Using Case-Based Learning to Facilitate Clinical Reasoning Across Practice Courses in an Occupational Therapy Curriculum

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Abstract

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Keywords

Clinical reasoning, case-based learning

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Using Case-Based Learning to Facilitate Clinical Reasoning Across Practice Courses in an Occupational Therapy Curriculum

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ABSTRACT

Although occupational therapy educators have historically used cases as a means to prepare students for clinical practice, there is little evidence that this instructional method actually facilitates clinical reasoning. This convergent, parallel mixed methods study examined how the use of varied case formats, built on the tenets of case-based learning, facilitated specific components of clinical reasoning, and explored how the cases contributed to readiness for professional practice. Case formats included text, video, role-playing, simulated patients, and a client. Case-based learning activities included application of models and frames of reference, conducting assessments, planning and implementing interventions, clinical documentation, and identification of reasoning used. All cases included the opportunity for instructors to provide direct and appropriate feedback, and facilitation of student reflection on their performance. The Self-Assessment of Clinical Reflection and Reasoning (SACRR) was used for quantitative data analysis and detected statistically significant changes in the use of theory and frames of reference to inform practice and in student reasoning about interventions, following case-based learning. Student surveys allowed for pragmatic qualitative analysis, and identified the themes of self-awareness, confidence, and developing competence related to readiness for fieldwork and clinical practice. Student preferences for case format and benefits of varied types of cases were identified. Case-based learning used different case formats, and contributed to the occupational therapy student transition from a clinical reasoning novice to an advanced beginner. Knowledge of this process is useful to occupational therapy educators in structuring case-based learning activities to influencing reasoning.

INTRODUCTION
Clinical reasoning is a critical skill that is required of a competent occupational therapist, which must be integrated into the educational program preparing students to enter the profession. And while clinical reasoning has been described and its development in practice has been explored in research, there is still a limited understanding of how instructional methods may contribute to the acquisition of foundational clinical reasoning skills in higher education for students preparing for a career as occupational therapists (Ciaravino, 2006; Lederer, 2007; Mattingly, 1991; Rogers, 1983; Schell & Schell, 2018; Sherer & Shea, 2011; Unsworth & Baker, 2015; Vogel, Geelhoed, Grice, & Murphy, 2009).

There is consensus across the profession of occupational therapy that clinical reasoning cannot be performed without explicit consideration of each specific client and his or her particular abilities, limitations, contexts, medical condition, culture, and values (Fleming, 1991; Fleming & Mattingly, 1993; Mattingly, 1991; Rogers, 1983; Schell, 2014; Schell & Schell, 2018). Therefore, a variety of case study formats have traditionally been offered in occupational therapy education as a means to facilitate the development of foundational clinical reasoning. This allows for consideration of the individual client in the development of an occupational therapy evaluation, interventions, and discharge plan. Forms of case studies often used in health professions education include text cases, video cases, virtual patients, and simulated or standardized patients (Cook & Triola, 2009; Giles, Carson, Breland, Coker-Bolt & Bowman, 2014; Lysaght & Bent, 2005; Tomlin, 2005).

This study explored how instructional methods, based on the theoretical constructs of case-based learning, influenced clinical reasoning development in occupational therapy students. Specifically, different case formats were combined with the intent of developing students' skill in clinical reasoning. In addition, this study explored student perceptions of reasoning skills related to the various case formats and strengths of case-based learning that facilitated readiness for practice.

LITERATURE REVIEW
Clinical reasoning in occupational study has a rich history, with landmark descriptions and studies by Rogers (1983), Fleming (1991), and Mattingly (1991). Those seminal studies described how effective clinical reasoning depends on a full understanding of the client and their condition, application of appropriate models and frames of reference to guide evaluation and intervention, and the application of theory and knowledge within a specific context (Fleming, 1991; Fleming & Mattingly, 1993; Gillette & Mattingly, 1987; Mattingly, 1991; Rogers, 1983). More contemporary views of this process describe the reasoning of the occupational therapist in a broader range of practice settings and use the term professional reasoning to describe "the process that practitioners use to plan, direct, perform, and reflect on client care" (Schell, 2014, p. 384).

As clinical reasoning is a complex process, the following key categories of clinical or professional reasoning have been developed over time: scientific, diagnostic, procedural, narrative, pragmatic, ethical, interactive, and conditional reasoning (Schell &

Schell, 2018). Understanding these key components assists educators and experts in the field to systematically facilitate clinical reasoning skills in students and new practitioners. Developmental reasoning stages typically experienced by clinicians include novice, advanced beginner, competent, proficient, and expert (Schell, 2014). Progression through these stages describes a dynamic process that includes factors such as amount of time in a practice area, reflection on practice, development of knowledge and therapeutic skills, and many aspects of professional development and continuing competence. A *novice* in professional reasoning, for example, depends heavily on theory to guide practice due to a lack of experience, uses procedural reasoning as a set of rules to guide actions, uses narrative reasoning primarily to establish social relationships with clients, and is not skilled at incorporating external cues into adaptations of interventions (Schell, 2014). An *advanced beginner* in professional reasoning is starting to effectively use cues to expand on thinking purely according to rules, begins to identify patterns that influence practice, and begins to use pragmatic and narrative practice to expand and transform interventions (Schell, 2014). The *competent* practitioner becomes more automatic and deliberate in using therapeutic skills in clinical situations, and is able to make changes to interventions efficiently, although flexibility may be limited (Schell, 2014). A practitioner who demonstrates *proficient* reasoning demonstrates greater creativity and flexibility in clinical situations, is able to understand the broader context of therapy provision, and is more able to identify the relevance of occupational stories in intervention (Schell, 2014). Finally, an *expert* uses various aspects of clinical and professional reasoning in intuitive and efficient ways to fully understand clients and their goals, and to adapt practice to client needs (Schell, 2014).

Clinical or professional reasoning cannot be conducted without careful consideration of the characteristics and needs of each individual client, as well as the environment or context in which the occupational therapy services are provided. Therefore, case studies are often used in the education of many health professionals and are combined with a wide variety of learning activities. The cases may take the form of text cases, video cases, virtual patients, simulated or standardized patients (Cohn, Coster, & Kramer, 2014; Cook & Triola, 2009; Giles et al., 2014; Lysaght & Bent, 2005; Perlman, Weston, & Gisel, 2010; Tomlin, 2005). The formats vary in their practical applications by instructors and demands of learners. However, the tenets of case-based learning are consistent in all these formats.

Case-based learning describes the educational processes that allow learners to build their knowledge by exploring expert experiences in the form of cases. Learners attempt to understand and interpret those expert situations, reflect critically on what can be learned from the case, and then recall the information to use it intentionally in new situations (Jonassen, 1996; Jonassen & Hernandoz-Serrano, 2002; Kolodner, 1997; Kolodner & Guzdial, 2000). According to Jonassen and Hernandoz-Serrano (2002), "...stories elicited from skilled problem solvers, indexed for the lessons they have to teach, … can support a broader range of problem solving than any other strategy or tactic" (p. 65). Since experts often infuse their stories with relevant contextual factors

and practical strategies for solving problems, novices in the discipline can learn effective problem-solving strategies based on those expert experiences.

Important components of cases used to teach include authenticity or realism, relevance to the needs or goals of the learner, richness in content and context, and connections between theory and practice. Detail or complexity should be gradually revealed within the cases as learners are able to critically analyze them. Finally, experts should provide supports to learners within their readiness for skills development and then gradually reduce those supports, a technique called scaffolding (Choi & Lee, 2009; Jonassen, 1996; Kim et al., 2006; Kolodner, 1997; Thistlethwaite et al., 2012). All of these constructs can have particular relevance to the practice of clinical reasoning in occupational therapy, to ensure that practitioners have developed the required skills and abilities to be effective agents of change for their clients.

METHODOLOGY

The purpose of this research study was to examine how occupational therapy students developed clinical reasoning skills using case-based learning methods, which were presented in various case formats. In addition, this study sought to explore student perceptions of how the case-based instructional methods contributed to the development of their reasoning abilities and their readiness for Level II fieldwork and clinical practice. To fully examine how case-based learning may influence clinical reasoning, a convergent, parallel mixed method research design was used, as represented in Figure 1 (Creswell & Plano Clark, 2011). Quantitative data consisted of a measure of perceived reflection and reasoning, the Self-Assessment of Clinical Reflection and Reasoning (SACRR). Qualitative data was obtained through open-ended questions posed to students about case-based learning and the development of their reasoning abilities.
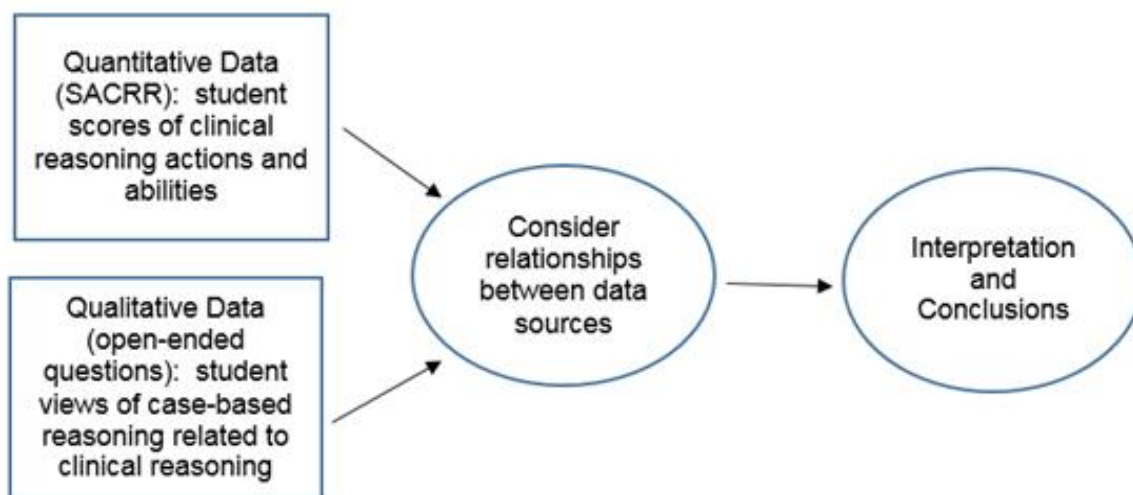

Figure 1. Overview of convergent parallel mixed methods research design

Context and Participants
This study was conducted in a graduate, entry-level occupational therapy (MSOT) program at a public university in the southeast United States. The program consisted of five semesters of didactic coursework, which included two Level I fieldwork experiences (totaling approximately 80 hours), followed by two semesters of Level II fieldwork (totaling at least 960 hours). Entire length of the MSOT program was two and a half years. Occupational therapy intervention courses across the lifespan were presented primarily in semesters four and five. Case-based instructional methods were utilized by all instructors teaching the courses focused on occupational therapy evaluation and intervention. Different formats for cases were utilized and assignments were tailored to the learning objectives of each course.

After approval was obtained from the institutional review board (IRB), all students enrolled in these intervention courses in semesters four and five were asked to participate in the research. Although students were able to decline participation in the research, they were required to complete the course assignments and activities, which included the case study activities, in order to meet course objectives and accreditation standards.   This convenience sampling yielded a total sample size of 48 students. There were 22 students who participated in the 2016-2017 academic year. Of this group, 21 participants were female and 1 was male; 21 were Caucasian and 1 was Asian; and mean age was 25.59 years (SD 3.35, range 22-38 years). All of the 26 students participating during the 2017-2018 year were Caucasian females, with a mean age of 24.92 years (SD 2.24, range of 23-34).

There were some minor differences in the curricular sequence preceding implementation of the research for these two student groups, as well as instructors teaching the courses and the number and type of cases. For example, the number of cases in one course was reduced from 10 cases to 7 cases and associated assignment requirements were modified for the 2017-2018 students. Finally, the 2016-2017 students completed a collaborative lab with PT students utilizing case-based learning while 2017-2018 students participated in a simulated patient event instead.

Measures / Instruments
The SACRR, developed by Royeen, Mu, Barrett, and Luebben (2001), is a 26-item self-report questionnaire that describes the cognitive process of clinical reasoning, measured with a 5-point Likert scale. This instrument has been used to assess learning and reasoning in occupational therapy students, and has demonstrated reliability and validity (Coker, 2010; Scaffa & Smith, 2004; Scaffa & Wooster, 2004). This was conducted as a post-test for both cohorts of students, as part of the course evaluation process. In addition, the SACRR was administered as a pre-test for the second cohort of students, to allow for examination of changes in clinical reasoning over two semesters in which case-based learning methods were used.

A brief, open-ended survey was administered to all participants of this research study at the end of semester five. This allowed exploration of student opinions of case-based learning, preferences for case formats, and generalized feedback on the assignments.

In addition, the 2017-2018 cohort was asked to provide their opinions of how clinical reasoning may have been developing, related to readiness for Level II fieldwork and clinical practice to expand on qualitative data generated in the 2016-2017 cohort.

Research Methods/Process
Initial IRB approval was obtained in the first year of the study and was amended to allow for expanded data collection in the second year of the study. Informed consent procedures were followed according to IRB procedures   All students who participated in the study completed post-test portions of the data collection process (total n=48).   Pre-test use of the SACRR was utilized for the 2017-2018 cohort at the beginning of semester four; however, this was not completed for the 2016-2017 students due to the timing of the IRB process.

All students participated in a variety of case-based learning activities in the intervention courses in semesters four and five (see Table 1). Text cases were either written by faculty or utilized from required textbooks for the courses. Video cases were taken primarily from the International Clinical Educators (ICE) Learning Center video library (https://www.icelearningcenter.com/), which was available to the students and faculty through a paid subscription and could be repeatedly accessed either on-campus or off-campus. These videos showed actual therapy sessions filmed with clients receiving occupational therapy, physical therapy, and/or speech language pathology services from licensed providers.

Students typically worked in pairs or small groups, in which each person had the opportunity to conduct assessments or implement planned occupational therapy services with another student who role-played the assigned client. For some graded competency demonstrations, the instructor would act as the client while the student implemented occupational therapy techniques. Finally, students evaluated and/or provided interventions to one actual client, under the direct supervision of occupational therapists on the faculty.

Intraprofessional and interprofessional case-based learning activities were implemented for each student group. Both groups collaborated with occupational therapy assistant students to complete a text-based case. In 2016-2017, students partnered with physical therapy students during a lab to implement and role-play a text-based case. In 2017-2018, occupational therapy, physical therapy, and physician assistant students collaborated to provide services to a simulated patient and determine discharge recommendations.

The specific assignments and activities associated with the cases varied. Students made observations and/or answered questions related to the cases, identified and applied appropriate models of practice and frames of reference to analyze the cases, described the clinical reasoning process and the key constructs of reasoning relevant to the cases, identified appropriate assessment tools for the cases, developed goals, planned and implemented interventions for the cases, and wrote documentation notes. Specific reflection activities were included in all cases, in the form of classroom

discussion facilitated by instructors or in written sections of assignments. Written intervention plans were consistently reviewed by instructors prior to implementation and students were observed when providing interventions. This allowed for immediate feedback and correction of any student errors, to facilitate client safety and student clinical readiness.

Table 1

Case Study Formats by Participant Group

	Text	Video	Role-Play (peer or instructor)	Simulated Patient	Client	Total Cases Studies
2016-2017	13	7	10	0	1	21
2017-2018	8	8	8	1	1	18

At the conclusion of all cases in semester 5, students in both cohorts completed the SACRR and an open-ended survey. Both groups answered questions related to their opinions of case-based learning and case formats, as well as opinions of the assignments associated with cases. The 2017-2018 group was also asked to describe their perceived readiness for Level II fieldwork and clinical practice, as attributed to the case-based learning process. This survey was completed through an online survey tool supported by the university, allowing for anonymous responses.

The SACRR generated data for 26 individual statements regarding the cognitive processes associated with clinical reasoning. In addition, a total score was calculated, ranging from 26-130 points. Paired sample t-tests were used to identify any statistically significant differences in the self-assessed reasoning from pre-test to post-test for the 2017-2018 student group. Independent sample t-tests were used to explore differences between the 2016-2017 and 2017-2018 group post-tests.

Qualitative analysis was conducted only with the 2017-2018 open-ended data, due to the slight modifications of questions based on prior years' data and the additional questions added after the IRB amendments. This analysis followed a pragmatic approach, as this data was collected to describe a process, and did not contain the depth of inquiry required of a phenomenology or grounded theory approach (Savin-Baden & Major, 2013). In addition, this pragmatic research allowed for a more efficient review of the data, so that it could be considered in a timely manner and results applied to future offerings of the courses in a short time. This pragmatic, qualitative inquiry complemented the quantitative measure in accordance with the convergent, parallel research design.

Student survey data from 2017-2018 were examined by two researchers, who were the principal investigators and course instructors for the adult intervention courses during semester five. One question, regarding student perceptions of the case formats, was reviewed for descriptive data only. A question regarding relationship of the instructional

methods to the development of clinical reasoning was analyzed following the pragmatic guidelines. As pragmatic qualitative research does not espouse particular methods of coding, these questions were analyzed using two rounds of coding. Descriptive coding was used first, to identify the topics inherent in the student responses (Saldana, 2013). Pattern coding was utilized for the second round, to identify relationships between the codes, explain the data, and summarize the topics into themes (Saldana, 2013). To improve trustworthiness of data analysis, two researchers examined raw data independently then utilized peer debriefing to reach consensus during both stages of coding.

Consistent with the convergent, parallel mixed methods design, the quantitative results from the SACRR and the themes identified from the pragmatic qualitative analysis were compared to form a more comprehensive understanding of how case-based learning may contribute to clinical reasoning.

RESULTS
Quantitative data, which was collected using the SACRR, was examined in two ways. First, changes from pre-test to post-test of the 2017-2018 cohort were explored (n=26). Second, differences between the post-test scores of the 2016-2017 and the 2017-2018 cohorts were examined (n=48). Then, qualitative data was coded into themes. Finally, the two data sources were explored to identify conclusions and implications of this research.

Quantitative Changes in Clinical Reasoning Within Group
When comparing pre-test to post-test SACRR mean scores in the 2017-2018 cohort, 25 of the 26 individual items of the SACRR improved, and 1 of the 26 did not change. Statistical significance was noted in 10 of those items (p<.05). In addition, the mean of the total SACRR score improved from 96.23 to 103.62, out of a possible 130 points, which was a statistically significant change (t=4.60, p<0.01; see Table 2).

This indicates that the students' overall perceived clinical reasoning abilities increased following the case-based learning experiences, as well as ten specific actions which are used in the clinical reasoning process.

Table 2

Statistically Significant Items in SACRR Pre-Test and Post-Test Scores (df=25)

SACRR Statement	Pre-test		Post-test		Difference	t	p
	Mean	SD	Mean	SD			
I look to theory for understanding a client's problems and proposed solutions to them.	2.96	0.77	3.88	0.71	0.92	2.39	0.03
I look to frames of reference for planning my intervention strategy.	3.27	0.72	3.62	0.70	0.35	2.37	0.03
I try to understand clinical problems by using a variety of frames of reference.	3.19	0.85	3.69	0.74	0.50	2.82	<.0.01
I can function with uncertainty.	3.35	0.89	3.85	0.78	0.50	2.48	0.02
I clearly identify the clinical problems before planning intervention.	3.88	0.43	4.50	0.51	0.62	4.50	<0.01
I anticipate the sequence of events likely to result from planned intervention.	3.96	0.60	4.42	0.50	0.46	3.33	<0.01
Regarding a proposed intervention strategy, I think, "What makes it work?"	3.73	0.96	4.08	0.80	0.35	2.21	0.04
Regarding a particular intervention with a particular client, I determine whether it worked.	3.96	0.60	4.46	0.71	0.50	2.82	<0.01
I make decisions about practice based on my experience.	3.73	0.72	4.08	0.69	0.35	2.56	0.02
I use theory to understand intervention strategies.	3.19	0.69	3.62	0.75	0..43	2.85	<0.01
TOTAL	96.23	8.59	103.62	7.22	7.39	4.60	<0.01

Quantitative Comparison of Clinical Reasoning Between Groups
When comparing SACRR mean scores of the 2016-2017 cohort (M=104.98, SD 7.08) and the SACRR mean scores of the 2017-2018 cohort (M=103.62, SD 7.22), no statistically significant differences were identified. At the conclusion of semester five and all intervention courses utilizing case-based learning methods, these two groups were essentially equivalent in their perceived clinical reasoning abilities. Therefore, despite differences in curriculum sequence, instructors, or number and format of cases, it was evident that engaging in case-based learning promoted improved clinical reasoning.

Survey Results
All participants expressed their opinions about the types of cases through a survey conducted at the end of semester five. Although this data was not appropriate for further analysis, it is relevant for educators to consider in designing instruction and utilizing cases. The majority of students (57.7%) reported a preference for a variety of case formats, rather than using just one type. Second to variety of case formats, video cases were preferred by 26.9%, no preference was identified by 11.5%, and 3.8% preferred simulated patients.

The strengths and benefits of each case format were also identified. Students reported that text cases provided the most detailed background and context-specific information about a client, and many cases included information as it could be written in an occupational therapy evaluation. This facilitated identification of patient deficits to consider in writing goals and planning interventions. This level of detail is an important factor in allowing learners to critically reflect on a case, consistent with tenets of case-based learning (Jonassen & Hernandoz-Serrano, 2002). The visual representation of an actual patient was the most commonly cited advantage of the video cases. Students appreciated the authenticity and realism of the scenarios and the ability to observe client-centered decision-making by the health care practitioners. Authenticity and relevance to student learning needs are also critical components of case-based learning (Kim et al., 2006; Kolodner, 1997; Thistlethwaite et al., 2012). One student reported "It was great to be able to see an actual patient and how they were physically and cognitively presenting. This made it easier to design interventions that would accurately challenge the patient given their current performance levels." Students commented on the ability to review and re-visit both the text and video cases as a technique they used when thinking about a case and completing assignments.

The simulated patient event (interprofessional session with 2017-2018 cohort) had both positive and negative attributes identified by learners. Some were concerned that the actors did not accurately portray assigned patient deficits or that the experience was not truly standardized between students. However, the majority of students felt that the simulated patient experience was very valuable in giving them a hands-on experience and allowing them to test their own interactive reasoning in a genuine context. One student reported, "Simulation … is the pinnacle of learning experiences. It is as close as you can get to the real thing, and trying and failing or succeeding in the most real environment was most helpful to me." A few students noted that a graded progression

from text to video to simulated patient cases may be the most appropriate format for the gradual withdrawal of instructor support. This is reflective of scaffolding, described by Jonassen (1996) as a necessary part of case-based learning.

Qualitative Analysis and Themes
The questions that focused on clinical reasoning and readiness for Level II fieldwork were further analyzed following two levels of coding using the pragmatic approach described earlier. The themes of self-awareness, confidence and developing competence were identified.

Self-awareness. The varied case formats asked students to examine and use their knowledge and skills in context as they planned and implemented interventions (see Table 3). By using a specific case rather than a general diagnosis, students were required to engage in scientific, conditional and pragmatic forms of reasoning. In some instances, this allowed students to clearly recognize both the foundational knowledge they had gained as well as possible gaps in their knowledge base. One learner described this as "My clinical reasoning has increased exponentially. I feel ready for fieldwork II in that, even if I do not know everything, I will be able to reason through a situation and to recognize what gaps in information I have and know when to seek someone else." This change also reflects the change from reliance on procedural reasoning used by the novice practitioner to the pragmatic reasoning used by an advanced beginner (Schell, 2014).

In addition to awareness of knowledge and skills, students reflected on their improved awareness of interpersonal skills and therapeutic use of self. The construct of therapeutic use of self has been identified as a key component of the occupational therapy process (American Occupational Therapy Association, 2014), but is not easy for novices to implement and utilize, rather than just describe. Implementation of case-based learning required therapeutic use of self throughout role-playing or simulated patient experiences. A student reported, "I really liked not being graded on the actual intervention sessions as this took the pressure off and allowed me to experiment with my therapeutic use of self along with applying the knowledge I have gained over the course of this program." Similarly, another stated "Planning an intervention and actually carrying the intervention out with a real person are two different things, and the case studies have helped me become more cognizant of how I interact with other people." This change from narrative reasoning as only social interaction to narrative reasoning to guide interventions is another shift from novice to advanced beginner reasoning (Schell, 2014).

Finally, performing occupational therapy techniques and skills within the context of a case study allowed students to begin the process of transitioning from student to therapist, consistent with the use of scaffolding. As students entering an occupational therapy curriculum often seek out feedback from instructors, it is necessary that the practitioner develop the self-awareness to continually engage in reflection, self-assessment, and professional development, with decreasing levels of expert feedback. Although students were not all able to assume this responsibility fully, one student

described "I really feel that this course has been great for a lower-stress way to put it all together from previous semesters. It all came together and I feel like I got to start taking ownership and responsibility for my intervention decisions."

Confidence. Self-awareness is the first step in developing clinical competence; however, gaining confidence allows students to embrace the natural discomfort of stepping into the profession to implement and improve practice skills (see Table 4). Various assignments were included with the case-based learning methods to promote this ability to reflect and self-correct skills. Only a few students did not gain confidence, as evidenced by this learner report, "I think I am more prepared, but also more scared for fieldwork II. I feel like I struggled with the cases and it has made me doubt my ability to be successful as a future OT." In some cases, instructors were able to identify uncertainty or deficits in professional skills as students role-played the cases. This could be addressed immediately following case demonstrations, similar to how this feedback occurs in fieldwork and clinical settings. This could not be done in a large or didactic classroom setting.

Students reported increasing levels of confidence in their ability to perform clinical reasoning and implement the skills of the occupational therapist. They could identify improvement in specific skills, such as documentation, planning and implementing interventions, and comfort when working with clients. They also consistently described improved clinical reasoning and readiness for fieldwork. A student stated, "I feel exponentially more confident in my ability to begin and succeed in fieldwork this summer." Similarly, "I believe that the cases we have completed have extremely strengthened my clinical reasoning skills. Though I do not feel fully competent, I believe the cases have increased my confidence in my skills and abilities as an OT student."

Developing competence. The development of self-awareness and confidence are valuable for students entering Level II fieldwork. However, successful demonstration of competent reasoning and therapeutic techniques required observable application of those techniques, not just theoretical discussion of therapy provision (see Table 5). Case-based learning enabled the students to apply knowledge and skills gained from the expert cases to new contexts and situations, and to repeat this level of analysis by utilizing multiple cases. As one participant explained, "I think they really helped me feel more prepared for FW. I have ideas now of interventions to use, understand how to create an intervention personal to each client, and how skills can be worked on through particular occupations, and more naturally partake in clinical reasoning." This also demonstrated movement from a novice to advanced beginner level of clinical reasoning.

The level of competence related to demonstrating skills and applying knowledge of occupational therapy assessments and interventions was clearly observable in use of the cases. However, the natural process of clinical reasoning is not as obvious. This must be articulated by students after careful reflection. One student noted, "I feel that my clinical reasoning skills have developed a lot this semester. While there is still a lot of room for growth, I thought the case studies really prompted me to be intentional with my interventions and to think through why I was choosing certain aspects." Another

student reported, "I definitely think that I've learned more about clinical reasoning and how to apply it to practice and that it has become an innate part of my decision-making which will be helpful for me on my fieldwork experiences." The innate nature of reasoning is rarely seen of a novice therapist. This is a clear step toward the more skilled levels of reasoning demonstrated by the advanced beginner (Schell, 2014).

Table 3

Audit Trail for Pragmatic Qualitative Analysis (Self-Awareness Theme)

Interview Responses	Descriptive Coding	Pattern Coding into Themes
"Applying the interventions with classmates helped me identify my own strengths and weaknesses as a therapist and identify areas in which I needed improvement." "I feel ready for fieldwork in that even if I do not know everything, I will be able to reason through a situation and to recognize what gaps in information I have and know when to seek someone else." "I believe I am ready for any and all things to be thrown at me and I appreciate that I am skilled in some areas and need work in others. This course has helped me feel competent and also know my limits."	Awareness of Gaps in Knowledge and Skills	Self-Awareness
"I really liked not being graded on the actual intervention sessions as this took the pressure off and allowed me to experiment with my therapeutic use of self along with applying the knowledge I have gained over the course of the program." "The case studies have helped me become more cognizant of how I interact with other people."	Therapeutic Use of Self	
"...it all came together from previous semesters... I feel like I got to start taking ownership and responsibility for my intervention decisions." "This was a great way to glean a large variety of intervention ideas and explore personal creativity in selecting occupation-based interventions."	External Feedback vs. Ownership	

Table 4

Audit Trail for Pragmatic Qualitative Analysis (Confidence Theme)

Interview Responses	Descriptive Coding	Pattern Coding into Themes
"I feel that my clinical reasoning skills have developed a lot. While there is still room for growth, I thought the case studies really prompted me to be intentional with my interventions and to think through why I was choosing certain aspects."	Reasoning	
"Completing these case studies have given me confidence in my abilities to plan intervention and has significantly improved my ability to write SOAP notes."	Documentation	
"I think that I have a base knowledge of how to go about planning for intervention sessions with a wide range of patients." "I think being able to consistently plan and carry out treatment sessions throughout the semester was great practice for fieldwork."	Intervention Planning and Implementation	Confidence
"I think these case studies have been incredibly important! They have been a game changer in my level of clinical confidence." "I think these cases helped me to be more prepared for fieldwork, as it allowed me to get comfortable with working with clients in an environment that would support me."	Comfort	
"I definitely think that I've learned more about clinical reasoning and how to apply it to practice and that it has become an innate part of my decision-making, which will be helpful for me on my fieldwork, experiences." "I think I would have subconsciously used some forms of clinical reasoning; however, thinking specifically about it was beneficial."	Reasoning as a Natural Process	

Table 5

Audit Trail for Pragmatic Qualitative Analysis (Developing Competence Theme)

Interview Responses	Descriptive Coding	Pattern Coding into Themes
"…I do feel like information and ideas are flowing more freely now that I have been through the past two semesters. I feel as though knowledge about conditions and possible interventions comes more automatically now than it did at this time last year."	Putting the Pieces Together	
"The cases…have been very helpful…because we were able to apply the information learned in class to an actual scenario. It helped me better understand [course content] and how it can be used in a clinic setting with a patient."		
"I definitely think that I've learned more about clinical reasoning and how to apply it to practice and that it has become an innate part of my decision-making which will be helpful for me on my fieldwork experiences."	Decision-Making	Developing Competence
"I think the case studies helped tremendously with my preparedness for fieldwork II and my confidence going into it. I will still be nervous, but I know I will fall into the rhythm of the facility and I just need to trust the knowledge I have."		
"I think they really helped me feel more prepared for fieldwork. I have ideas now of interventions to use, understand how to create an intervention personal to each client and how skills can be worked on through particular occupations and more naturally partake in clinical reasoning."	Preparedness	
"Practice, practice, practice is always helpful in developing these skills and increasing comfort level."	Repetitive Practice	

DISCUSSION

This mixed methods study explored how case-based instructional methods influenced the clinical reasoning of occupational therapy students. Specifically, quantitative analysis of the SACRR identified significant changes in the clinical reasoning process of students, both related to the overall process and to specific components of reasoning, following case-based learning. Those components of reasoning included the application of theories and frames of reference to practice, as well as careful analysis and reflection related to intervention planning, implementation, and outcomes. Qualitative analysis of student reflections identified qualitative themes explaining student development of self-awareness, confidence, and competence as occupational therapy practitioners. These skills were impacted by using a variety of case formats and repeated case-based learning methods, as applied in different courses across an academic year. There was not a specific number of cases, nor one specific activity that facilitated this process. Rather, it was the use of the tenets of case-based learning that contribute to this improved clinical reasoning and skill development of future practitioners. Review of the cases initially allowed students to interpret the experiences of skilled practitioners and reflect critically on what could be learned from each case. By students having to use the information of the case in new ways, such as developing and implementing appropriate interventions, they had to intentionally reason how their learning from the case could be applied and generalized (Jonassen, 1996; Jonassen & Hernandoz-Serrano, 2002; Kolodner, 1997; Kolodner & Guzdial, 2000).

Different formats of cases offered different strengths of the case-based learning. Text cases provided detail that made cases content rich, while video and simulation supported authenticity and relevance to the learner and are rich in context. All formats supported scaffolding, graded complexity, and use of reflection and integration into students' reasoning process. Although the case-based learning activities were customized by each instructor to meet specific learning objectives of courses, all included consideration of the client's unique context that is necessary to reason through the occupational therapy process (Fleming, 1991; Fleming & Mattingly, 1993; Gillette & Mattingly, 1987; Mattingly, 1991; Rogers, 1983).

Case-based learning also facilitated the transition from a novice in clinical reasoning to advanced beginner skills, such as decreased reliance on rules-based thinking and external feedback or guides to the reasoning process (Schell, 2014). This is an important factor as students prepare for Level II fieldwork and may be able to demonstrate practice skills based on reasoning more efficiently. In addition, these cases allowed students to ensure that their reasoning process was an explicit, comprehensive process incorporating all types of professional reasoning that are relevant to occupational therapy practice (Schell & Schell, 2018).

When considering the qualitative and quantitative results together, it is clear that case-based reasoning provided a positive learning environment for students, contributed to student knowledge and skills, and allowed them to assess and improve their clinical reasoning and clinical skills.

Although these results are promising, the limitations of the small sample size and lack of a control group must be acknowledged. In future studies, baseline measures of clinical reasoning with the SACRR may be valuable as students enter the occupational therapy program. Utilizing case-based learning earlier in the curriculum can also be implemented and studied. In addition, more rigorous qualitative data collection and analysis may lend additional insights that result from the research.

Implications for Occupational Therapy Education
This research supports continued and/or increased use of case-based learning opportunities in occupational therapy education, with attention to the tenets of well-constructed cases and use of varied case formats by occupational therapy educators. Although many educators may provide scaffolding intuitively, since it mirrors the construct of adapting and grading that occupational therapists use skillfully, applying it intentionally may strengthen student learning outcomes through case-based learning. In addition, this supports improvements to each case format, such as including detail to video or simulated cases that supports a content and context rich case and provides information that can contribute to connecting theory to practice. Finally, this allows occupational therapy educators to consider the benefits of each type of case format so that case-based learning can be infused across a curriculum in an intentional and purposeful manner. Building on the strengths of each type of case and deciding how the cases are presented may support increased levels of student competence as they prepare for Level II fieldwork and clinical practice.

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