability on Saturdays and the location contained the necessary equipment to demonstrate and teach learning strategies. The administrator of the center granted access to the facility at no cost to the researcher, as the space was only needed for one day.

The space in which this in-service occurred included equipment that were necessary for teaching of the study's in-service. This equipment included a projector, laptop, and a screen. These items allowed for the researcher to present video demonstrations of occupations requiring flexibility and strength of the shoulder. Manual therapy techniques were also illustrated through PowerPoint presentation and in person by the presenter. In addition, two plinths were available to use during demonstrations of hands-on manual therapy techniques of the shoulder, such as joint mobilization and scapular release.

In order to engage the occupational therapy practitioners in occupations, there were situational analyses of different occupations such as reaching, picking up objects, tucking in one's shirt, combing hair, brushing teeth, and putting a dish in a cabinet. When examining these situations, the researcher acting as a presenter, explained the motions and necessary muscles needed for each occupation. Following each particular case study, clinical reasoning and analysis were used by the participants to determine the method to decrease shoulder pain of a patient to permit completion of the occupation.

Inclusion/Exclusion Criteria and Recruitment Procedures

The inclusion criteria consisted of a convenience sample of occupational therapists and certified occupational therapy assistants who had signed up for the study. Potential participants were identified and collected through verbal recruitment as they worked at different facilities within the region. In addition to the verbal recruitment, a flyer handed out to occupational

therapy practitioners and occupational therapy assistants was used as a recruitment tool. All of the participants were currently practicing in the field of occupational therapy at the time of the study. The participants of this study were recruited to participate by the presenter and other occupational therapy practitioners in the area. The surrounding region encompassed a one-hundred-mile circle that included parts of central U.S.

The exclusion criteria consisted of those younger than eighteen years of age and those that are not in the occupational therapy field of practice. Subject selection did not distinguish the gender or ethnicity of the participants. The last exclusion includes those individuals that do not attend this in-service.

Project Methods

Occupational therapy practitioners participated in a one-day in-service consisting of hands-on manual therapy techniques such as stretching, trigger point release, and joint mobilizations of the shoulder. The in-service began with registration and each participant of the study signed an informed consent form after it was explained and all participant questions had been answered. A signed copy of the informed consent form was then turned in to the instructor/researcher by each participant.

Next, a pretest was administered to each study participant to establish a baseline for each person's prior knowledge of manual therapy. Following the pretest, the in-service presentation was divided into four sections. The first section provided information regarding manual therapy, definitions of techniques, description of tissue and tissue occurring changes, and the synovial pump effect. The other three sections presented consisted of the manual therapy techniques of stretching, joint mobilizations, and myofascial trigger point release. These are three techniques

that may be used as treatment intervention with clients that have shoulder pain. The research supports that clients report shoulder pain decreases with these manual therapy interventions.

This quantitative, one group pretest/posttest design utilized the literature as a guide to implement the best strategies for teaching the manual therapy course and compared the knowledge before and after the completion of the course. Also, the practitioner's frequency of implementing the manual therapy techniques into clinical practice was assessed to evaluate carry over and gained knowledge.

The three manual therapy topics of stretching, joint mobilization, and myofascial trigger point release were presented by PowerPoint alternating with hands-on demonstrations and case scenario. To wrap up the in-service, a short summary with a question and answer session over the entire in-service and additional hands-on demonstrations were included. A free lunch was provided after the in-service.

The following learning activities were utilized as teaching strategies to the occupational therapy practitioners during the manual therapy in-service. These activities included lecture with PowerPoint slides, videos, and scenarios or case studies, and hands on demonstrations. All of these were utilized by the educator in a way that accomplished the objectives as well as facilitated student learning. Lecture allowed the student to experience the teacher face-to-face and learn in the classroom. The in-service design utilized the behavioral style of learning with the teacher guiding the instructional strategies providing demonstrations of how to administer stretching, trigger point release, and joint mobilizations techniques.

The video demonstrations were embedded in the PowerPoint presentation of the manual therapy techniques which included stretching, joint mobilizations, and myofascial trigger point

release. Video demonstrations were included in this in-service to promote learning and to show demonstrations of specific occupations requiring different shoulder symptoms and impaired active range of motion. Case scenarios were provided to enhance critical thinking and clinical reasoning to allow the students the opportunity to process the steps necessary to provide the best treatment. The instructor/researcher utilized scenarios derived from previous clients having shoulder pain and impaired function to enhance the learning process.

During the in-service, each of the participants were able to practice the manual therapy techniques on one another. Hands-on practice of each technique was completed in pairs to further engage the practitioners and reinforce learning. A short summary followed with a question and answer session over the in-service information presented and additional demonstrations were included as needed.

Table 1. Schedule of manual therapy in-service

Time	Occupation
9:00 – 9:15 A.M.	Informed Consent and Registration
9:15 – 9:30 A.M.	Pretest
9:30 – 10:30 A.M.	Beginning PowerPoint Presentation and Stretching PowerPoint Presentation section with videos Hands-on demonstrations and case scenarios
10:30 -10:45 A.M.	Break
10:45 – 12:00 P.M.	Myofascial tender point release PowerPoint Presentation section with Videos Hands-on demonstrations, case scenarios

12:15- 12:30 P.M.	Break
12:30 – 1:45 P.M.	Joint Mobilization PowerPoint Presentation with videos Hands-on demonstrations, case scenarios
1:45- 2:15 P.M.	Questions and Answers and hands-on demonstration
2:15 – 2:45 P.M.	Completed posttest and survey of in-service
3:00 P.M.	Free Lunch

Instruments

The research study utilized three instruments from which data was collected and analyzed. The three instruments included: a pretest/posttest, an in-service survey, and a follow up practice survey four weeks after the in-service. These instruments were developed with the purpose of collecting specific data to evaluate the participants increase in knowledge, the effectiveness of the teaching strategies used during the in-service, and the frequency of carry-over of the techniques.

The pretest labeled “Pretest/Posttest” was given to the occupational therapy practitioners at the beginning of the in-service and a posttest followed at the end of the in-service. The pretest and posttest were arranged in a manner to provide a comprehensive assessment of the practitioner’s knowledge about manual therapy and the three techniques that were going to be taught during the in-service and then knowledge about the same techniques after the in-service. The data of the pretest was used to determine the occupational therapy practitioners’ prior level of knowledge regarding manual therapy. The pretest was composed of twenty-five questions

that were grouped by categories and were administered to the participants on paper (Appendix A). There were five questions regarding manual therapy treatment techniques, five questions regarding stretching, five questions regarding pressure points, five questions regarding joint mobilizations, and two questions regarding anatomy, and three questions regarding diagnosis or conditions. Each of the three manual therapy techniques that were taught during the in-service had five questions related to each of the techniques. This allowed the assessment to evaluate all learned manual therapy techniques as well as the participants knowledge.

The pretest and posttest questions, in-service survey questions, and the four-week survey questions following the in-service were developed from the literature review and in conjunction with the Chair of the doctoral committee who is a Certified Hand Therapist (CHT). With Dr. Hayden's guidance the researcher/student learned the format and design of the questions and determined the number of questions to provide appropriate data and measurable outcomes. The posttest was administered to the participants at the end of the manual therapy in-service. The posttest was used to determine if there was a change in the occupational therapy practitioners' level of knowledge regarding manual therapy after the in-service. The posttest was the same assessment as the pretest.

The second instrument included a twelve-question Likert type survey regarding how helpful the different teaching techniques in the in-service were for the participants (Appendix B). Six questions were developed to assess how helpful the participants found the various teaching strategies of PowerPoint lecture, video, case studies, handout, hands on demonstrations, and hands on practice. The remaining six questions gauged the occupational therapy practitioners' perception of how helpful the in-service was at increasing manual therapy knowledge, skills, and the likelihood that participants would use their newly learned skills in the clinic. The best

teaching strategies survey questions were evaluated using a number system of 1, 2, 3, and 4. Number 1 represented Not helpful, 2 represented Minimally helpful, 3 represented Moderately helpful, and 4 represented Very helpful. Each participant answered the twelve questions with this 1-4 scale of how helpful a teaching strategy was for him or her personally.

The third instrument was emailed to the participants four weeks following the in-service to determine the participants' frequency use of the three manual therapy techniques on nonpatients or patients since the in-service. The four-week post survey was a Likert Scale assessment (Appendix C) consisting of six questions allowed the participants to rate the type of manual therapy technique that he or she has been using in their practice since the in-service and the frequency of times used in his or her treatment. The questions were graded on the scale of how many times each manual therapy technique had been practiced on a nonclient and used with a client since the in-service with categories as follows:0, 1-2, 3-4, and 5 or more.

Outcome Measures

The three objectives of this research study included: 1) Does training in best practices for manual therapy techniques increase occupational therapists' knowledge for implementing manual therapy, 2) which active learning strategies did the occupational therapy practitioners prefer when learning a new hands-on skill, and 3) does training in best practices for manual therapy techniques increase occupational therapists' frequency of implementing manual therapy in practice? The first objective was measured by the pretest/posttest. The second objective was measured by the in-service survey teaching strategies survey. The third objective was measured by the four weeks follow up survey.

The data from the pretest and posttest was organized in an excel spreadsheet and analyzed to determine if there was a change in the mean average. The two test scores were

evaluated to see if the score increased from pretest to posttest. This increase could indicate that education of the manual therapy in-service increased knowledge of the participants about manual therapy techniques.

The data from the best teaching strategies survey was examined in an excel spreadsheet to determine mean scores for each of the twelve questions on this survey. By assessing the mean score, this helped determine which teaching strategies the participants felt was most helpful for him or her in learning about manual therapy techniques for shoulder pain move to data analysis. The data can be utilized to assess the occupational therapy practitioners' perspective of the best and least preferred methods of learning manual therapy techniques.

Also, four weeks following the in-service the last assessment was emailed to the participants to determine if they had implemented this knowledge into clinical practice and if the in-service influenced occupational therapy treatment interventions. The last assessment was designed to measure if the new knowledge gained from the in-service was actually implemented into their current practice occupational therapy. The frequency of manual therapy interventions used in treatments in that interim period could show the usefulness and influence of the in-services on integrating manual therapy techniques into occupational therapy treatment sessions.

The data was analyzed by a two-tailed T test. The results were 0.0027, which was rounded to 0.003 revealing that the results were statistically significant. X = pretest, Y = posttest and the difference was represented by d=y-x. Therefore, the results indicated that majority of the time people improve in knowledge shown by a higher test score on the posttest. This assumption is true majority of the time.

Ethical Considerations

The ethical considerations of this research study were the IRB, informed consent, and the instructor for the in-service was also the researcher collecting data. This research study provided an in-service for manual therapy for occupational therapy practitioners that was not initiated until the IRB was approved. No data was collected until the IRB was approved. Each participant signed the informed consent for approval of participation. All participants were currently in the occupational therapy field of practice and eighteen years of age or older. The participants pretest/posttest scores remained anonymous for the data collection. The researcher conformed to all regulations of the Institutional Review Board. It was disclosed to the study participants that the instructor was an occupational therapist in the occupational therapy doctorate program at Eastern Kentucky University. Also, the occupational therapy practitioners were aware the data collected was for the OTD capstone project and deidentified data would be shared in the capstone report and capstone oral presentation.

Timeline of Project

The needs assessment for this Capstone project was created in the OTS 902 class of this doctorate program and on August 7, 2018, the needs assessment was completed. The Institutional Review Board application was started in OTS 903 and completed and submitted on December 2, 2019. Approval from the Institutional Review Board was obtained on January 14, 2020. The in-service date for my Capstone project was January 25, 2020, where informed consent was obtained from the participants. Part of the data was collected on January 25, 2020, and then the last section of data was gathered by email by March 20, 2020. Data started being analyzed with the help of the Committee Chair on February 6, 2020, and has continued until the

completion of the Capstone project. The final OTS 906 oral presentation was completed on April 30, 2020. Final submission of Capstone report will be on May 8, 2020.

Table 2. Timeline of Project

Assignment	Date
Needs Assessment	August 7, 2018
Developed Internal Review Board Application	December 2, 2019
Internal Review Board approval	January 14, 2020
Obtained Inform Consent	January 25, 2020
Collected the data	January 25-March 20, 2020
Analyzed the data	February 6-April 30, 2020
Final OTS 906 Oral Presentation	April 30, 2020
Final Capstone Submission	May 8, 2020

Section Four: Results and Discussion

Results

An in-service was completed for occupational therapy practitioners. Occupational therapists and occupational therapy assistants in attendance were involved in an interactive in-service involving different teaching strategies. The age range of the participants was nineteen to seventy years of age. Data was collected from a twenty-five-question pretest and posttest exam, an in-service survey, and a survey that was emailed four weeks after completion of the in-service. The three objectives of this in-service were 1) does training in best practices for manual therapy techniques increase occupational therapists' knowledge for implementing manual therapy, 2) which active learning strategies did the occupational therapy practitioners prefer when learning a new hands-on skill, and 3) does the training in best practices for manual therapy techniques increase occupational therapists' frequency of implementing manual therapy techniques in practice?

Descriptive statistics illustrating the difference between the pretest and posttest scores of the participants are in Table 3. Figure 1 below illustrated the knowledge gained by comparing the difference between the average pretest and posttest scores, which was eighteen percent.

Table 3. Pretest/Posttest Differences

Participants	Pretest	Posttest	Difference
1	48	72	24
2	32	44	12
3	40	64	24
4	52	72	20
5	64	88	24
6	32	56	24
7	40	64	24
8	80	72	-8

Total	388	532	144
Average	48.50%	66.50%	18

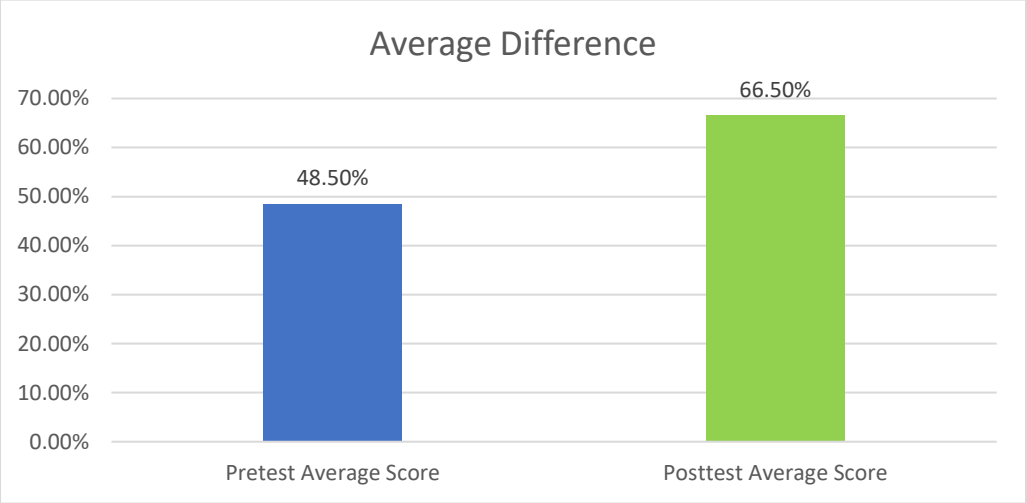

Figure 1. Difference in the pretest and posttest average scores.

Figure 2 below shows the pretest scores in blue and the posttest scores in green for the eight participants of the in-service. Seven of the eight participants scored higher on the posttest than the pretest. According to Dimitrov and Rumrill, majority of the time participants score higher on the posttest than the pretest (2003).

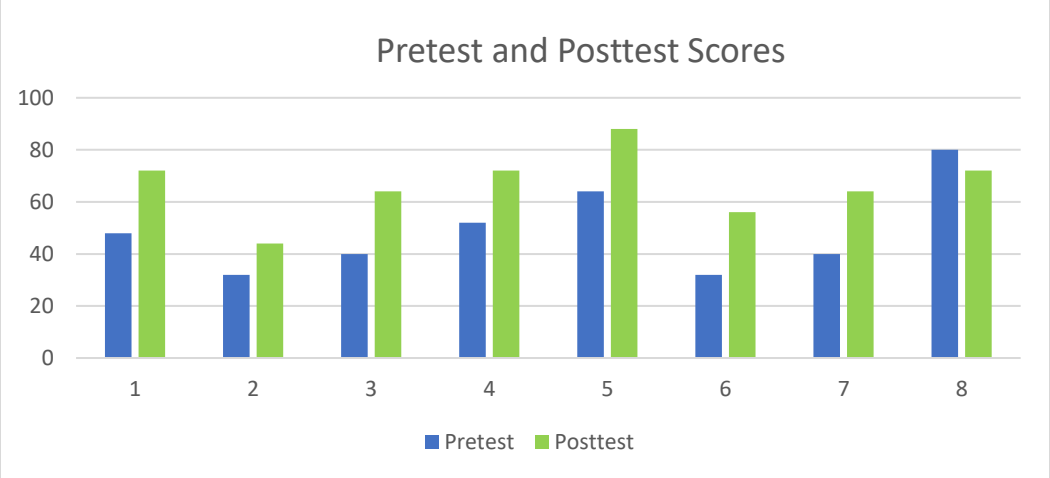

Figure 2. Pretest and posttest scores of the eight participants.

The next graph, Figure 3, indicates the participants' number of correct answers itemized for each question for the pretest and posttest. The questions for seventeen, twenty, and twenty-one were the only questions where the pretest correct answers were higher than the posttest correct answers.

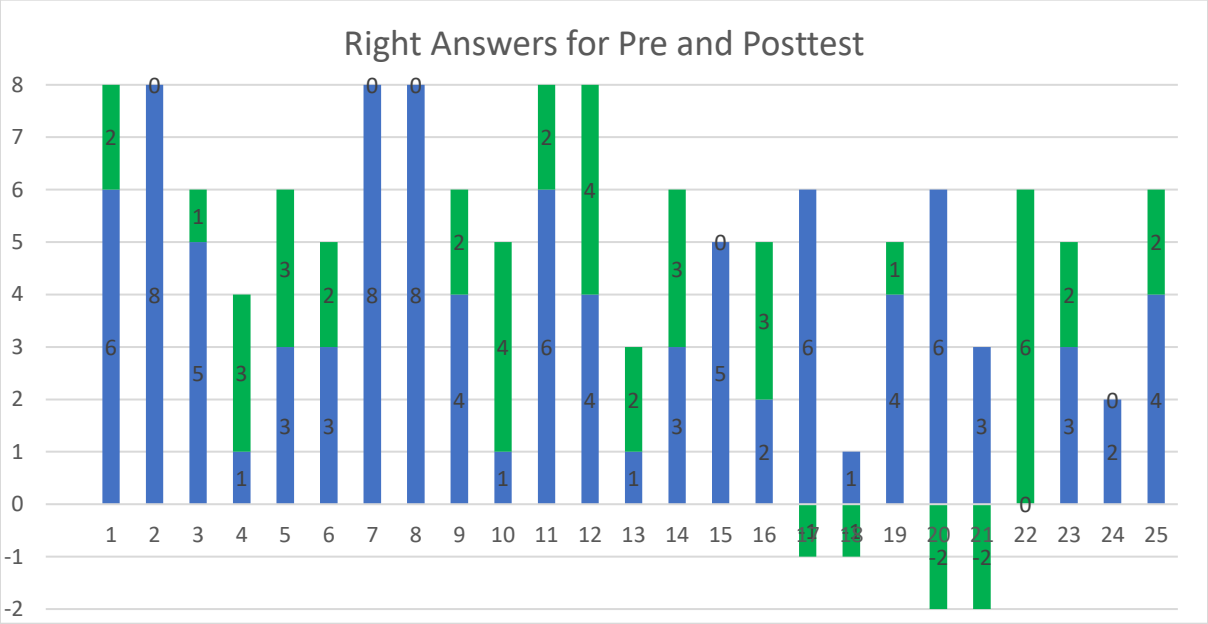

Figure 3. Right answers for pretest on bottom and the right answers for posttest on top.

The following graph, labeled Figure 4 with the title Mean Difference in the Five Groups, separated the twenty-five questions into five groups of five questions per each group. These groups included manual muscle techniques, stretching, trigger point release, joint mobilization, and anatomy and shoulder injury questions. Each of these groups has an individual data series that is color coded to go with their correct data series. The first of the data series is manual therapy questions noted in blue. The second of the data series is stretching questions recorded in yellow. The third of the data series is described as trigger point or myofascial release data questions in green. The fourth of the data series is described as joint mobilization questions in

black color. The fifth of the data series is anatomy and shoulder injury questions data labeled in red. The mean average of the five questions of the pretest/posttest questions were calculated. After the initial calculation the mean difference was found.

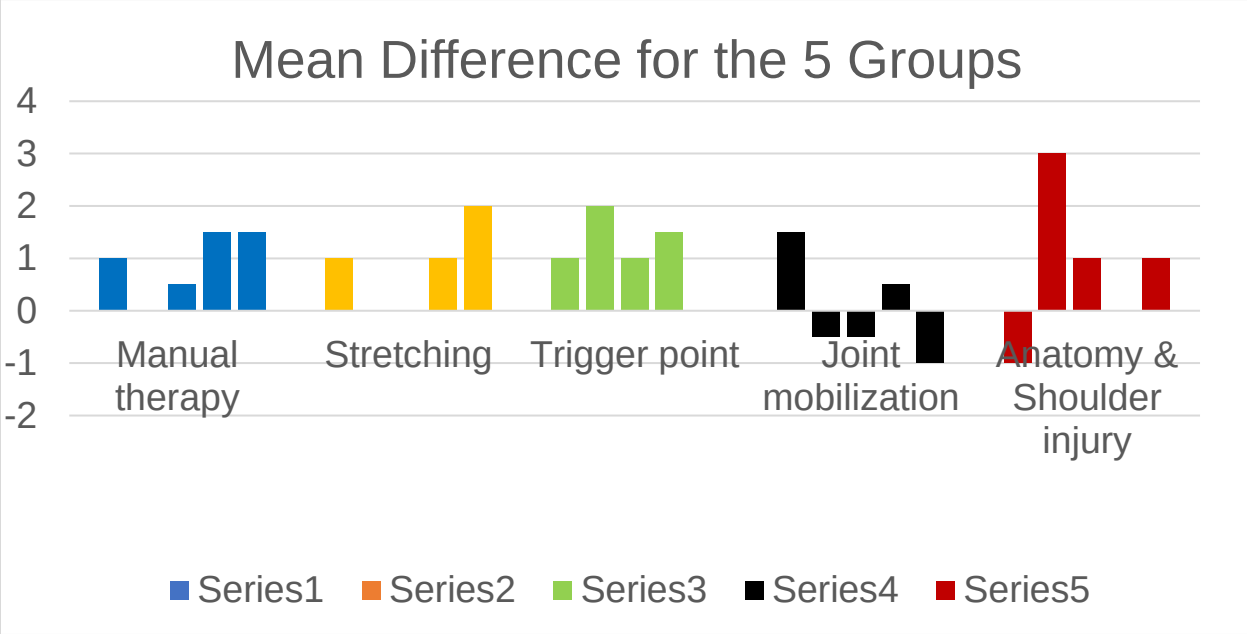

Figure 4. Mean difference for the five categories of pretest/posttest.

A post survey titled, "Best Teaching Strategies for Manual Therapy In-service" was administered to participants after the in-service (Appendix B). The survey included twelve questions regarding the teaching strategies used during the teaching of the in-service. Participants answered questions regarding how helpful each teaching strategy was for him or her. The participants chose answers based on the scale of 1= Not helpful, 2= Minimally helpful, 3= Moderately helpful and 4= Very helpful.

Figure 5 graph shows the answers to these questions rated between 1-4. The mean average of each question was calculated for all of the eight participants. The top three teaching strategies rated by the participants were practicing the techniques, use new knowledge, and

hands-on demonstration. The five middle strategies that rated 3.75 out of four included presentation, increase knowledge, knowledge to administer manual therapy, ability to provide manual therapy, and OT clinical practice. PowerPoint and videos were rated a 3.6 out of four which is still a high score. The least valued teaching strategies were the case studies 3.5 out of five and the handout 3.28 out of four.

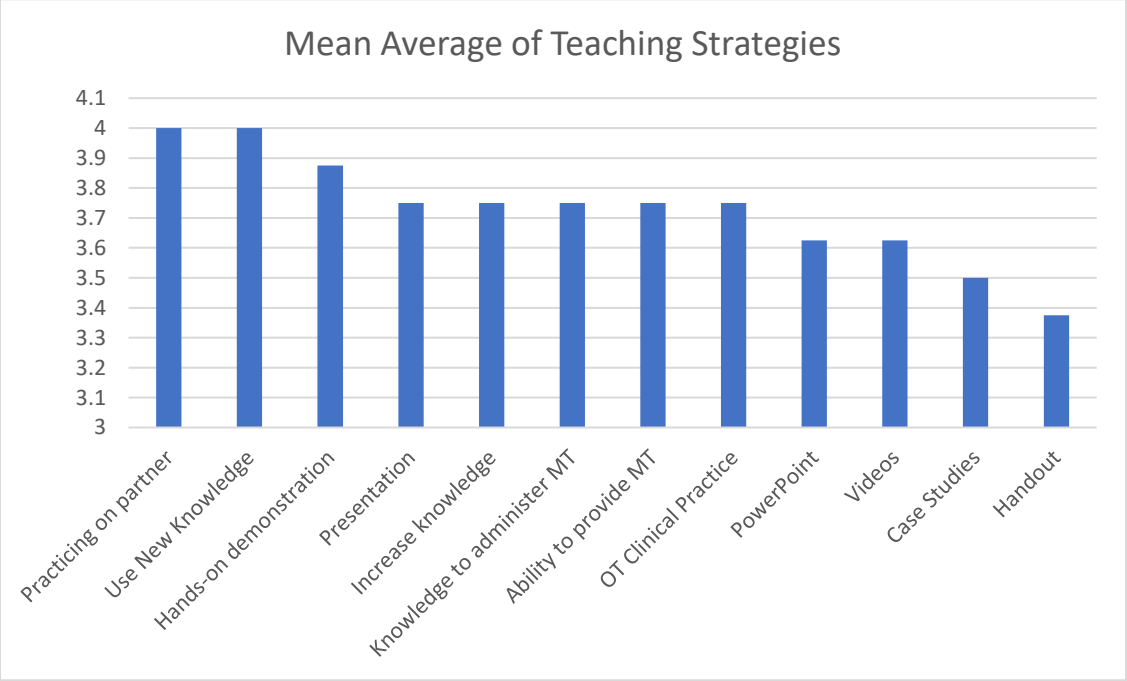

Figure 5. How the participants scored the teaching strategies.

Four-week Survey Results

Table 2 titled Four Week Survey shows the results of the survey that were emailed to all of the eight participants four weeks following the in-service. There were six questions that each of the practitioners answered regarding the number of times that he or she had administered manual therapy following the in-service. This data included administering manual therapy on non-clients as well as clients in clinical practice.

Table 4. Four-week Survey Results

Participants	Stretching on non-clients	Joint mobilization on non-client	Myofascial trigger point release on non-client	Stretching on clients	Joint mobilization on client	Myofascial trigger point release on client
1	1-2	0	0	0	0	0
2	1-2	1-2	3-4	0	0	0
3	1-2	1-2	1-2	5+	5+	5+
4	1-2	1-2	1-2	5+	5+	5+
5	3-4	1-2	3-4	0	0	0
6	1-2	1-2	3-4	5+	3-4	1-2
7	3-4	1-2	1-2	5+	5+	1-2
8	1-2	0	3-4	3-4	1-2	5+
Totals	12-20X	6-12X	15-22X	23-24+	19-21+	17-19+

All eight of the participants reported that each had utilized the stretching technique at least one to two times with non-clients. Two participants had utilized the stretching technique three to four times with non-clients. When analyzing the use of stretching in clinical treatment, three participants reported zero utilization, one participant reported three to four times of utilization, and four reported utilization of five or more in clinical treatment.

Six of the eight participants reported practicing joint mobilization with non-clients one to two times since the in-service. The remaining two participants reported zero utilization of joint mobilization with non-clients. When analyzing the use of joint mobilization with clients in clinical treatment, three reported zero utilization, one reported one to two times of utilization, one reported three to four times of utilization, and three reported five or more times of utilization.

Since the manual therapy in-service, seven out of the eight participants have utilized myofascial trigger point release as a technique with non-clients. Three of those seven

occupational therapy participants utilized the myofascial trigger point release one to two times, the remaining four of the seven utilized this technique three to four times with non-clients.

Further analysis of the utilization of myofascial trigger point release in clinical treatment also showed two of the participants have utilized this manual therapy technique one to two times in clinical treatment and three participants have utilized this technique five or more times in clinical treatment. The results of the four-week survey revealed that every participant utilized stretching with non-clients since the in-service. However, three of the participants did not practice stretching on clients in clinical practice. For nonclients, the myofascial trigger point release was used more than any of the other manual therapy techniques, fifteen to twenty-two times. This technique was used with clients it was used more than seventeen to nineteen or more times. Joint mobilization was used the least of the three manual therapy techniques, six to twelve times with non-clients. With clients, it was used more than nineteen to twenty-one or more times. When looking at the overall data results from the four-week survey, all of the participants have utilized a manual therapy technique at least once either with non-clients or clients in clinical treatment since the in-service.

Discussion

Research Question 1: Does training in best practices for manual therapy techniques increase occupational therapists' knowledge for implementing manual therapy?

After a one-day in-service, occupational therapy participants improved in knowledge and understanding of the manual therapy techniques by eighteen percent as indicated by pretest and posttest mean differences. Similarly, Creupelandt., Anthierens, Habraken, Sirdifield, Siriwardena, and Christiaens (2019) stipulated that if the posttest score is higher than the pretest score, then knowledge was gained regarding manual therapy techniques.

Only one participant answered two more questions wrong on the posttest than the pretest. Anecdotally, one participant mentioned to the researcher that she felt she had done worse on the posttest than the pretest. This could have been due to fatigue, inattention, or an unrelated variable to this study. According to Dimitrov and Rumrill (2003), pretest/posttest designs are used to measure behavior research and measuring change resulting from the experiment. Using gain scores in measuring change has been criticized because it is not always true (Dimitrov & Rumrill, 2003). This assumption is true in this study as the pretest and posttest were the same, so they were equally reliable and have equal variances (Dimitrov & Rumrill, 2003).

In comparing each of the twenty-five questions pretest and posttest, there were only four questions (seventeen, eighteen, twenty, and twenty-one) where the number of correct answers dropped from pretest to posttest. Three of the five joint mobilization questions and one of the anatomy questions received worse scores on the posttest. This may be because of the way the questions were worded, because this was the most unfamiliar topic covered in the in-service, or that joint mobilizations require a longer period of time to understand than a one-day in-service. The joint mobilization questions that were most missed by the participants involved rhythmic oscillation or movement of the shoulder joint and the questions were about ligament pain, joint pain, and muscle-tendon pain. Possible reason for this may be due to the instructor needing to focus more on the four cardinal principles established in the Stevenson and Vaughn (2003) journal article titled *Four Cardinal Principles of Joint Mobilization and Joint Play Assessment*.

The four cardinal principles taught to physical therapy students, physical and occupational therapists, and other health care professions were positioning, stabilization, mobilization, and comfort (Stevenson & Vaughn, 2003). The instructor could have used more

time and demonstrated more regarding joint geometry, application, and safe and repeatable joint play and assessments to ensure competency of future practitioners.

The anatomy and shoulder injury question regarding upward motion of the scapula and what muscles must be weak was a question missed by many of the practitioners. The teaching of musculoskeletal clinical skills increases competency which is vital in understanding the anatomy of the shoulder in order to know how to effectively treat shoulder pain and impairments (O'Dunn-Orto et al., 2012). Other possibilities that may affect why every participant in the research study did not improve from pretest to posttest may include that nothing is absolute, maturation of the younger practitioners compared to the older practitioner may cause differences, people get tired closer to the end of the in-service, and people may not feel well at the end of the in-service (Dimitrov & Rumrill, 2003). Also, people are not equivalent at the pretest and therefore are not equivalent at the end of the in-service (Dimitrov & Rumrill, 2003).

Research Question 2: Which active learning strategies do the occupational therapy practitioners prefer when learning new hands-on skills of manual therapy?

Based on the highest scores, the three teaching strategies that were the most preferred in the in-service were practicing manual therapy techniques, using the new knowledge, and hands-on demonstration experiences. Participants' perceptions were that they learned the most from these three teaching strategies. These three effective teaching strategies were active learning strategies, derived from both the behavioral learning and constructivism learning theories.

Several scholarship of teaching and learning articles support hands-on learning and practicing as methods of learning new material in occupational therapy students. Knecht-Sabres, Kovic, St. Amand, and Wallingford (2012) completed a research study that modified a

component in the curriculum to better address the educational needs of the adult learner and to improve skills needed in clinical practice. In designing an Adult Practice course, the occupational therapy students were instructed to complete hands-on learning with a standardized patient. The standardized patient enhanced the adult students clinical reasoning, confidence and competence in clinical skills, which are essential in clinical practice (Knecht-Sabres et al., 2012). Their level of comfort and skill of various foundational skills significantly improved after the hands-on learning experience (Knecht-Sabres et al., 2012).

The occupational therapy practitioners rated practicing the techniques on a partner as very helpful. Every practitioner reported a four out of four (4 = very helpful) for this active learning strategy. Hayden (2013) emphasized that practice and proficiency learning of technical skills requiring the occupational therapy assistant student's initiative had better results. The instructional design of a course for occupational therapy assistant students had learn new clinical skills by practicing the skills without a direct instructor present (Hayden, 2013). When students interact and do most of the work, the learning process is enhanced (Hayden, 2013). Coker (2010) provided a study that supports the use of hands-on critical thinking and clinical reasoning skills for occupational therapy students. The students were enrolled in three semesters of lecture course and then began the interactive learning of hands-on with children with hemiplegic cerebral palsy. The students who interacted with the children at a day camp developed interactive and conditional reasoning skills. The occupational therapy students that did no interact with the clients only developed procedural reasoning skills (Coker, 2010). Therefore, this study indicates hands-on or experiential learning can increase clinical reasoning and critical thinking skills for occupational therapy students. Howell, Wittman, and Bundy (2012) researched an interprofessional clinical education for occupational therapy and psychology

students through a training program for social skills for children with autism spectrum disorders (2012). This program allowed hands-on experience in the real world which appeared to be more beneficial for the students' learning. The students valued the hands-on clinical learning more than the interprofessional learning experience (Howell et al., 2012).

The next five teaching strategies were all rated the same at 3.75 out of four points. These included Power Point lecture presentation, increase knowledge of manual therapy for clients, knowledge to administer manual therapy, ability to provide manual therapy for painful shoulders, and how occupational therapy clinical practice benefited from the teachings of the in-service. All eight participants rated these teaching strategies as between three to four on all of these five questions, which indicated these aspects of his in-service was perceived as moderately to very helpful.

The lecture and video demonstrations both measured at 3.6 out of four which indicated that they were helpful, but the participants felt the hands-on demonstrations were more active and this type of learning helped each learn better. Video was a way in which an educator could show visually the different techniques of manual therapy to the practitioners in the study before participating in the hands-on demonstration. Video demonstrations are another method of educating healthcare professional as well as providing feedback to encourage improvement (Weichenthal, Ruegner, Sawtelle, Campagne, Ives, & Comes, 2018). In support of video demonstrations, a research study regarding teaching resuscitation and clinical skills for the emergency department was completed by utilizing video demonstrations (Weichenthal et al., 2018). Videos provided a clear and precise demonstration to increase knowledge, improve clinical reasoning and critical thinking, procedural skills and development as a healthcare professional (Weichenthal et al., 2018). Therefore, technology-based learning activities have

encouraged students to learn independently, research, and using visual cues to enhance the understanding in various fields of study (Bradshaw & Hultquist, 2017).

Case studies were an active learning technique that appeared to facilitate discussion and clinical reasoning and critical thinking. The occupational therapy participants scored the case studies as 3.5 out of four which was next to the overall lowest score. This score was surprising due to the participants interaction with others regarding the challenges posed by the shoulder pain and impairment found in the case studies. The occupational therapy practitioners participated in the discussions and demonstrations regarding the case scenarios and appeared to learn clinical skills to address the specific impairment.

Participants' feedback regarding the handout was a little more than moderately helpful. The handout was rated the over lowest teaching strategy of 3.375 out of four and therefore was determined to not be as beneficial to the participants. The handout contained a page for each of the manual therapy techniques taught with definitions, short descriptions, characteristics, and a picture to illustrate. The handout did not contain specific information that one participant questioned about in regard to diagnoses discussed in the in-service. This may have influenced others when rating the handout. Also, the handout may have been rated more helpful once the participants returned to the clinic to administer techniques to nonclients and clients.

A positive outcome of this study included all of the participants scored question twelve a four out of four. This question focused on the utilization of this new knowledge and how likely the practitioner will implement the knowledge into daily clinical treatment. This outcome revealed that the occupational therapy practitioners valued manual therapy techniques and understood the positive impact that these skills can have on their clients. With continued

application of manual therapy techniques in treatment, occupational therapy practitioners can improve their ability to incorporate these techniques into their repertoire of technical skills.

The teaching strategies rated by the participants confirmed that students of today prefer the active learning techniques with participation, use of new knowledge, and hands-on experiences. The hands-on demonstrations and the practicing of the manual therapy techniques on each other indicated more meaningful learning to each participant. Hands-on learning reinforced learning through action and this method strengthened the meaningfulness and encouraged a better understanding of the manual therapy techniques.

The active teaching strategy of practicing on a partner appeared to be very effective and important to the occupational therapy practitioner due to the rating on the survey scoring a four out of four. Allowing the participants to actively participate in hands-on demonstrations encouraged the same high score as practicing on a partner in regards to how the participant scored it on the survey.

Research Question 3: Does training in best practices for manual therapy techniques increase occupational therapists' frequency of implementing manual therapy in practice?

Through the active learning techniques utilized in this in-service, the student actively participated in the learning process and according to Fook, "Teaching involves changing the beliefs and habits of a learner or a student" (2012, p. 4818). As occupational therapists are experts at analyzing a person's ability to function in his or her environment, manual therapy techniques will decrease the patient's pain and improve the individual occupational performance of each client (Gray, 1997). All participants had utilized at least one manual therapy technique by the four-week follow up survey. Myofascial trigger release was the most administered to

non-clients, followed by stretching. For clients, stretching was the most delivered manual technique, followed by joint mobilization. Three participants did not use any of the techniques taught on clients in clinical practice.

Four-week Follow Up Results

In discussing the participants' answers to the four-week survey, occupational therapy practitioners used stretching and joint mobilization manual therapy techniques the most with clients. However, in practicing the techniques with non-clients, myofascial trigger point release and stretching occurred more frequently. When analyzing the participants use of manual therapy as therapeutic intervention in clinical treatment, three of the participants did not utilize any of the three techniques on clients during the four-week period after the in-service. There are possible reasons why the practitioners practice the techniques on non-clients, but not on clients in the clinic. Three of these reasons may include: 1) the occupational therapy participants may have not been employed during the COVID 19 pandemic, 2) the evaluating occupational therapist may not have been educated in manual therapy techniques or the benefits of this technique and did not included this in the plan of care and therefore the OTA could not have initiated manual therapy interventions, 3) the occupational therapy practitioner may not have felt confident in his or her ability to utilize this new skill, and lastly, 4) the appropriate client and clinical impairment may not have been treated during this time frame.

Limitations

Limitations of research are a concern of a research project in how this may impede validity. One limitation of this research study is the small sample size (external validity) used in the in-service (Dimitrov & Rumrill, 2003). The limited number of occupational therapy practitioners recruited for this study limits the conclusions that can be drawn from the study.

However, a small sample size was ideal for teaching an in-service with active learning techniques.

Another limitation is that there is limited research regarding learning manual therapy techniques and therefore, there is limited research to compare with the results. Also, the in-service was completed in one day and therefore there was limited time for discussion. The other time limitation was experienced through the schedule of the OTD program. There was insufficient time for a follow up survey extended out for longer than a four-week period after the in-service.

Future Research

Future research must be completed with a larger sample size to provide stronger evidence regarding the results of occupational therapists gaining knowledge in manual therapy techniques. Implications of manual therapy becoming a part of occupational therapy education is important. Occupational therapy practitioners must continue to strive to improve and grow the clinical skills of present and future therapists. Learning new knowledge such as manual therapy techniques, reduces the gap in the occupational therapy education curriculum and strengthens the influences and opportunities of the profession (AOTA, 2018).

Based on the results of this study, another survey could be sent at the end of six to nine months to determine if the frequency has increased to determine a longer-term impact this study would have regarding occupational therapists use of manual therapy interventions after instruction in manual therapy techniques.

Conclusion

The results of this research indicated that occupational therapy practitioners improved their knowledge of manual therapy techniques following a one-day in-service. All participants

gained knowledge in manual therapy techniques, stretching techniques, and trigger point release techniques. However, participants did worse on three joint mobilization questions and one anatomy question. This may show that the questions could have been too difficult or confusing to the participants. Possibly, this is an indicator that occupational therapy practitioners may need more education in these two areas. Further study of this area is needed for occupational therapy practitioners to provide the appropriate intervention to be more effective in treating clients with shoulder pain.

The active learning teaching strategies were the preferred type of teaching indicated by the practitioners. The occupational therapy practitioners all indicated that the practicing of the manual therapy techniques and the using the new knowledge of manual therapy were very helpful to them.

All of the participants have utilized a manual therapy technique either with non-clients or clients in clinical treatment since the in-service. This demonstrates that occupational therapy practitioners have a need to use manual therapy techniques as therapeutic interventions. Manual therapy is a necessary intervention in reducing shoulder pain that is an ingredient of evidence-based therapy. By educating occupational therapy practitioners regarding manual therapy techniques, clients with shoulder pain may ultimately experience less pain and display increased occupational performance. Occupational therapy practitioners must continue to learn these techniques to help clients as well as the overall profession.

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Appendix A

Best Teaching Strategies for Manual Therapy In-service
Pre/Post-Survey for Spring of 2020 Participants

Knowledge (Multiple Choice Questions)

1) Manual therapy is administered for which of the following?

   a) Restoring muscle tissue strength

   b) Restoring tissue to its normal extensibility

   c) Reducing scar tissue

   d) Improving one's balance

2) The result of manual therapy techniques being administered include all of the following except:

   a) Range of motion

   b) Decreases pain

   c) Improves function

   d) Increases muscle bulk

3) When using manual therapy in the reduction of pain perception this appears to be impacted by _____.

   a) Static movements

   b) Dynamic movements

   c) Immobilization

   d) Ice

4) When there is competition in the sensory information, _____occurs.

   a) Compression loading

   b) Tension loading

   c) Overload

   d) Gating

5) Gating of pain sensation occurs through which manual therapy technique?

a) Immobilization

b) Pressive stretching

c) Compression of the skin

d) Passive joint oscillation and articulation

6) All of the following are types of stretching except _____.

a) Passive range of motion

b) Static and rhythmic stretching repetitively

c) Traditional massage techniques

d) Trigger point release

7) When a person is injured, connective tissue changes in order to allow:

a) The body's inflammatory response to protect itself

b) Decrease pain in the sensory receptors

c) Increased flexibility to prevent further injury

d) Increased sensory receptors sensations

8) All of the following are factors that are important in effective manual therapy stretching except_____?

a) Adequate force

b) Duration of time

c) Season of the year

d) Repetition

9) Transverse and longitudinal stretches are slow stretches that are used for which of the following:

a) Rhythmic stretches to increase blood flow

b) Decrease blood flow in muscle

c) Increase blood flow in muscle

d) Decrease flexibility

10) Which of the following techniques is essential for the code of stretching?

a) Stretching should be applied directly to the target tissue

b) Stretching should be applied as quickly as possible to increase blood flow

c) Stretching should be applied slowly with extensive force

d) Stretching around the joint is best for increasing blood flow and decreasing pain

11) What is the best way to detect highly sensitive pressure points that produce pain?

a) Through ultrasound under water

b) Through palpation

c) Through intense compression

d) Through stretching

12) What type of painful situation presents similar to shoulder pain and has the same symptoms such as pain at rest and motion, sleep disorders, pain during provocative tests?

a) Torn ligament

b) Myofascial trigger point

c) Tender point

d) Bruises

13) Which of the following muscles has the most frequent occurrence of trigger points in clients with shoulder pain?

a) Pectoralis major

b) Supraspinatus

c) Infraspinatus

d) Teres minor

14) What factor about trigger point release reduces the level of pain?

a) Stretching the muscles

b) Ischemic compression reducing blood flow

c) Taut band of muscles

d) Overload of tissue

15) The occlusion of blood flow to inactivate a tender point is known as _____.

a) Tissue manipulation

b) Entrapment

c) Massage

d) Ischemic compression

16) Which joint mobilization glide increases shoulder flexion and internal rotation?

a) Inferior joint glide

b) Distraction

c) Posterior glide of shoulder

d) Scapular release

17) Rhythmic oscillatory joint articulation is to decrease _____.

a) Ligament pain

b) Joint pain

c) Muscle tendon pain

d) Bone pain

18) Rhythmic elongation and shortening by joint articulation decreases _____.

a) Ligament pain

b) Joint pain

c) Edema

d) Muscle-tendon pain

19) Scapulothoracic mobilizations include which two joints?

a) Acromioclavicular joint and coracoclavicular joint

b) Acromioclavicular joint and sternoclavicular joint

c) Sternoclavicular joint and coracoid process

d) Coracoid process and the Acromioclavicular joint

20) Rhythmic voluntary contraction decreases _____.

a) Loosens the joint

b) Joint pain

c) Ligament pain

d) Muscle-tendon pain

21) Weakness of what two muscles limits movement of scapula in upward rotation?

a) Trapezius and infraspinatus

b) Teres minor and infraspinatus

c) Infraspinatus and serratus anterior

d) Serratus anterior and Trapezius

22) Which muscles stabilizes the shoulder?

a) Supraspinatus

b) Deltoid

c) Subscapularis

d) Trapezius

23) Which painful shoulder diagnosis has the symptom of tendonitis of the supraspinatus?

a) Impingement syndrome

b) Rotator cuff tear

c) Bursitis

d) Adhesive capsulitis

24) Frozen shoulder (Adhesive capsulitis) includes all of the following except _____?

a) Difficulty with scapular upward rotation

b) External rotation

c) Shoulder extension

d) Superior Tilt

25) What is the most common cause of shoulder pain in primary care?

a) Falls

b) Rotator cuff tear

c) Adhesive capsulitis

d) Impingement syndrome

Appendix B

Best Teaching Strategies for Manual Therapy In-service

Post Survey for Spring of 2020 Participants

4 Random numbers:_____

Satisfaction scored

1. On a scale of 1-4, how helpful was the handout that was presented to you today?

(1= Not helpful, 2= Minimally helpful, 3= Moderately helpful, 4= Very helpful)

1 2 3 4

2. On a scale of 1-4, how helpful was the lecture from power point that was provided to you today?

1 2 3 4

3. On a scale of 1-4, how helpful were the videos that were presented to you today?

1 2 3 4

4. On a scale of 1-4, how helpful were the case studies that were presented to you today?

1 2 3 4

5. On a scale of 1-4, how helpful were the hands-on demonstrations that were presented to you today?

1 2 3 4

6. On a scale of 1-4, how helpful were practicing the techniques on a partner today?

1 2 3 4

7. On a scale of 1-4, how helpful was the information presented to you today?

1 2 3 4

8. On a scale of 1-4, how helpful was the educational in-service in increasing your knowledge on manual therapy for clients with shoulder pain?

1 2 3 4

9. On a scale of 1-4, how helpful was the educational in-service provided in increasing knowledge on administering manual therapy techniques for clients with shoulder pain?

1 2 3 4

10. On scale of 1-4, how helpful do you feel the information presented to you today was in increasing your ability to provide manual therapy techniques for clients with painful shoulders?

1 2 3 4

11. On a scale of 1-4, how beneficial was the knowledge related to OT clinical practice?

1 2 3 4

12. On a scale of 1-4, based on the education provided, how likely are you to utilize this new knowledge and implement it into your daily clinical treatment?

1 2 3 4

Appendix C

Best Teaching Strategies for Manual Therapy In-service

Four-week Follow-up Survey for Spring of 2020 Participants

1. Since the Manual Therapy In-service, how many times have you practiced stretching as a technique with non-clients?

0 1-2 3-4 5 or more

2. Since the Manual Therapy In-service, how many times have you practiced joint mobilization as a technique with non-clients?

0 1-2 3-4 5 or more

3. Since the Manual Therapy In-service, how many times have you practiced myofascial trigger point release as a technique with non-clients?

0 1-2 3-4 5 or more

4. Since the Manual Therapy In-service, how many times have you used stretching as a therapeutic technique in your clinical treatment?

0 1-2 3-4 5 or more

5. Since the Manual Therapy In-service, how many times have you used joint mobilization as a therapeutic technique in your clinical treatment?

0 1-2 3-4 5 or more

6. Since the Manual Therapy In-service, how many times have you used myofascial trigger point release as a therapeutic technique in your clinical treatment?

0 1-2 3-4 5 or more