Teaching Clinical Reasoning as a Thinking Frame

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Key Words: curriculum • education

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This article was accepted for publication July 30, 1997.

Objective. Clinical reasoning concepts can be viewed as descriptions of mental operations or as a thinking frame—a structure to organize and support clinical thinking. This study examined an approach for teaching clinical reasoning as a thinking frame to occupational therapy students.

Method. A quasi-experimental, pretest-posttest design was used with a convenience sample of 10 undergraduate occupational therapy seniors. All participants (a) acquired the thinking frame of clinical reasoning concepts through explicit instruction and (b) practiced that thinking frame with an external aid—the Clinical Reasoning Case Study Format. The accuracy of participants' definitions of clinical reasoning concepts before and after this learning experience were examined to assess their acquisition of the thinking frame. The content of clinical reasoning case studies were examined to assess students' application of the thinking frame to clinical situations.

Results. Wilcoxon signed rank tests done on presemester and postsemester definitions ratings indicated that the latter were rated significantly higher than the former for (a) narrative reasoning \( p = .008 \), (b) procedural reasoning \( p = .005 \), (c) interactive reasoning \( p = .006 \), (d) pragmatic reasoning \( p = .008 \), and (e) conditional reasoning \( p = .01 \). The content of participants' clinical reasoning case studies indicated that they were able to apply clinical reasoning concepts.

Conclusion. The results suggest that using a clinical reasoning thinking frame to organize clinical observations is an effective way to help entry-level occupational therapy students learn and apply clinical reasoning concepts.

In today's rapidly changing health care environment, occupational therapy practitioners need to be flexible thinkers skilled in clinical reasoning. Clinical reasoning is the thought process practitioners use during evaluation and intervention. Several types of clinical reasoning have been described in the occupational therapy literature, including narrative, procedural, interactive, pragmatic, and conditional reasoning (Mattingly & Fleming, 1994; Schell & Cervero, 1993). These clinical reasoning concepts can be viewed as descriptions of mental processes that become proficient only through clinical experience (Benner, 1984; Dreyfus & Dreyfus, 1986). Alternatively, clinical reasoning concepts can be viewed as a thinking frame—a structure to organize and support clinical thinking (Perkins, 1987). Although occupational therapy students may not be able to enter Level II fieldwork proficient at the actual mental operations of clinical reasoning, they can be ready to use clinical reasoning concepts to
guide their clinical learning. This study examines an approach for teaching clinical reasoning as a thinking frame to occupational therapy students.

**Literature Review**

**Types of Clinical Reasoning**

The types of clinical reasoning used by occupational therapy practitioners have been described by several authors. Narrative reasoning yields the client's occupational story (i.e., his or her life history as told through preferred activities, habits, and roles). Narrative reasoning also encompasses the client and therapist's shared story (i.e., how the therapist and client will incorporate the client's activity preferences into intervention to build a meaningful future for the client). Ideally, practitioners use narrative reasoning to set an overall mental context for their work with a particular client (Clark, 1993; Mattingly, 1991; Neistadt, 1996). Procedural reasoning is the process of defining clients' diagnostically related occupational performance area, performance component, and performance context problems and selecting appropriate interventions. This type of thinking taps practitioners' reservoirs of knowledge about specific diseases and their functional sequelae (Fleming, 1991; Mattingly & Fleming, 1994). Interactive reasoning yields an understanding of what the disease or disability means to the client (i.e., the client's illness experience). Interactive reasoning also encompasses the interpersonal interactions between therapists and clients (Fleming, 1991; Mattingly & Fleming, 1994). Pragmatic reasoning is used to consider all of the practical issues that affect occupational therapy services: the treatment environment; the therapist's values, knowledge, abilities, and experiences; the clients' social and financial resources; and the clients' potential discharge environments. Therapists use this type of reasoning to decide what can be done for a particular client in a given treatment setting (Schell & Cervero, 1993). Conditional reasoning is used to revise treatment moment to moment to meet clients' needs. This revision is done with an eye to clients' current and possible future contexts (Fleming, 1991; Mattingly & Fleming, 1994).

**Clinical Reasoning as a Thinking Frame**

These clinical reasoning concepts describe the varied mental operations occupational therapy practitioners use when working with clients. These concepts also constitute a thinking frame specific to the field of occupational therapy.

Writing as an educator interested in teaching thinking skills, Perkins (1987) described a thinking frame as “a guide to organizing and supporting thought processes” (p. 47). He suggested that using thinking frames is one way to improve intellectual competence. Clinical reasoning concepts can be used as a guide to organize and articulate occupational therapy thinking about clinical practice. This clinical reasoning thinking frame is potentially useful to occupational therapy students faced with learning the mass of content and process taught in their academic curricula.

**Teaching Thinking Frames**

Perkins (1987) suggested that there are three stages involved in learning thinking frames: (a) acquiring the frame, (b) making the frame automatic, and (c) transferring the frame. Perkins said that students acquire thinking frames only through explicit instruction in those frames. He stated that “studies suggest that modeling alone without making explicit the principles modeled, leads to less and sometimes no learning” (p. 48). That is, students cannot be expected to infer thinking frames from modeling alone. Applied to occupational therapy education, this principle suggests that without explicit definitions of the different types of clinical reasoning, students will not understand the various types of thinking used in clinical practice from instructors’ modeling of the clinical thinking process.

Making the frame automatic involves practice in applying the frame to real-life situations. In the initial stages of making the frame automatic, before they have internalized the frame, students benefit from external aids that prompt them about the main features of the thinking frame. Keeping a newly acquired thinking frame in one's head takes up space in working memory, restricting the working memory available to apply the frame's concepts to an actual situation (Perkins, 1987). An external aid frees up working memory for application of the frame. For occupational therapy students, this means that analyzing a practice situation for the various types of clinical reasoning would be easiest initially with a list of definitions or guiding questions about the different types of reasoning.

Transferring the frame occurs only if students practice the frame in varied situations. Perkins (1987) described two types of transfer: low-road and high-road. Low-road transfer occurs when “a performance made automatic in one context gets triggered in another context resembling the first” (p. 51). Low-road transfer, then, is a chance occurrence triggered by environmental stimuli. Given the complexity of client situations and the tremendous differences between different health care delivery systems, Level II fieldwork students are not likely to encounter any two clinical situations sufficiently similar to prompt low-road transfer of clinical reasoning concepts. High-road transfer is "mindful abstraction from the context of learning and
application to another context” (p. 51). This type of transfer is more flexible and therefore more desirable. High-road transfer is appropriate to the clinical reasoning thinking frame because this frame is composed of abstract concepts. To transfer these concepts across practice settings, students need to learn how these concepts are concretely expressed in practitioners’ actions.

The current study examined the effects of acquiring and practicing a clinical reasoning thinking frame on students’ ability to articulate and apply clinical reasoning concepts. The hypotheses were as follows: After instruction in clinical reasoning concepts and application of those concepts to a case study analysis, participants will (a) be more accurate in their descriptions of clinical reasoning concepts than before this learning experience and (b) demonstrate accurate application of clinical reasoning concepts as seen by the content of their clinical reasoning case studies.

Method

Participants

A convenience sample of 10 undergraduate occupational therapy seniors from the University of New Hampshire (8 women, 2 men) participated in this study. The average age of the participants was 25 years, with a range of 21 years to 42 years. The participants’ graduating average grade point average (GPA) was 3.6 out of 4.0. Participants had all enrolled for a semester-long elective independent study with the author to gain additional clinical experience in their final academic year.

Design

A quasi-experimental, pretest–posttest design was used to test the hypotheses of this study. Both qualitative and quantitative data were gathered. All participants (a) acquired the thinking frame of clinical reasoning concepts through explicit instruction and (b) practiced that thinking frame with an external aid—the Clinical Reasoning Case Study Format (see Appendix). The accuracy of participants’ definitions of clinical reasoning concepts before and after this learning experience were examined to assess their acquisition of the thinking frame; the content of clinical reasoning case studies were examined to assess participants’ application of the thinking frame to clinical situations.

Procedure

Explicit instruction in and practice with the clinical reasoning thinking frame took place within a semester-long independent study course offered by the author. This course was offered twice; six students took the course during the fall semester, and five took it during the spring semester. At the beginning of each course, the instructor told students that she was trying out a clinical reasoning focus for this independent study and wanted them to take a clinical reasoning quiz at the beginning and end of the semester so that they could assess their own learning. The instructor assured students that she would not look at their quizzes until the end of the semester and then only if they gave her permission to do so. The quiz asked students to define: (a) clinical reasoning, (b) narrative reasoning, (c) interactive reasoning, (d) procedural reasoning, (e) pragmatic reasoning, and (f) conditional reasoning. Quizzes completed at the beginning of the semester were sealed in an envelope by the students; the sealed envelope was kept but not opened by the instructor. Students looked at these quizzes at the end of the semester, after they had taken the quiz again, to assess their learning of clinical reasoning terminology. All students chose to return both quizzes to the instructor, knowing that these might be used as part of a write-up of the course format. All but one student also provided the instructor with a copy of the completed clinical reasoning case studies. Data were examined for the 10 students for whom quizzes and case studies were available.

During the first class session, after the quiz, the instructor gave a lecture and handout about clinical reasoning concepts and oriented the students to the structure of the independent study course. In this independent study, students worked with an occupational therapist at a local rehabilitation center once a week for approximately 3 hr. They received on-site supervision from the clinical educator and met with the independent study instructor every other week for 80 min for group supervision and discussion. Some of these discussions were focused on how students had seen the different types of clinical reasoning manifested during their clinical time. Most discussions focused on students’ stories about clients they had seen and questions students had related to those stories.

The students’ final assignment was to complete a clinical reasoning case study on a client they frequently saw being treated by their on-site occupational therapist. The course instructor supplied a Clinical Reasoning Case Study Format for the case studies that provided students with questions addressing each specific type of clinical reasoning. The Appendix contains a revised version of this format; the format students used in this study did not include definitions of the different types of clinical reasoning. The Clinical Reasoning Case Study Format was meant to be an external aid to help students practice applying clinical reasoning concepts to a client situation. These clinical reasoning case studies were graded by the course instructor and returned to students before the end of the semester.

Data Analysis

Clinical reasoning quizzes. Two raters, the author and
against the definitions provided ro participants at me be­
anothet occupational therapist, independently rated par­
ginning of the semester. The following scale was used ro
soning case studies to see whether clinical reasoning con­
76% of the definition ratings. After their independent rat­
erence definition written; .5 = some of the concepts in the
definitions were used in the analysis. For each type of
clinical reasoning, Wilcoxon signed rank tests were done
on presemester and postsemester definitions ratings. A
.05 level of significance was used for these analyses.

Clinical reasoning case studies. The two raters inde­
dependently rated the content of participants’ clinical rea­
siong case studies to see whether clinical reasoning con­
tected were expressed in the different sections of those
assignments. The clinical reasoning case studies were
divided into the following sections: (a) narrative reason­
ing, (b) interactive reasoning, (c) procedural reasoning,
(d) pragmatic reasoning, and (e) conditional reasoning.
The reference definitions used to judge the quizzes were
also used as a guide for rating the clinical reasoning case
studies. The following scale was used to rate the content
of each section: 0 = none of the concepts in the reference
definition written; 5 = some of the concepts in the reference
definition written; 1 = all of the concepts in the reference
definition written. The two raters agreed on
80% of the definitions and the independent ratings for 76% of the
definitions were used in the analysis. The consensus ratings for 24% of
the definitions were used for descriptive statistics. After their independent rat­
ings, the raters discussed their discrepant ratings until a
consensus was reached. The consensus ratings for 20% of
the definitions and the independent ratings for 80% of the
case study sections were used for descriptive statistics.
After reading and rating all the case studies, the two raters
read them again, highlighting exemplar passages relative to the different types of clinical reasoning.

Results

The results are discussed relative to the study’s two hy­
potheses: After instruction in clinical reasoning concepts and application of those concepts, participants will (a) be
more accurate in their descriptions of clinical reasoning
concepts than before this learning experience and (b) demonstrate accurate application of clinical reasoning
concepts as seen by the content of their clinical reasoning
case studies.

Accuracy in Descriptions of Clinical Reasoning Concepts

Table 1 shows participants’ mean ratings for the different
definitions at the beginning and end of the semester.

<table>
<thead>
<tr>
<th>Term</th>
<th>Mean Presemester Rating</th>
<th>Mean Postsemester Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical reasoning</td>
<td>.65</td>
<td>.65</td>
</tr>
<tr>
<td>Narrative reasoning</td>
<td>.20</td>
<td>.85</td>
</tr>
<tr>
<td>Procedural reasoning</td>
<td>.10</td>
<td>.95</td>
</tr>
<tr>
<td>Interactive reasoning</td>
<td>.05</td>
<td>.55</td>
</tr>
<tr>
<td>Pragmatic reasoning</td>
<td>.05</td>
<td>.80</td>
</tr>
<tr>
<td>Conditional reasoning</td>
<td>.05</td>
<td>.65</td>
</tr>
</tbody>
</table>

Note. n = 10. 0 = none of the concepts in the reference definition written; 5 = some of the concepts in the reference definition written; 1 = all of the concepts in the reference definition written.

Wilcoxon signed rank tests done on presemester and
postsemester definitions ratings indicated that the latter
were rated significantly higher than the former for (a)
narrative reasoning (p = .008), (b) procedural reasoning
(p = .005), (c) interactive reasoning (p = .006), (d) prag­
matic reasoning (p = .008), and (e) conditional reasoning
(p = .01). There was no significant difference between
participants’ presemester and postsemester definitions of
the term clinical reasoning. Therefore, the first hypothesis
was supported for all of the concept terms except clinical
reasoning.

Accuracy of Application of Clinical Reasoning Concepts

Table 2 shows participants’ mean content ratings for the
different sections of their clinical reasoning case studies.
Scores indicate that participants were able to apply clinical
reasoning concepts in their case studies. Exemplar quotes
from participants’ case studies also suggest that they
applied clinical reasoning concepts to their analyses of
client cases. Identifying information, such as names of per­
sons and places, has been removed from these quotes to
protect the anonymity of the clients. Participant 7’s case
study was about a person with a total knee replacement;
all other participants wrote about clients with brain dys­
function from vascular or neoplastic etiologies.

Narrative reasoning. Question 4 in the narrative rea­
siong section of the case study asked participants to
write clients’ stories in one to two paragraphs, including
an ending about what the clients’ lives would be like after
discharge and starting with “Once upon a time...” This
question was meant to help participants synthesize the
information gathered for the narrative reasoning section.

Table 2

<table>
<thead>
<tr>
<th>Case Study Section</th>
<th>Mean Content Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative reasoning</td>
<td>.85</td>
</tr>
<tr>
<td>Procedural reasoning</td>
<td>.85</td>
</tr>
<tr>
<td>Interactive reasoning</td>
<td>.90</td>
</tr>
<tr>
<td>Pragmatic reasoning</td>
<td>.90</td>
</tr>
<tr>
<td>Conditional reasoning</td>
<td>.75</td>
</tr>
</tbody>
</table>

Note. n = 10. 0 = none of the concepts in the reference definition expressed; 5 = some of the concepts in the reference definition expressed; 1 = all of the concepts in the reference definition expressed.
in a narrative mind-set. Participant 3 responded to this question as follows:

Once upon a time, there was a man who was a retired mechanic and lived alone in his home. He performed all of those everyday chores without a thought. He liked to listen to big band music and was involved in a fraternity. It was important for him to be able to drive himself around whether it be to go to the park or to get groceries. He had certain meals scheduled for each day of the week, and he liked to dine out at places like [...] .

One day in September he has a stroke which left his left arm paralyzed, limited his vision on his left side, and decreased his balance so he couldn’t walk. He was brought to [...] for rehabilitation. He wanted to walk again and return home. He was making good gains in occupational and physical therapy. It was looking like he would be able to return home with help. However, he had another stroke which took away all of his gains and left him worse than before. His left side was weaker, and he even had a lot of trouble eating. Due to this, he was [discharged] from OT [occupational therapy], and it was decided he would remain at [...] . At one point, he wasn’t expected to live much longer, but he pulled through and improve. From here on out, it is one day at a time.

In response to this same question, Participant 4 wrote:

Once upon a time, [N.], who is 82, fell in the middle of the night, then crawled back into bed afterwards knowing that something was wrong but not wanting to wake anyone. She was taken to the hospital the next day and diagnosed with a CVA [cerebrovascular accident], resulting in left side hemiparesis. She is now at [...] and is trying to regain her independence with the help of occupational therapy among other disciplines. When she came to [...] , she was unable to move the left side of her body and was a max assist in transfers and a mod assist in self-care activities. She was unable to stand and complained of dizziness. The patient was no longer able to perform a lot of the activities she enjoyed, including teaching a bible class, quilting, and driving. [...] Five weeks later, [N.] is doing much better. [...] [N.] has a great social support network and hopes to return home in 12 weeks from starting treatment. She will return home to her one-story house with services. There are no stairs and there is a ramp to the front door, so mobility will not be a problem for [N.]. She will be able to perform many of the activities she previously enjoyed, such as attending religious services, doing jigsaw puzzles, reading, visiting with family and friends, and attending group activities. However, she may have to give up the activities of driving and quitting if an adaptive technique is not found to help her. She will be independent in self-care and many homemaking skills. The activities that [N.] is no longer able to perform will be performed by family, friends, and the services she will have at home.

Procedural reasoning. Question 6 in the procedural reasoning section asked participants to list the occupational therapy treatments they would deliver if they were this person’s therapist. In response to this question, Participant 10 wrote:

I would have tried to incorporate some type of painting or ceramics into treatment for bilateral skills since this was a strongly expressed interest of the client. Even during [functional] balance training, the therapist was turning the client’s body for her and had her doing very little dynamic reaching and compensating for the shifts in her own body’s weight. I think it would have been more beneficial to the client to do [functional] balance training while dusting or cooking or in another activity where more natural compensations could be made instead of in such a controlled manner.

Question 9 in the procedural reasoning section asked participants to analyze a treatment session by observing the treatments given and noting the frames of reference and rationales for those treatments and the client’s physical and psychosocial responses. Participant 6 chose to use the suggested chart format for this analysis; the first row of that chart is excerpted in Table 3.

Interactive reasoning. Question 1 in the interactive reasoning section asked participants to describe the client’s perception of his or her illness, and Question 3 asked them to describe the way the therapist interacted with this client during one treatment session. In response to these questions, Participant 5 wrote:

The client’s perception of her illness is very positive. She understands what has happened to her and knows her limitations and strengths. She realizes that she will never be fully independent in some of her activities and will probably never live alone again. She has experienced some depression secondary to the stroke, but it has not affected her motivation to meet her goals in therapy.

... The therapist always knocks on the door to say she is coming in and focuses treatment around what the client feels is important. When working on bed mobility, the OT [occupational therapist] could not figure out exactly which way the client would roll over. So the OT asked if she could lie on the side of the bed next to the client to figure out how people roll over and could tell the client how to use the affected arm. I felt this was appropriate because the OT knows the client very well, the OT was trying to help the client be independent in bed mobility, and there were other people in the room. The client also is very comfortable with the therapist and laughed when the OT was figuring out how people roll over.

In response to these same interactive reasoning questions, Participant 9 wrote:

The patient was very hypersensitive and critical of her motor problems. She often did not feel she was making any progress, i.e., with her coordination exercises [or increased] bilateral hand use. She could not see her cognitive deficits.

During the treatment session in which [the] patient was doing coordination exercises, the therapist messed up during the session where they clap hands together in different patterns. They both laughed when this happened, and the patient explained how it should have been done. Throughout the session, the therapist asked the patient how she was feeling, asked about her headaches, and asked about her family. I could tell she used a holistic approach when with her patient. They were able to joke and laugh together, which was great to see.

Pragmatic reasoning. Question 6 in the pragmatic reasoning section asked participants to describe the physical resources available at the facility. In response to this question, Participant 7 wrote:

The OTs have a gym which is adequate for the size of the facility. The gym is shared with PT [physical therapy]. There is a large equipment room which contains evaluation tools, adaptive equipment, and a few games. The gym has three therapy beds with curtains for patient privacy. [...] There is a kitchen available for cooking; it is not very big, so I do not think more than one patient is in there at a time. There is also a bathroom where tub and toilet transfers can be practiced.

Question 8 in the pragmatic reasoning section asked participants whether the client would be going home to an accessible environment. In response to this question, Participant 8 wrote:
Table 3
First Row of Participant 6's Response to Procedural Reasoning Question 9 on the Clinical Case Study Format

<table>
<thead>
<tr>
<th>Treatment (Frame of Reference)</th>
<th>Rationale</th>
<th>Psychosocial</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient washed his face and body.</td>
<td>Have patient be more independent in ADL and also feel in control.</td>
<td>Mr. B. felt he was improving but doesn’t want to go home until he is where he was. Mr. B. was surprised when he was able to wash under his [left] arm with his [right] hand. Mr. B. didn’t want to do deodorant with [right] hand because he is afraid of dropping it. He was looking forward to a shower that night.</td>
<td>His [right] hand was shaky, but he was able to wash [and] dry his face, dip [and] squeeze the washcloth. He was able to wash under his left arm, even though his [right] hand was shaky. He successfully washed the front of his body, and the [occupational therapist] did his back.</td>
</tr>
</tbody>
</table>

Note. ADL = activities of daily living.

The patient is going home to a one-level home. The home has five stairs leading into it. The patient’s son has lowered the stair rise to 5 inches [for] each step, which helps him get in and out easier. I would also recommend to the patient to have rubber nonslip mats inside and outside the tub to make transfers easier. I would also want to see grab bars installed in the bathroom and the patient using a tub seat. I would also advise the patient and his wife to remove the throw rugs or use extreme caution when ambulating throughout the house.

Conditional reasoning. The conditional reasoning section asked participants to summarize the client’s history and the participants’ recommendations for further treatment or other services. This summary was meant to simulate a discharge summary—that part of clinical documentation where therapists are most explicitly articulating an image of the client’s future. For this section, Participant 1 wrote:

Mr. P, is an 86-year-old man who was admitted to [..] on [date] after his second resection of his transverse dural arterial venous malformation. Mr. P. also has necrosis of the, dysphagia, depression, and diabetes and had a right CVA in [date]. He is a retired swim coach who enjoys golfing and other sports and also going out to eat and to shows. He was previously living with his significant other before the surgery.

While at [..], Mr. P. was treated by an OT for upper-extremity strengthening and active range of motion [AROM]. He also worked on ADL [activities of daily living] and functional mobility. He gained AROM and strength in his upper extremities and became more independent with ADL, for example, bathing and shaving with your sink level. Due to a lack of motivation, he was not making further gains and was discharged from occupational therapy services. I would recommend that Mr. P. be discharge to either a shared home or long-term-care facility [...]. He needs more care than will be available at home.

Participant 2 wrote:

[S.] had a lacunar CVA at the age of 85, after 22 years of retirement as a slaughter house owner and dairy farmer. [S.] also suffers from depression, anemia, and hypertensive cardiomyopathy. He seemed to enjoy his social life with friends and brothers and was dedicated to visiting his wife daily [in the nursing home where she resided]. He is currently receiving occupational therapy for decreased endurance, decreased functional mobility, and decreased independence in ADL. OT has been engaging [S.] in ADL retraining, functional mobility training, therapeutic exercise, and home management. [S.] is making great improvements in all of the above areas and continues toward his goal of going home. [S.‘s] discharge has been planned, and a home evaluation was completed. It is recommended that he continue outpatient OT to further increase his endurance and possibly to do a driving evaluation if/when appropriate. [S.] should also hire a homemaker and a home health aide to make his life safer and as independent as possible.

Participants’ rating scores (see Table 2) and these exemplar quotes support the second hypothesis.

Discussion

The results suggest that using a clinical reasoning thinking frame to organize clinical observations is an effective way to help occupational therapy students in entry-level educational programs learn and apply clinical reasoning concepts. The results also suggest ways to improve the teaching of clinical reasoning as a thinking frame. Perkins’s (1987) three stages for learning thinking frames will be used to structure this discussion: (a) acquiring the frame, (b) making the frame automatic, and (c) transferring the frame.

Acquiring Thinking Frames

Participants’ ratings on their pretest definitions of clinical reasoning concepts (see Table 1) support Perkins’s (1987) contention that students need explicit instruction to acquire thinking frames. All occupational therapy faculty members at the University of New Hampshire are well versed in clinical reasoning concepts, and all believe that they integrate these concepts into their teaching (Neistadt & Atkins, 1996). However, the senior-level students in this study were not able to articulate clear definitions of narrative, procedural, interactive, pragmatic or conditional reasoning at the beginning of the study. These participants were all excellent students, as demonstrated by their average GPA. Moreover, their pursuit of the elective course associated with this study suggests that they were all highly motivated, independent learners. Participants may not have known these definitions because they may not have been exposed to these exact reasoning terms.

The concepts associated with these terms may have been taught; however, faculty members may not have used these exact terms to label the concepts. Using clinical reasoning terminology to label types of clinical thinking may
help students to (a) distinguish among the different mental operations therapists use in practice and (b) more readily access the processes and content they have learned related to those different mental operations (Neistadt, 1996).

Interestingly, all participants were able to give a general definition of clinical reasoning at the beginning of the study probably because faculty members frequently use this term to describe clinical thinking. Participants who did not receive full credit for pretest or posttest definitions focused on clinical reasoning as the thought processes involved in treatment planning but did not mention evaluation. This focus on treatment planning may be processes involved in treatment planning but did not mention evaluation. This focus on treatment planning may be derived from students' numerous treatment planning assignments throughout the curriculum. The clinical observations associated with this study may have reinforced that treatment planning focus because students did not observe and analyze evaluation sessions.

Making Thinking Frames Automatic

The external aid—the Clinical Reasoning Case Study Format—used in this study to help students practice the clinical reasoning thinking frame did not include definitions of the different types of clinical reasoning. The questions under each section were meant to lead students through the thought processes associated with those types of reasoning. However, participants did not uniformly transfer that thinking to abstract definitions of particular types of clinical reasoning. This is particularly evident in their posttest definitions of interactive reasoning (see Table 1). Though the questions in the interactive reasoning section asked about clients' illness experiences and therapists' interactions with clients, most participants wrote about only one of those two concepts in defining interactive reasoning at the end of the study, after their clinical reasoning case studies had been completed. Adding definitions to the external aid, as shown in the Appendix, might help students integrate the thinking processes prompted by different questions into the general themes associated with a given type of reasoning.

The posttest and case study ratings for conditional reasoning (see Tables 1 and 2) suggest that the Clinical Reasoning Case Study Format needs to be more explicit about how conditional reasoning relates to the question in that section. Participants were not told that this section was meant to simulate a discharge summary; the addition of that information, as shown in the Appendix, might strengthen students' understanding of conditional reasoning as they use this external aid.

Transferring Thinking Frames

This study did not examine the transfer of the clinical reasoning thinking frame across varied situations. It is unlikely that practicing the thinking frame on one case would be sufficient to assure transfer of the frame to analysis of other clients. To facilitate high-road transfer (Perkins, 1987) of the clinical reasoning thinking frame, occupational therapy educators need to provide students with multiple and varied opportunities to apply the thinking frame to client situations. Within the confines of an academic curriculum, this might be done by having students practice the thinking frame with simulated clients, videotaped clients, and actual clients. The external aids used for these experiences could be gradually condensed to reduce student reliance on the external aid (Perkins, 1987). For example, the Clinical Reasoning Case Study Format could be used with a simulated client; a treatment planning assignment that chunked information by the different types of clinical reasoning could be used for a videotaped client; an outline version of the treatment plan assignment could be used for an actual client. The effect of this teaching strategy on Level II fieldwork and entry-level practice performance could be tracked to assess the degree of transfer of the thinking frame to clinical practice.

Conclusion

This study suggests that occupational therapy students are able to use clinical reasoning concepts as a thinking frame well before they become proficient at the mental operations described by clinical reasoning concepts. Teaching students to organize their clinical observations according to clinical reasoning concepts may accelerate their progression to expert levels of practice as therapists. Further research is needed to test this hypothesis and discover other methods of occupational therapy education that will prepare practitioners for the performance demands of today's health care environment.

Acknowledgments

I thank Douglas Simmons, OTR/L, for his help in rating the quizzes and case studies and for his incisive questions and discussions during that process. I also thank all the students, clients, and clinical educators who participated in the independent study course described in this article.

Appendix

Clinical Reasoning Case Study Format

Clinical Reasoning

The thought processes occupational therapy practitioners use during evaluation and intervention.

Narrative Reasoning

Narrative reasoning yields the client's occupational story (i.e., his or her life history as told through preferred activities, habits, and roles). Narrative reasoning also encompasses the client and therapist's shared story (i.e., how the therapist and client will incorporate the client's
activity preferences into intervention to build a meaningful future for the client).

1. Complete Canadian Occupational Performance Measure (COPM) interview.
2. Review chart for social history (summarize the social history).
3. Who is this person (occupational narrative)?
   a. What activities and roles have been important to this person in the past?
   b. What activities and roles are still important to this person?
   c. What activities and roles does this person want to be able to perform after occupational therapy treatment?
4. What activities of importance to this person are now difficult for him or her to do, given his or her disability? How and why are these activities difficult? (You may want to use a chart format with the following column headings to answer this question: Activity, Performance Deficit, Reasons Activity Is Difficult.)
5. What valued activities will this person be able to do after occupational therapy treatment?
6. In one to two paragraphs, write this person's story, including an ending about what his or her life will be like after discharge from this facility. Start with, "Once upon a time...."

Procedural Reasoning

Procedural reasoning is the process of defining clients' diagnostically related occupational performance area, performance component, and performance context problems and selecting appropriate interventions.
1. Summarize this person's diagnoses (primary and secondary) and medical history.
2. List the diagnostically related treatment precautions for this person.
3. List the occupational therapy problems and their corresponding goals
   a. as they appear in the record.
   b. as you would write them (use Uniform Terminology [American Occupational Therapy Association, 1994] language) and be sure that your goals are written as measurable objectives.
4. Give a rationale for any differences between your lists in 3a and 3b. If no differences exist, explain why you think the list in the record reflects this person's needs.
5. List the occupational therapy evaluations delivered or planned as listed in the medical record and the types of information (strength, joint mobility, etc.) gleaned from these evaluation procedures. Additionally, list any other evaluations you believe that you might do with this person if you were his or her occupational therapist and explain why you would give these evaluations.
6. List the occupational therapy treatments
   a. delivered or planned as listed in the medical record.
   b. that you would include if you were this person's occupational therapist.
7. For each treatment listed in 6a and 6b, list the occupational therapy frame of reference you think relates to that treatment.
8. Give a rationale for any differences between your lists in 6a and 6b. If no differences exist, explain why you think the list in the record reflects this person's needs.
9. For one occupational therapy treatment session with this person, observe the treatments given, frames of reference for those treatments, rationales for those treatments, and the person's physical and psychosocial responses to the treatments. (You may want to use a chart format with the following column headings to record your observations: Treatment, Frame of Reference, Rationale, Person's Psychosocial Response, Person's Physical Response.)
10. Would you do this session any differently as a therapist? If no, why not? If yes, what would you do differently and why?
11. What were the apparent decision points or changes in the session? Why do you think these changes were made when they were?
12. Were this person's short-term goals achieved while in this facility? If no, why not? Were the goals unrealistic? Was the occupational therapy treatment inappropriate? Was the person motivated?

Interactive Reasoning

Interactive reasoning yields an understanding of what the disease or disability means to the client (i.e., the client’s illness experience). Interactive reasoning also encompasses the interpersonal interactions between therapists and clients.
1. Describe this person's perception of his or her illness using information from the medical record, your COPM interview, and the person's comments during treatment.
2. Describe this person's interpersonal style.
3. In one occupational therapy treatment session, describe the way the therapist interacted with this person.

Pragmatic Reasoning

Pragmatic reasoning is used to consider all of the practical issues that affect occupational therapy services: the treatment environment; the therapist's values, knowledge, abilities, and experiences; the client's social and financial resources; and the client’s potential discharge environments. Therapists use this type of reasoning to decide what is possible to do for a particular client in a given treatment setting.
1. How long will this person be able to stay in this facility for treatment?
2. What medical insurance does this person have?
3. How many occupational therapists and certified occupational therapy assistants are available to give treatment in this facility (i.e., staffing)?
4. How much time does an occupational therapist in this facility have to spend, on average, each day doing paperwork, attending meetings, and supervising staff members and students?
5. How many clients does each occupational therapist treat each day?
6. What kind of physical resources are available for occupational therapists in this facility (equipment, space, etc.)?
7. Does this client have a social support network (family members, friends) who can help provide care after discharge?
8. Will this client be going home to an accessible environment? If not, what barriers exist in the discharge environment, and what changes would you as an occupational therapist recommend in that environment?

Conditional Reasoning

Conditional reasoning is used to revise treatment moment to moment to meet the clients’ needs. This revision is done with an eye to the clients' current and possible future contexts.

Using no more than half of an 8.5-in. x 11-in. piece of paper, summarize this person's medical and social histories, occupational therapy treatments, occupational therapy problems and current status of these problems, and your recommendations for further treatment or other services (e.g., home health aides, homemakers). (This is meant to simulate a discharge summary—the type of documentation where practitioners most explicitly articulate their images of the client’s future.)
References


