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Clinical Reasoning in PTA Students: A Survey of PTA Program Directors

Abstract

Purpose: The purpose of this study was to investigate the perspectives of program directors of CAPTE accredited physical therapist assistant (PTA) educational programs on clinical reasoning (CR) in PTA students and the applicability of the Integrated Clinical Education Theory (ICET) to clinical reasoning in PTA students through exploratory research. **Methods:** Participants completed a survey that collected information about demographics and PTA program directors' perspectives on qualities of clinical reasoning and on the concepts of the ICET. Descriptive statistics and directed content analysis were used to analysis participants' responses to Likert scale questions and open-ended questions, respectively. **Results:** Three hundred and seventy PTA program directors were emailed a questionnaire and 97 participated. Participants indicated that clinical reasoning is an important skill for PTA students to develop and perceived that the ICET concepts are an important component in clinical reasoning development. Perceptions of clinical reasoning also aligned well with the definition of clinical reasoning associated with physical therapy students. **Conclusion:** Clinical reasoning is an important skill that should be developed in PTA students. The ICET framework can potentially serve as the foundation for the development of clinical reasoning in PTA students.

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INTRODUCTION

Clinical reasoning (CR) skills are utilized by health care practitioners during each patient interaction in order to make decisions about diagnosis, treatment, referrals, and communication. As students in health profession education programs prepare to be clinicians, CR is a critical skill that must be developed.^{1,2,3,4,5} Clinical reasoning has been described as “a complex problem-framing, problem-solving, and decision-making process necessary for effective health care practice.”⁶ Studies have investigated theories to support, methods to develop, and assessments to evaluate clinical reasoning skills in physical therapy, medicine, and nursing, but there has been no identified research on clinical reasoning skills in physical therapist assistant (PTA) students. This lack of research may be due to the fact that CR has been considered a skill required only by professionally educated and trained clinicians. Certified occupational therapy assistants (COTAs) function in a role similar to the PTA, except work under the direction of an occupational therapist (OT). Unlike the literature on CR in PTAs, one case report was identified that suggests COTAs engage in CR processes similar to OTs.^{7, 8, 9} This clinical reasoning that COTAs engage in has been suggested to involve pragmatic, procedural, interactive, conditional, and narrative reasoning.^{10, 11, 12, 13} An in-depth look at these types of reasoning is beyond the scope of this paper yet the implication is that despite the differences in training both OTs and COTAs need to utilize CR.

Although physical therapists (PTs) and PTAs in the United States both provide physical therapy services, there are significant differences between them beginning with the level of education. PTs are educated at the doctoral level, whereas PTAs are educated at the associate degree level. PTs evaluate individuals whose quality of life has been impaired by injury or pathology and based on the evaluation results, design a plan of care to promote independence, prevent loss of mobility, and promote wellness. PTAs work under the direction and supervision of the PT and follow the plan of care developed by the PT. In contrast to the abundant amount of research on CR in PT students and clinicians, the lack of research regarding PTA CR suggests that PTAs do not utilize CR during patient interactions. However, the Commission on the Accreditation of Physical Therapy Education (CAPTE) expectations for PTA students may suggest otherwise. CAPTE standards require entry-level PTAs to provide safe interventions that follow the PTs plan of care by monitoring and adjusting interventions within the plan of care as well as determining when an intervention should not be performed based on the situation.¹⁴ This may be extrapolated to equate to CR when considered in light of the following definition of CR supported in PT literature: “a nonlinear, recursive cognitive process in which the clinician synthesizes information collaboratively with the patient, caregivers, and the healthcare team in the context of the task and the setting. The clinician reflectively integrates information with previous knowledge and best available evidence in order to take deliberate action.”¹⁵

Despite the suggested definition of CR, there still are inconsistencies in the frameworks and processes that the PT education programs use to teach and assess CR as found in the literature. These variations can further increase the difficulty connecting CR to PTAs. Authors have suggested that the PT community of educators should agree upon core elements, skills, and teaching strategies to serve as the foundation for research to help establish evidence based practices to teach and assess CR.¹⁵ A recent concept analysis on clinical reasoning in physical therapy concluded that cognitive, psychomotor, and affective skills are the foundation for CR and supported the need for the profession to agree upon a unified understanding for the benefit of teaching, assessment, and research.¹¹ Furthermore, in a 2016 perspective on educational research in PT, the importance of research that is grounded in theoretical concepts that expands beyond the PT boundaries, influences curricular design and pedagogical choices, and that “strengthens the relationship among communities of practice – the classroom, laboratory, & clinic-where teaching and learning occur in the context of practice”¹² was emphasized. Possibly, the PT community needs to agree upon accepted terminology and methods to teach PT students before the concept can be applied to PTA students.

The Integrated Clinical Education Theory (ICET), a theoretical framework, was proposed by Jessee to serve as a guide for developing nursing program curricula to promote effective clinical reasoning skills.⁷ The ICET (Figure 1- reprinted with permission) takes into consideration the concepts of metacognition, reflection, context, psychomotor and affective skills, which seem to align with the concepts suggested for CR in PT students.¹¹ It was developed with the intent to establish a clinical education curriculum that included a 10-week fundamental nursing course at Vanderbilt University School of Nursing with integrated didactic elements and small group discussions, laboratory sessions, and reflective practice, with clinical site and conference experiences that intentionally promotes the development of clinical reasoning skill in nursing students.⁷ This theory assimilates concepts from several learning theories, which include situated learning theory (SLT), expert practice (EP), deliberate practice (DP), and the Tanner clinical judgement model (TCJM)¹⁶. The ICET theory is based on three tenets: centrality of context, multiple practice opportunities, and discourse with meaningful feedback. The tenet of centrality of context is derived from SLT and includes the context of the environment and personnel. The tenet of multiple practice opportunities is based on the theories of EP and DP, which emphasize the importance of repetitive opportunities for clinical experiences that develop cognitive, affective, and psychomotor skills. Finally, the discourse with meaningful feedback tenet has integrated concepts from

SLT and the TCJM model and emphasizes discourse about noticing, interpreting, responding, and reflecting on a situation with constructive feedback, which is labeled as “clinical coaching.”⁷ Figure 1 (reprinted with permission⁷) provides an illustration of the theory at work. Practice opportunities must include clinical coaching, interaction with the team, and reflection with discourse and meaningful feedback, but must be considerate of the context of the experience.

Furthermore, the ICET seems to align well with the definition proposed and supported in the PT literature and may provide a practical framework that educators can use to facilitate the development of CR skills in PTA students. The purpose of this study was to investigate PTA Program Director perspectives on clinical reasoning in PTA students and the applicability of Jessee’s Integrated Clinical Education Theory to clinical reasoning in PTA students.

Place Figure 1 here.

Figure 1. Illustration of the interplay of the six concepts of the ICET⁷ during clinical education experiences. The sociocultural context of practice surrounds the experiences that occur over time with multiple practice opportunities, during which there is a continuum of reflection, discourse with meaningful feedback with clinical coaching, and interactions with team members. Reprinted with permission.

METHODS

Design and Procedures

This exploratory study investigated PTA Program Directors perceptions of CR and the applicability of the ICET for PTA students.

Subjects

The sample for this study was a census of the population of PTA program directors whose contact information was retrieved from the Commission on Accreditation in Physical Therapy Education (CAPTE) website and the data from the 2017 Annual Accreditation Reports submitted by CAPTE accredited PTA programs. Emails were sent to 370 PTA program directors with the hyperlink for the Google Forms[®] Survey, *PTA Clinical Reasoning Questionnaire*. Institutional Review Board (IRB) approval was obtained from Wilkes University. The first question of the survey served as the informed consent. Participants who indicated consent proceeded to complete the questionnaire and participants who did not consent automatically submitted their survey without progressing to further questions.

Data Collection Instrument

The questionnaire was developed on Google Forms[®] by the researcher specifically to collect data for this research. The questions used for this study can be found in Table 1. The survey included three sections. Demographic information was collected from the first section. The second section of the questionnaire was related to clinical reasoning and included an open-ended question that asked for a description of CR and Likert scale questions that asked if CR was important to PTA students and if it was developed during didactic and clinical experiences. The third section was designed to determine if program directors considered the concepts proposed in the ICET to be applicable to the development of CR skills in PTA students. Section three included Likert scale questions to rank the importance of the ICET concepts in the development of CR skills and also included open-ended questions to allow participants to provide additional information about the process of CR development. The Likert scale utilized in this study was a 5-point scale using the following scoring: 1=*Strongly Disagree*; 2=*Disagree*; 3=*Neutral*; 4=*Agree*; 5=*Strongly Agree*.

Table 1. PTA Clinical Reasoning Questionnaire Questions used for Data Analysis

Type of Question	Survey Question
	<i>Section 1</i>
Drop Down	In what state is your program located?
Open-ended	How many clinical experiences do students in your PTA program participate?
Open-ended	How many total hours are included in your clinical experiences?
Open-ended	How many of those clinical hours are spent in integrated experiences?
Open-ended	How many of those clinical hours are spent in terminal experiences?
	<i>Section 2</i>
Open-ended	Provide 3-5 words or short phrases that you believe best describe clinical reasoning.
Likert Scale	PTA students need to develop clinical reasoning skills to work as entry-level PTA's.
Likert Scale	The didactic portion of your curriculum is intentionally designed to develop your students' clinical reasoning skills.
	<i>Section 3</i>
Likert Scale	It is important that the clinical settings provide an environment that is conducive to student learning. (Context of practice)
Likert Scale	It is important that clinical settings provide staff with the appropriate knowledge, assumptions, and expectations to create to a successful setting for student learning to occur. (Context of practice)
Likert Scale	It is important that students engage in practice over time with clinical situations to accumulate knowledge and engage in reasoning about those situations encountered. (Experience over time)
Likert Scale	It is important the clinical instructors engage students in discussion before, during, and after patient interactions to promote reflection on the actions and to promote reflection on future actions. (Continuum of reflection)
Likert Scale	It is important that there are opportunities for students to engage in multiple experiences with similar patient contexts to promote recognition of subtle distinctions of similar situations in order to modify care. (Multiple practice opportunities)
Likert Scale	It is important that there are opportunities for practice use of the verbal and non-verbal skills required as a PTA. (Discourse-purposeful engagement)
Likert Scale	It is important that clinical instructors provide one to one verbal questioning, teaching, and feedback with a student in the context of patient care situations so that students can identify salient aspects of PT practice. (Discourse- clinical coaching)
Likert Scale	It is important that the students are able to interact with team members through verbal discussion of clinical situations regarding background knowledge and past experiences that influence expectations and decisions, moral and ethical perspectives, evidence guiding practice, and reasoning processes that are used to determine the most appropriate actions. (Discourse- Interactions with team members)
Likert Scale	It is important that there is opportunity for timely verbal feedback to be provided during or just after the clinical situation that is specific about how to improve. (Meaningful feedback)
Open-Ended	Please provide any additional comments about how clinical education experiences can promote clinical reasoning.

Analysis

The Statistical Package for Social Sciences (IBM®SPSS® Version 25) was used to analyze the quantitative data collected. The mean number of clinical experiences and CE hours were calculated for each region using the data from Section 1 of the survey. Frequency distributions were used to analyze the responses to the Likert scale questions in Sections 2 and 3.

Content analysis was used to analyze the open-ended question responses in order to assess text for explicit or implicit terms that could be associated with the selected concepts and provide support for a theoretical framework or theory.^{17, 18} In this case, the associated categories were the concepts from the definition of CR in PT students provided by Christensen et. al⁹ and the concepts of the ICET.⁷ The identified components from the definition of CR included nonlinear recursive cognitive process; synthesis of information; collaboration of team; context of staff and setting; and decision making and deliberate action. The identified concepts of the ICET included centrality of context, multiple practice opportunities, and discourse with meaningful

feedback. Following the directed content analysis method described by Hsieh and Shannon,¹⁸ the responses were coded with these predetermined codes, and responses that did not associate were analyzed to determine the existence of additional codes.

RESULTS

Ninety-seven of the 370 PTA program directors who were sent surveys completed and submitted the questionnaire for a response rate of 26%. Respondents represented all regions of the United States - Northeast, Midwest, South, and West. The means and standard deviations for # of clinical experiences, total CE hours, integrated clinical hours, and terminal clinical hours can be found in Table 2. There were incongruencies noted between some participant's responses and either CAPTE requirements or the summation of total clinical education hours. As a result, data were excluded from the computation of clinical experiences and hours if the following situations occurred:

- a. The total number of hours reported was less than the 520-hour minimum required by CAPTE;
- b. The sum of the integrated CE hours reported plus the terminal CE hours did not equal the total CE hours; and/or
- c. The number of integrate hours or terminal hours of CE reported was 0.

After exclusion of the cases, the sample size for data describing CE experiences was 70. The majority of PTA programs included three clinical education experiences (with a range from 2 - 5) and an average of 638 total clinical hours (200 integrated clinical hours and 438 terminal clinical hours). See Table 2 for details.

Table 2. Description of CE Experiences Based on Region

Region		# of clinical experiences	Total CE hours	Integrated clinical hours	Terminal clinical hours
Region 1 Northeast N = 13	Mean (Std Dev)	3.00 (+0.41)	648.81 (+51.67)	170.69 (+130.64)	478.12 (+ 116.56)
	Minimum	2	540.0	60.0	240.0
	Maximum	4	720.0	480.0	560.0
Region 2 Midwest N = 28	Mean (Std Dev)	3.39 (+0.74)	635.62 (+52.78)	212.77 (+107.91)	422.86 (+135.02)
	Minimum	2	520.0	67.5	240.0
	Maximum	5	720.0	400.0	640.0
Region 3 South N = 22	Mean (Std Dev)	3.14 (+0.64)	626.27 (+64.18)	195.91 (+96.25)	430.36 (+103.09)
	Minimum	2	540.0	60.0	240.0
	Maximum	4	720.0	480.0	600.0
Region 4 West N = 7	Mean (Std Dev)	3.00 (0)	668.14 (+40.10)	213.14 (+111.13)	455.00 (+127.70)
	Minimum	3	592.0	90.0	240.0
	Maximum	3	720.0	370.0	585.0
Total N = 70	Mean (Std Dev)	3.20 (+0.63)	638.38 (+55.81)	199.69 (+108.02)	438.69 (+120.80)

Minimum	2	520.0	60.0	240.0
Maximum	5	720.0	480.0	640.0

Figure 2 illustrates the participants' perceptions of the importance of CR for PTA students and of the intentional inclusion of CR in didactic curriculum. One hundred percent of the participants either "agreed" or "strongly agreed" that PTA students need to develop CR skills., and 99% of the participants either "agreed" or "strongly agreed" that the didactic curriculum of their program were intentionally designed to develop CR skills.

Figure 2. Participant Response Frequencies to Section 2 Questions

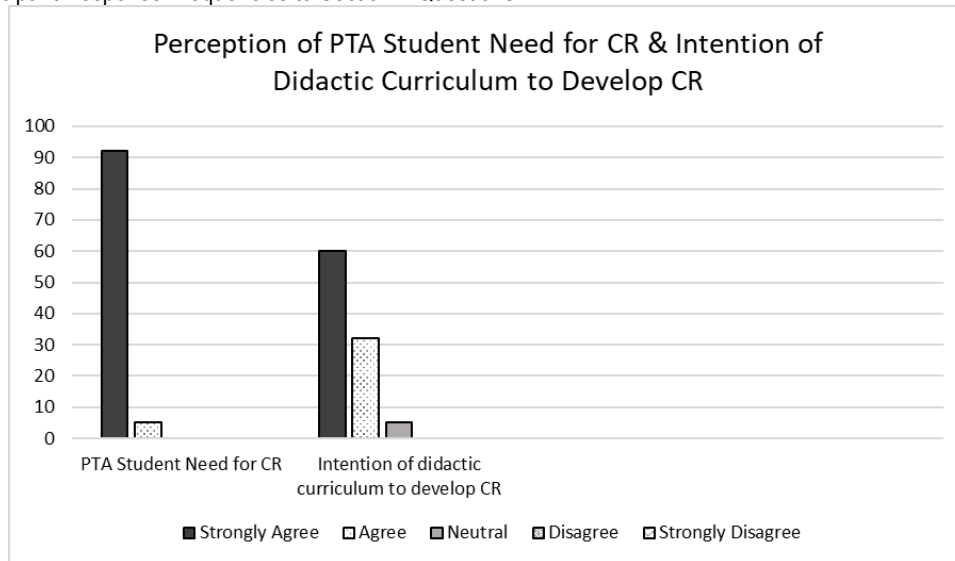


Figure 3 illustrates the participants' perception of the applicability of the concepts of ICET to CR in PTA students. Results indicated that between 95% and 100% of the participants considered the concepts of the ICET to be important ("Agree" or "Strongly Agree") to the development of CR in PTA students.

Figure 3. Participant Response Frequencies to Section 3 Questions

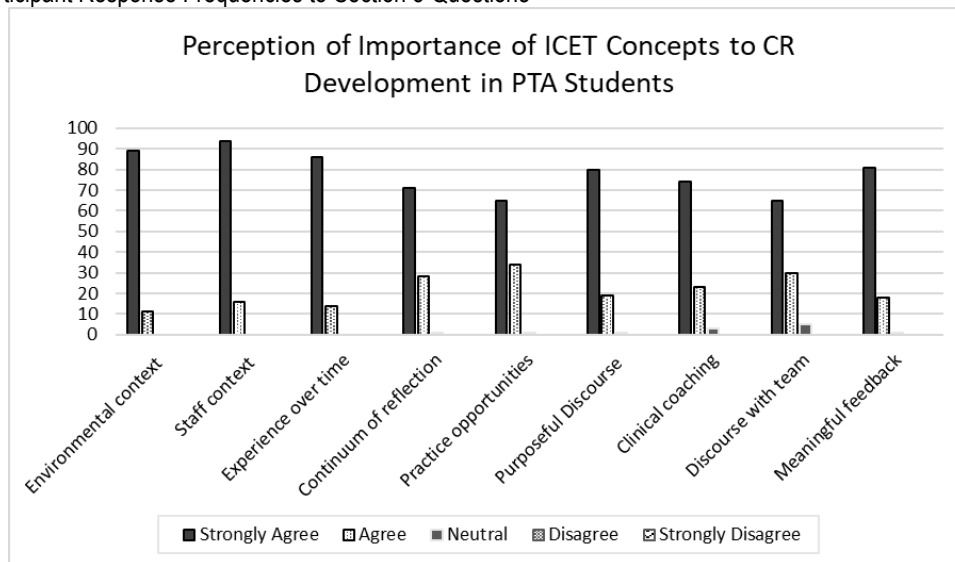


Table 3 and Table 4 present the results of the content analysis of the open-ended questions from sections 2 and 3. Table 3 specifically includes several examples of how the responses from the question “Provide 3-5 words that you believe best describe clinical reasoning” were coded to align with key concepts from the definition of CR as well as an overall frequency of responses in each category. The greatest number of responses aligned with “nonlinear recursive cognitive process” and “synthesis of information.” Many others were coded to “content of staff and setting” and decision making/deliberate action. No responses were coded to the concept of “collaboration with team.”

Table 3. Content Analysis of Open-Ended Responses to Terminology from Clinical Reasoning Definition

Sample of Responses to "Best Describe Clinical Reasoning"	Nonlinear Recursive Cognitive Process	Synthesis of Information	Collaboration with Team	Context of Staff & Setting	Decision Making/ Deliberate Action
The ability to draw upon presented evidence to make sound judgments.	*	*			*
knowledge, intuition, and or thought processes related to intervention provided to a specific patient based on that specific patient's situation	*	*		*	*
critical thinking and problem solving	*	*			
Critical thinking based upon findings	*	*			
integration, critical thinking, holistic view	*	*			
processing relevant information, making sound clinical judgments	*	*			*
Total Number of Response % (#)	91% (85)	86% (80)	0%	21% (20)	57% (53)

Table 4 presents several examples of how the responses from the open ended questions were coded to align with the three concepts from the ICET (centrality of context, multiple practice opportunities, and discourse with meaningful feedback) as well as an overall frequency of responses in each category. Over 80% of the responses coded with “centrality of context” and “discourse with meaningful feedback,” but only 8% aligned with “multiple practice opportunities.”

Table 4. Content Analysis of Open-Ended Responses to Concepts of the ICET

Sample of Responses to Questions #6, 20, 30	Centrality of Context	Multiple practice opportunities	Discourse with Meaningful Feedback
The limitations regarding environments and opportunity for timely feedback relates directly to the productivity standards in a clinic.	*		*
Devote time to students rather than being encumbered by productivity requirements	*		*
Ensuring that the PTA student has multiple opportunities to interact/communicate directly with the supervising PT.	*	*	*
Many clinical settings no longer value how clinical education of students helps their own clinical practice. The CI is the most valuable teacher and serves so much more than just an opportunity to experience. Clinical reasoning must be modeled and the context of learning is where all the puzzle pieces come together.	*	*	*
Ability to integrate information provided, e.g., PT evaluation, with prior general/clinical knowledge; and current patient status information.	*		*
Critical thinking with a component of problem solving in a clinical setting	*		
Experience varies depending on the facility and CI assigned. The instructor must intentionally promote this aspect of learning.	*	*	*
Total Number of Responses % (#)	83% (95)	8% (8)	89% (101)

DISCUSSION

The purpose of this study was to investigate PTA Program Director perspectives on CR in PTA students and the applicability of Jessee’s Integrated Clinical Education Theory in developing CR skills in PTA students. The results indicated that despite the lack of available evidence to support CR in PTAs, 100 % of the PTA program directors who participated not only believed that CR is an important skill for PTA students to develop but also perceived the concepts of the ICET to be an important component of that development. The responses to both Likert scale and open-ended questions aligned well with both the current research on CR in PT students and the majority of concepts of the ICET. The results also suggest that PTA Program directors intentionally design didactic curriculum to develop CR. These findings are promising since this is the first identified research on CR skills in PTA students.

There are unquestionable differences between PTs and PTAs, particularly related to the level of education and level of autonomy in clinical care. The plethora of research dedicated to CR in PT students and novice clinicians clearly indicates the importance of this skill, while the lack of research describing CR in PTA students and novice clinicians should not imply irrelevance of the skill. CAPTE standards for PTA education require competence in modification of therapeutic interventions based on a patient’s presentation and response, and one can assume that appropriate and safe modifications require reasoning in a clinical setting. Beyond this assumption, though, the results of this study further support clinical reasoning, as described by the proposed definition presented earlier, in PTA students. Ninety-one percent of the open-ended questions aligned with “nonlinear recursive thinking,” and 86%, 21%, and 57,% respectively, aligned with “synthesis of information,” “context of staff and setting,” and “decision making and deliberate action,” which are all components of a proposed definition of CR.¹⁵ However, there were no responses that could be associated with “collaboration with the team.” Considering the current emphasis on interprofessional

education in health care, the lack of association of PTA CR with collaboration may seem alarming. However, this may be a component of CR that is considered specific to PTs. Since PTAs work under the direction and supervision of the PT and are focused on the implementation of the plan of care developed by the PT, the influence of other team members may be perceived as inconsequential to the development of CR skills in these students. Future research aimed to investigate the perspectives of other stakeholders, such as students, clinical instructors, directors of clinical education, faculty, and the role of the interprofessional healthcare team in clinical reasoning for PTA students, and novice clinicians, may help to fill this gap.

Further support for the value of CR skills in PTA students is evident when the results of this study are compared to the results of other research including a concept analysis of clinical reasoning by Huhn, Gilliland, Wainwright, and Christensen.¹⁹ Salient themes related to attributes, antecedents, and consequences of CR identified in that study included context, clinical environment and personal factors, intuitive and analytical knowledge, reflection, and interaction with patient/family and health care team. The first four of which were all identified as valuable to CR development in PTA students in the current study. In addition, these salient themes seem to relate to the three concepts that serve as the basis for the ICET theory, which have also been identified as important components of CR in professions other than nursing.¹¹ The results of this study indicate that more than 89% of the responses aligned with “discourse with meaningful feedback,” and even though significantly less aligned with “centrality of context” and “multiple practice opportunities,” many of the responses implied the importance of these. Numerous studies on clinical reasoning in physical therapy education can potentially support the integration of the ICET concepts. Mai, et al²⁰ found that early clinical experience in a variety of settings improves the professional behaviors, as well as the cognitive, affective, and psychomotor skills of physical therapy students. Weddle and Sellheim found that early clinical experience helped DPT students to think like physical therapists; and that students, faculty, and clinical instructors considered appropriate, timely feedback necessary for effective clinical education experiences.²¹

The ICET concept of multiple practice opportunities is based on the necessity for repetitive opportunities to develop cognitive, affective and psychomotor skills required for effective and efficient CR.⁷ Similarly, Huhn et al. describe CR in physical therapy as an integration of cognitive, psychomotor, and affective skills.¹⁹ Although the frequency of explicit survey responses related to multiple practice opportunities was not as high as those related to the other two concepts of the ICET, it can be implied in that in order for discourse with meaningful feedback to occur there must be opportunities for practice. Responses such as “ensuring that the PTA student has multiple opportunities to interact/communicate” demonstrate support for repeated educational experiences in developing CR skills. Other responses such as “time to interact/communicate directly with the supervising PT,” support the concepts of discourse and meaningful feedback. While comments such as: “Many CI’s are struggling with meeting productivity demands and being able to have teachable moments and meaningful discussions with students,” clearly identify the important link between the context and time for discourse and feedback.

There are several limitations identified that limit the generalizability of the results of this study and that may serve as the basis for future research. First, the survey used to collect data was not validated and was used for the first time in this study. However, several steps were taken to improve the validity. Although no formal validation procedure was followed, a pilot study was conducted to evaluate the clarity of the survey and to seek input on question content and format; the researcher’s dissertation committee reviewed the questions; and the questions regarding the ICET concepts were reviewed by Jessee to ensure accuracy. Consideration of the feedback received from all sources was used to make changes to the wording and organization of the questions. In addition, the population surveyed included only program directors or PTA programs within the United States, and there are other stakeholders who may provide valuable insight into the topic of CR in PTA students, including directors of clinical education, other faculty members, clinical instructors, and students. Finally, the response rate of 26% was also relatively low, therefore, the results of this sample may not be representative of the entire population of PTA program directors, and there may be merit in investigating the differences between programs in different regions of the country as well.

CONCLUSION

This is the first identified literature on clinical reasoning in PTA students. The ICET was developed as a tool for curricular development for nursing students, but the results of this study suggest that using this theory as a framework for development of PTA curricula may help to ensure that CR skills are developed in academic and clinical settings. Despite the limitations, valuable information has come from this data analysis and results align with the current literature available on CR in PT. Future research on CR in PTA students and the applicability of the ICET to PTs and other healthcare professionals is recommended.

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